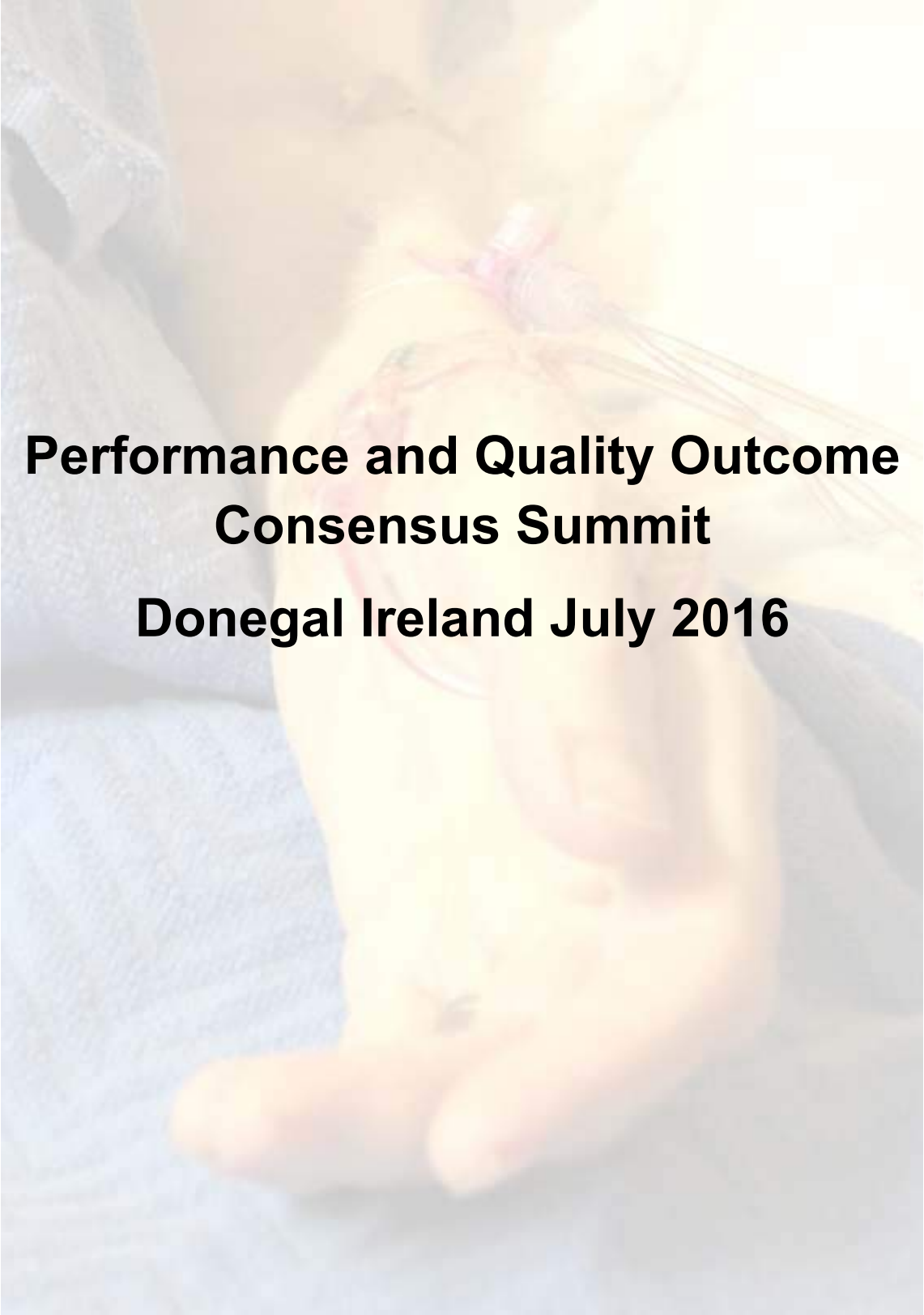
Resources for Optimal Care of Emergency Surgery



Performance and Quality Outcome Consensus Summit

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HSE and Saolta

This project had been led by DCRA and World Society of Emergency Surgery with support also from World Society of the Abdominal Compartment

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Introduction

Emergency Surgery has been, over the centuries, the foundation stone of Surgery. Patients with emergency surgical conditions need prompt attention, early diagnosis and excellence in treatment to ensure good outcomes. To achieve these goals, so important in life threatening Emergency Surgery, a system with adequate planning, resourcing and monitoring has to be in place.

Emergency Surgery, once the backbone of Surgery, has been somewhat side-lined by new innovative areas in surgery, including subspecialties, even super-sub specialization. It is really only relatively recently that health authorities and patients themselves recognise that this potential void and relative lack of standards in Emergency Surgery care needs to be improved. This is what the Donegal Summit is all about. A stating point in a new era is recognising the importance of the Emergency surgery conditions, their impact on patients' families and the communities. In particular there is a need for an organised approach.

Acute care surgery morphing into Emergency Surgery and linked strongly to Trauma Surgery is evolving. For 20 years Trauma Surgery organisation and outcome evaluation has led the way, with help from esteemed Societies and Colleges. The marked improvement in organisation and delivery in trauma care occurred in many countries. Patients and their families benefitting by better outcomes. The American College of Surgeons Committee on Trauma took a giant step forward mapping a path for resources required for optimal care of the injured patient. Their position statements, analysis of care and outcomes are a pivotal moment in surgical care transformation. All about a system organising the once disorganised, taking pride in accrediting and verifying service excellence. All achieved by clinicians working together.

Well defined, standards and guidelines in Emergency Surgery do not exist, despite some significant recent publications and improved implementation of training. There is now a fundamental requirement for National System for Acute Care with designation of receiving hospitals.

Emergency surgery systems need documented policies and procedures with expected outcome, both internally and externally validated and reported. Nationally agreed validation and accreditation of services should occur.

The Donegal Summit is unique in that Clinicians across many disciplines have started a process for setting arbitrary, but clinically relevant, resource and performance expectations in the delivery of Emergency and Acute Care Surgery. It follows on from the Dublin World Society of Emergency Surgery Summer meeting, with significant input from the Society of the Abdominal Compartment and support of the Royal College of Surgeons of Ireland, the Health Service Executive of Ireland and the Donegal Clinical Research Academy.

This unique meeting will act as a documented catalyst to advance Emergency Surgery Care globally.

Michael Sugrue Ron Maier

Resources and Designation of Emergency Surgery

Position Paper on Resources and Designation on Emergency Surgery Service

L Hsee, G Velmahos, P Crowley, K Mealy

Introduction

Timely access to Emergency Surgery presents a major health challenge worldwide. Patients requiring emergent and urgent surgical care are often critical. Some cases are life threatening, therefore prompt attention is required. Due to the wide spectrum of surgical conditions, timely input from clinicians with the right expertise, a multi-disciplinary approach and a streamlined acute pathway are critical to ensure optimal outcomes for patients.

Historically, it is not uncommon to manage emergency surgical patients interspersed in the daily elective activities within a given hospital system[1]. The lack of timely access to emergency surgical care is a growing problem. The reasons for this are often multi-factorial and may include, shortage of emergency surgeons, inadequate access to operating room and lack of a dedicated team and clinical pathway.[2]

Over the past decade, the importance of a comprehensive system in managing emergency surgical care is better recognized across the health sector and government organisations. Surgical colleges, hospital institutions, training boards and health ministries have published multiple consensus papers and statements on this topic.

The aim of this paper is to outline the minimum requirement of resources and designation on Emergency Surgery Services. This aim is also to identify important key performance indicators to facilitate the validation of emergency surgical care in order to provide a safe delivery of surgical care for acute patients.

Methods

A review of published articles and consensus statements relating to the establishment and design of emergency, acute care surgery and emergency general services was performed. Emergency surgery position statements from the surgical colleges, surgical institutions and key government organisations were assessed. Key elements of the emergency resource allocation and designation were identified. Five key performance indicators were developed according to the standardisation of this position paper.

Results

The emerging organisation of an emergency surgery service as a distinct entity is advocated and supported by surgical colleges and health organisations. The overarching aim is to improve and streamline overall acute patient care and maximise patient outcomes.

The development and configuration of an emergency surgical service should not be implemented in isolation[3]. While there is no set format or structure of an acute surgical delivery, the following is an outline of a framework, which summarises the principles of the resources and designation of emergency surgery:

Identify the scope of emergency surgical requirements: There is evidence that the quality of emergency patient care is varied and sub-optimal worldwide.[4] Contributing factors include lack of infrastructure, resources, senior clinical input, leadership and management. The emergency surgical workload is often high and under-appreciated. In order to provide adequate resources for an emergency surgical service, it is important to understand the scope of service requirement such as patient volume, case mix and level of clinical support. Surgical demand and access need to be measured routinely[5]. This can be achieved through training, research and planning of health services[6]. The workload of emergency surgery can then be predicted and measured.

Leadership: Clinical leadership in emergency surgery is paramount and needs to be identified early on. The appointment should be a well-respected surgeon who has a clear understanding of the acute surgical process and a commitment to quality surgical care. Clinical governance is achieved through the support and partnership of surgical colleagues, senior hospital management and often the institutional chief executive[7]. An appointed steering group may be beneficial to advocate for the resources of an emergency surgical service.

Patient care: There should be a balance between elective and emergency surgical streams. Patient centred care often requires a separation of emergency surgical patient care from elective settings[8]. Emergency surgical resources need to be protected and ring-fenced to that effect. A clear acute surgical pathway from admission to discharge must be recognized and developed.[9] Timely access to investigations, diagnostic and pathology services contribute to the efficiency of an emergency service[10]. Where possible a dedicated operating room and sessions must be made available to the emergency surgical service. Emergency surgical care is led by consultant surgeons to provide timely and accurate decision-making and treatment.[7] There is a potential to decrease health care costs by reducing unnecessary investigations.[12] Emergency surgical cases, where clinically

appropriate, should be scheduled during standard hours. The aim is to reduce unnecessary surgery after hours and overnight.[6] There is evidence that prolonged hours increases the risk of serious errors that can lead to patient harm and death.[6] A multi-disciplinary approach to the overall care of the patient is vital. This would include nurse specialist and allied health providers.

Emergency Surgical Team and Supporting Staff: While there is no set team structure, emergency surgical team design depends on the cohort of patients, case mix and resources available. Appropriately trained and competent health care professionals are required to provide the service. The consultant surgeon should not have other commitments while managing the emergency surgical service.[6] It is ideal for surgical trainees to gain competency in the management of emergency surgical patients. It is also valuable to involve nursing colleagues. A multi-disciplinary radiology meeting dedicated to emergency surgical service will provide education and improve patient care.[1] Sufficient administrative support must be employed to facilitate the team.

Training: While the aim is to improve surgical patient care, there is an opportunity to provide training of emergency surgeons. This allows surgical fellows and senior residents to obtain concentrated expertise in the acute and emergency aspects of surgery. As emergency surgical service is a consultant led service; it facilitates the supervision of residents, interns and medical students. It is also an invaluable field for training in surgical nursing and emergency anaesthesiology. Accreditation is required in emergency surgical training. Many surgical colleges have already incorporated emergency surgical training into their curriculum.[16] Studies have shown certified emergency programs improve outcomes in patients undergoing emergency surgery.

Patient follow-up, benchmarking and quality initiatives: Follow up for patients post discharge from the emergency surgical service is an integral part of emergency surgical care. Monitoring includes factors such as histology, wound reviews and further patient assessments. Participation in departmental mortality and morbidity audits is essential. Data collection and interval reviews of key performance indicators are also valuable[11].Surgical services should benchmark common measures for service and patient care improvement.

Designation of emergency surgical services: An increasing number of tertiary care hospitals are utilising a dedicated emergency surgical service with sub-specialty support. In urban and rural settings, regionalisation of acute care has been supported. Its aim is not only to provide the best care of the patients in the specialty but also support for outlying community hospitals where complex surgical conditions can be transferred[13]. It is a safety net for the improvement of emergency surgical

patient care. While regionalisation and designation policies are complex with multiple competing issues, careful planning and evaluations are required.[14] A localized policy and regional escalation plan is necessary to facilitate communication and resource utilisation[15].

Conclusion

This position paper outlines the minimum standards and principles of framework required for resources and designation of emergency surgical services. The provision of emergency surgical care is constantly evolving. Existing policies and resources require constant evaluation to ensure the optimal care of the emergency surgical patient.

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Topic Title: Resources and Designation of Emergency Surgical Services

Resources and Designation of Emergency Surgical Services KPI 1

Title: Emergency Service Workload and Demand

Description	Data to estimate patient volume, case mix, level of clinical support required
Rationale	Data to estimate patient volume, case mix, level of clinical support required
Target	Prior to the initiation of an emergency service and at regular intervals
KPI collection frequency	Annually
KPI calculation	Number of emergency patients admission-discharge. Operative vs non-operative volumes. Case categorisation. Time of operations. LOS.
Reporting aggregation	
Data sources	Administrative data/hospital patient data

Resources and Designation of Emergency Surgical Services KPI 2

Title: Emergency Services are Consultant-led

Description	Emergency Services should be attended by qualified surgeons
Rationale	Increase patient care efficiency, early decision making, decrease unnecessary use of resources, improve patient care pathway
Target	24/7 Consultant Surgeon cover
KPI collection frequency	Annually
KPI calculation	Published on call consultants roster to cover the service Yes/no
Reporting aggregation	
Data sources	Surgical Department, hospital on call roster

Resources and Designation of Emergency Surgical Services KPI 3

Title: Effectively separating of emergency and elective streams

Description	Effectively separating of emergency and elective streams
Rationale	Dedicated emergency/acute operating room, separate surgical team management, minimal cancellation to elective surgery, timely management of emergency surgical patients
Target	Dedicated emergency surgical teams, dedicated operating sessions, clear acute surgical pathway
KPI collection frequency	6 monthly
KPI calculation	ON call surgeon does not hold elective work load during on call commiiment
Reporting aggregation	
Data sources	Surgical Department/Hospital administration

Resources and Designation of Emergency Surgical Services KPI 4

Title: Development of emergency surgical measures and benchmarking

Description	Set KPIs for emergency surgical service provision
Rationale	Patient care improvement, quality assurance and pathways, cost benefit/efficient use of resources, research, transparency reporting
Target	Time to OR, LOS and complications for common conditions such as appendicectomy, cholecystectomy and emergency laparotomy outcomes
KPI collection frequency	Annually
KPI calculation	Look at trend and achievement of targets
Reporting aggregation	
Data sources	Surgical Department/Hospital administration. Each department should have an annual report as part of Emergecny Surgery registry

Resources and Designation of Emergency Surgical Services KPI 5

Title: Local regional designation policies on Emergency Surgical Services

Description	Clear documentation on the resources available
Rationale	Provide best patient care, provide smaller hospitals with adequate clinical support, provide guidelines for standardisation patient management
Target	Written policy; Governance structure
KPI collection frequency	Annually
KPI calculation	
Reporting aggregation	
Data sources	Surgical Department/Hospital administration

Acute Care Unit Structure

L Ansaloni, R Maier, E Moore

Acute Care Surgery Units structure (proposal draft)

Acute care surgery (ACS) refers to the surgical management of serious, emergency conditions, requiring some form of immediate surgical care or intervention. Essentially ACS should offer the surgeon the opportunity to perform a working diagnosis, to intervene appropriately and thereby to promptly have an impact on the outcome of the critically ill patient [1]. The last decade has seen a major advance in the field of ACS, and to some extent has become the standard of care.

Actually the development of ACS unit in order to effectively manage patients presenting with acute surgical emergencies presents an enormous challenge not only to the medical profession, but even to healthcare providers and medical institutions, as well as placing an immense strain on the National Healthcare Systems. It should always even pointed out that at the center of these issues is the patient [1, 2, 3, 4]. In many hospitals of different countries, surgical emergencies are still managed by an “on-call” team, which is also responsible for elective surgery. Actually in this model, surgical emergencies are only attended to after the elective commitments had been completed. This is obviously far from ideal, thus opening a new pathway for ACS to develop and improve.

Historically there have been several factors which have contributed to the development of ACS as a separate entity:

(1) Firstly there has over the last few years been a trend for general surgeons to want to subspecialize i.e. general surgeons have wanted to focus their interest on a particular area in general surgery, such as breast surgery, vascular surgery or gastrointestinal surgery. Most of this work is in the form of elective surgery. As a result surgeons have become de-skilled in managing patients with acute surgical emergencies.

(2) Secondly, there was an urgent need to improve the quality of care given to patients with surgical emergencies. Traditionally surgical emergencies were managed by a team of doctors who were on-call for that day or week for emergencies, but who also had elective commitments in the form of an elective theatre list or an outpatient clinic. As a result the emergencies were only attended to after the elective commitments had been attended to. This invariably resulted in considerable delays in the management of the emergencies and it almost invariably occurred after normal working hours. The overall impact was that these patients with surgical emergencies often received suboptimal care.

(3) Thirdly, there is a trend for older surgeons to not want to do emergency calls and to come out to operate in the middle of the night. As a result it has become increasingly difficult to maintain an adequate roster of surgeons, on-call for emergencies.

(4) Finally it has to be considered the impact of the increasing conservative approach to many of the trauma patients. For example, many patients with blunt and penetrating abdominal trauma can now be managed non-operatively. As a result the amount of surgery being performed by trauma surgeons has decreased considerably and trauma surgeons are becoming de-skilled. There is therefore a need to increase the surgical load for trauma surgeons

For these reasons Acute Care Surgery Units (ACSU) should be developed in order to provide acute surgical management in a timely manner i.e. management which includes both diagnostic and therapeutic services. Cases include emergency abdominal surgery, such as removal of the gallbladder or appendix, management of acute bowel obstruction, and reduction of, and surgical intervention for, acute hernias. It often even incorporates the intricate management of life threatening surgical infection, like major trauma patients

Several different ACS models for providing care for surgical emergencies have been described:

A) Combination of acute surgical care, trauma and critical care: in this case ACS has been described as a multidisciplinary approach involving Emergency and Trauma Surgery, and Critical Care Medicine [5, 6, 7]. This model would be ideally applicable in a society where the trauma load is small or to hospitals which does not have a stand-alone Trauma Unit.

B) Dedicated, stand-alone ACS (non-trauma): this model would apply to institutions that have dedicated stand-alone Trauma Unit, carrying a substantive trauma load.

C) Team of dedicated “on-call” doctors (one week at a time), where the team would be free of their normal elective commitments for that week: this model would be applicable to most hospitals.

When considering a global view, the development of an ACS model has been driven mostly by research and literature from the USA and some European countries. The USA and Europe have diverse opinions and ideas on the various issues related to ACS, with the two parts always analyzing developments on either side of the Atlantic. One of the clear differences which comes to light orbits around the terms of employment and compensation of doctors, which determines the extent to which emergency call is mandatory or voluntary. The USA relies on the basic emergency service that is provided by residents and interns, whereas being covered by fully trained consultant. This permits the latter to concentrate more on elective surgery, but also offers the residents more chances to practice skills and techniques. The European system differs in that doctors are generally employed directly by hospitals and should take calls on the basis of a duty roster, thus covering all fields of emergency and elective surgery [8, 9, 10].

In most hospitals all over the USA, surgical emergencies include trauma and acute surgical diseases, as well as incorporating critical care as part of their functional unit. This ACS paradigm is estimated to relieve some of the stress on the surgical staff, aiming at maintaining or improving patient care and increasing the attractiveness of trauma and emergency surgery to surgical trainees [11]. The mixture of emergency and general surgical care by trauma units has allowed the trauma surgeon to maintain operative skills in an era of increased non-operative management [12].

The various models of ACS are well recognized in the literature. At the one end of the range is Denver Health Medical Center in Denver, Colorado, where most of the work of the acute, trauma and critical care are combined and run as a single service [13]. At the other end are institutions which have separate services for trauma, emergency surgery and critical care. Between these two extremes are institutions which base their service on the number of surgeons existing and the variety of surgical disease presenting at the institution. These institutions may have a two- or more-team approach to the treatment of their patient populations, often combining their trauma and emergency surgery services, at the same time maintaining a separate critical care service [14, 15].

In response to the need for better access to urgent surgical care and other pressing issues, such as the workforce shortage, one of the potential solutions could be the creation of ACS as a subspecialty, even in the model of organization [16]. Even from the educational point of view, as treatment paradigms shift to ACS and

emergency surgical disease management evolves, there will be a need for properly trained surgeons, who are willing to pursue the optimal urgent care (surgical or conservative) for these conditions. In addition to this, as the amount of knowledge available in medical science has grown exponentially, it has become increasingly difficult to be an expert in every aspect of general surgery after only four or five years of training. This has contributed to the current fragmentation manifesting as a plethora of subspecialty disciplines [6, 17, 18]. ACSU should even contribute to create a surgeon able to afford the efficacious care for all surgical emergency conditions.

The initial driving force behind the specialty in trauma care was the special need for the injured patient. Thus the special needs of the severely ill surgical patient, requiring emergency intervention, should be used as the driving force in recognizing the need for the ACSU. Regardless of how ACS is administered, the aim is that the trauma or non–trauma related acute surgical patient receives optimal care from the moment that presents, until discharge [4, 11].

In consequence of these premises the "ideal" structure of an ACSU can be described as a modular structure. The modular units dedicated with an h24 provision which essentially make up an ACSU are the following:

1) a modular units for emergency acceptance of patients with emergency resuscitation resources (ie “shock room”)

2) a modular unit for emergency diagnostics (ultrasounds, traditional radiology, CT scan…)

3) theatre and other interventional resources (eg interventional angiography)

4) ICU (for intensive management during observation, conservative treatment and postoperative period)

5) non-intensive surgical modular unit (for non-intensive management during observation, conservative treatment and postoperative period)

Depending on locally available resources, these modular units can be variously reassembled, but essentially they must at least have a shared protocol of coordination (Figure 1).

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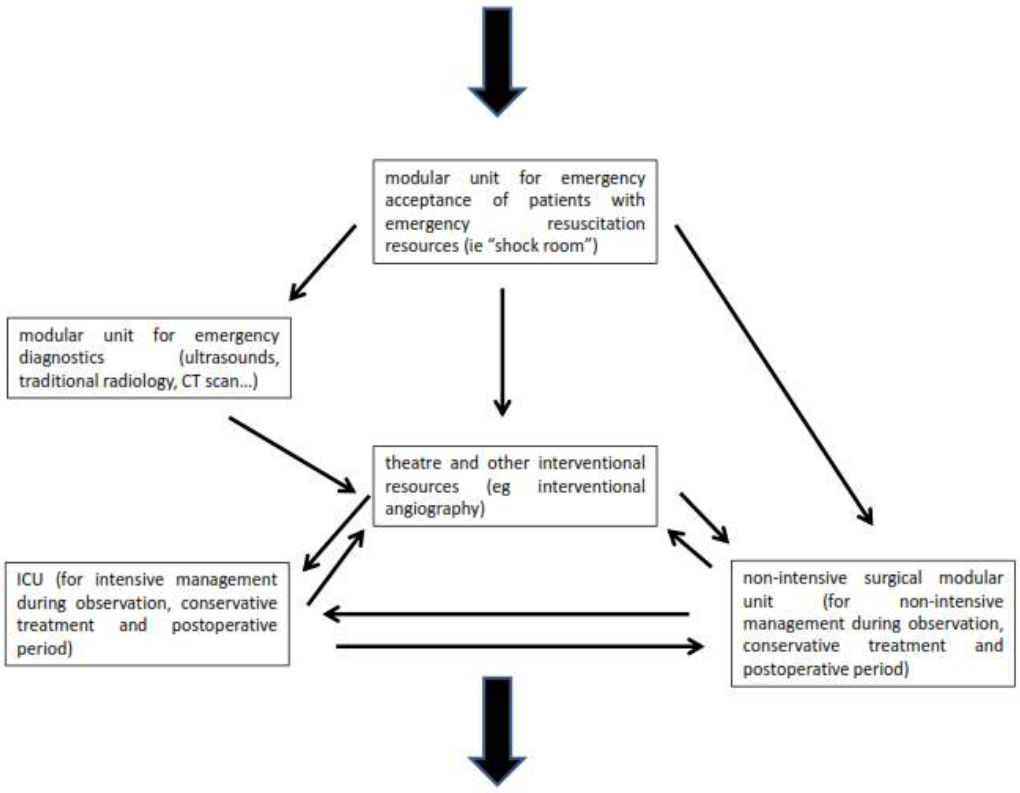
modular unit for emergency acceptance of patients with emergency resuscitation resources (ie "shock room")
modular unit for emergency diagnostics (ultrasounds, traditional radiology, CT scan...)
theatre and other interventional resources (eg interventional angiography)
ICU (for intensive management during observation, conservative treatment and postoperative period)
non-intensive surgical modular unit (for non-intensive management during observation, conservative treatment and postoperative period)

Figure 1

Reception and Triage

Acute Care and Emergency Surgery Position Statement: Triage

T Hodgetts, F Coccolini, K Soreide, P Balfe, R Maier

Aim

To outline key standards and develop measurement KPIs for triage in acute and emergency surgery.

Definition

The term triage is applied to assigning priorities for treatment. It is an indication that there are inadequate resources or availability to treat all patients at the same time or expeditiously . In the context of acute care and emergency surgery, 'triage' is necessary when:

a. A decision is needed on the priority to receive emergency surgery, implying the capacity or access of operating teams and/or operating theatres is insufficient
b. A decision is needed on how and when to assign a critical resource, such as blood to support emergency surgery or interventional radiology to control sepsis, when the demand or urgency outstrips the logistics or availability of the resource.

Validity of triage systems

Triage systems to apply priorities for treatment have their foundation in military medicine. Their modern application has been to support decision making in incidents with multiple injured casualties, in both civilian and conflict environments. Physiological systems (that rely on vital signs measurement) are favoured over anatomical systems (that rely on variable clinical experience) for inter-observer consistency (ALSG, 2002). However, the supporting evidence is limited that triage systems reliably identify those in need of life-saving interventions. The most widely recognised mass casualty triage algorithms in use are historically poorly evidence-based, and the combination of unpredictability with resource challenge during mass casualty events means there are substantial constraints to validating triage systems in this setting (Twomey et al, 2006; Jenkins et al, 2008). Retrospective analysis of performance of the *Triage Sieve* for combat trauma (Horne S et al, 2013) has led to recent modification for military use with improved sensitivity to detect the need for life-saving interventions (Vassallo et al, 2014).

Paediatric patients (<16 years old) are more likely than adults to be over-triaged for transport to a Major Trauma Centre and be discharged from the Emergency Department (Knofsky et al, 2013). This places unnecessary strain on predictably finite paediatric surgical resources when assessing the patients at hospital. This has been previously intuitively recognised and has led to the modification of adult physiological systems, taking into account how the normal range of vital signs varies

with age in infants and children (Hodgetts et al, 1998). In an analysis of performance of the *Paediatric Triage Tape* (Wallis and Carley, 2006a) the specificity (the ability to identify non-priority 1 patients) was demonstrated to be excellent, and the over-triage and under-triage rates were within the range deemed unavoidable by the American College of Surgeons; however, the sensitivity (to identify immediate treatment priority children with major trauma) was poor. In a comparison of four systems for paediatric triage following injury, the *Careflight Score* and the *Paediatric Triage Tape* had similar performance; while in contrast, the *JumpSTART* and *START* ('Simple Triage and Rapid Treatment') systems had very low sensitivities, failing to identify children with serious injury (Wallis and Carley, 2006b). Criteria have been developed by international Delphi consensus (Wallis et al 2006c) on which triage algorithms can be assessed, which associate the requirement for specific clinical interventions with triage priority.

In a US model of trauma care, helicopter transport (vs ground transport) is an independent predictor of survival for patients with penetrating injury, GCS<14, RR<10 or >29 breaths per minute, and age>55 years (n=258,387, p<0.01) (Brown, 2012). These factors can therefore realistically be applied as triage criteria for use of limited helicopter transport direct to a Major Trauma Centre.

Surgical triage in trauma

Irrespective of the limitations of existing triage systems, timely surgery (KPI3) is an essential component to limit mortality and morbidity for both major trauma and non-traumatic emergencies. Within an organised trauma system, direct transport to a Level I trauma centre is associated with mortality and morbidity benefits (Sampalis et al, 1997). In such a system, the advanced notification of hospital arrival of the seriously injured is an expectation (KPI1), which allows preparation for immediate access to surgery if anticipated (KPI4). It is a requirement for a trauma system, and applies logically more widely for all acute surgery, to determine a hospital's designation to receive surgical emergencies based on standardized criteria (KPI2): this ensures that the right patient is transported to the right hospital first time.

Military experience from contemporary campaigns has driven a doctrine to transfer the most critically injured blast and gunshot casualties directly from the heli-pad to the operating theatre (KPI4), drawing the Emergency Department team into the OR to assist in the initial resuscitation: this aims to substantially reduce the time to operative intervention for those that demand internal torso haemorrhage control (Hetteriatchy et al 2010; Tai et al 2011).

Transferring directly to the OR (KPI4) is not a new concept (Law, 1982; Steele 1997). While it has been shown to reduce time to 'knife to skin' (Steele, 1997), the overall mortality has been high (57%) despite rapid helicopter transport and early surgical intervention (Law, 1982). This contrasts sharply with recent military experience where cited outcomes have been extraordinary (Penn-Barwell et al, 2013), which is attributable in part to the effective selection through triage of the most seriously injured, but combined with timely multi-disciplinary surgery and sophisticated, synchronous, tailored management of coagulopathy through massive transfusion. Previous assumptions of outcome have been based on patients in a civilian setting with predominantly blunt and multisystem injury.

Complex and challenging ethical decisions are associated with the priorities for emergency surgery in a military operational setting (Mahoney et al, 2011), when resources that are usually taken for granted are finite, critically reduced by a casualty surge, or exhausted in a mass casualty event. In this situation, absolute clinical need is not the only priority. The limitation of resources will influence the priority decisions to admit to a field hospital (that is, the discretionary capacity to treat non-military patients), the scope of resuscitation (specifically the volume of blood products administered, and the duration of post-operative ventilation), and the nature of surgical procedures.

Surgical triage for non-traumatic emergencies

The requirement for direct Operating Room admission or accessibility in <30 minutes (KPI4) is not confined to trauma surgery. Patients with diagnosed or highly suspected Acute Type A Aortic Dissection (ATAAD) have benefitted from direct transfer to the cardiac OR: transesophageal echocardiography is performed under anaesthesia, and the patient then undergoes surgery if the diagnosis is confirmed. This strategy was deemed to be justified in 93% (228/245) patients studied (Chavanon et al, 2011).

Early warning of surgical sepsis

The early identification of sepsis in surgical patients (KPI5) and implementation of evidence-based therapies will jointly improve outcomes and decrease sepsis-related mortality (Levy et al, 2010). Reducing the time to diagnosis of severe sepsis is a critical component of reducing mortality from sepsis-related multiple organ dysfunction (Jones et al, 2010).

Sepsis screening tools, effectively a triage tool to indicate a priority for early intervention, have been developed to monitor intensive care patients. Their implementation has been associated with decreased sepsis-related mortality.

International guidelines for surviving sepsis have claimed that early goal-directed therapy (EGDT) improves survival for emergency department patients presenting with septic shock (Rivers et al, 2001). These guidelines have recommended protocolised resuscitation for a patient with sepsis-induced shock, defined as tissue hypoperfusion (hypotension persisting after initial fluid challenge, or blood lactate concentration ≥4 mmol/L); the protocol should be initiated as soon as hypoperfusion is recognized and should not be delayed pending intensive care admission (Dellinger et al 2008 and 2012).

In a recent meta-analysis of 4 randomised controlled trials comparing EGDT with stand care for sepsis (Coccolini et al, 2016), EGDT had no significant effect on mortality; length of hospital stay; requirement for respiratory or renal support; and duration of respiratory or cardiovascular support.

International guidelines have not specifically stated the time for surgical involvement when a surgical cause is underpinning septic shock: this is empirically set at <1 hour for this position statement (KPI5).

Topic Title: Reception and Triage

Reception and Triage KPI 1

Title: Hospital Contact/Transfer Centre for ACS

Description	Presence and use of Contact/Transfer Centre by EMS, physicians, and community for ACS Patients requiring surgery
Rationale	Hospitals should provide means for contact/transfer of ill ACS patients to optimize resource mobilization and optimize care
Target	>90% of all ACS patients requiring operation
KPI collection frequency	Trended monthly
KPI reporting frequency	Reported biannually
KPI calculation	**Numerator**: Total number of patients admitted through Contact/Transfer Center undergoing operation **Denominator**: Total number of ACS patients requiring operation
Reporting aggregation	Regional or state/country wide, age, gender
Data sources	Administrative data, Operative Logs, Transfer Center Calls

Reception and Triage KPI 2

Title: Self-assessment and Designation

Description	Listing of hospital self-assessments and designations based on standardized protocols
Rationale	Triage ACS critically ill patients to correct hospitals
Target	<10% Critical ACS die in non-designated hospitals
KPI collection frequency	Monthly trending
KPI reporting frequency	Reported annually
KPI calculation	**Numerator:** All ACS patients that die in non-designated hospitals **Denominator:** All ACS patients that die
Reporting aggregation	Regional or state, age, geography, catchment area
Data sources	Administrative data, admit diagnose, including shock, sepsis, deaths

Reception and Triage KPI 3

Title: Timely surgical consultation

Description	Monitored list of conditions/physiology, including peritonitis, hypotension, acidosis, sepsis, mandating surgical consultation <4 hours
Rationale	ACS patients should be referred expeditiously to surgical consults to optimize outcomes
Target	<10% ACS patients not referred in <4 hours
KPI collection frequency	Trended monthly
KPI reporting frequency	Reported biannually
KPI calculation	**Numerator:** ACS-criteria admitted patients not referred in <4 hours **Denominator**: ACS admitted patients
Reporting aggregation	Regional or state/country-wide, age, ethnicity
Data sources	Administrative data for diagnosis-linked admissions, ED data sets for presentation times, consultation time (need to record timing of consults and consultant arrival)

Reception and Triage KPI 4

Title: Immediate Operating Room access for critical illness

Description	Direct Operating Room admission or accessibility in <30 minutes
Rationale	Immediate access available for critical surgical illness to optimize survival
Target	<10% deaths occur in less than 4 hours without an operation
KPI collection frequency	Trended monthly
KPI reporting frequency	Reported annually
KPI calculation	**Numerator**: All ACS deaths in less than 4 hours without operation or procedure **Denominator:** All ACS deaths in less than 4 hours
Reporting aggregation	State/country-wide, age, gender
Data sources	Administrative data: Diagnoses and deaths Operative data: patients operated on

Reception and Triage KPI 5

Title: Treatment of Surgical Sepsis

Description	Surgical involvement in surgical septic shock in<1 hour
Rationale	Patients in septic shock require optimal source control for survival
Target	>90% of of surgical septic shock seen by surgeon in less than one hour
KPI collection frequency	Trended monthly
KPI reporting frequency	Reported annually
KPI calculation	**Numerator**: All patients with surgical sepsis seen by surgeon in less than one hour **Denominator**: All ACS patients with surgical sepsis
Reporting aggregation	Regional/State-wide, age, gender
Data sources	Administrative for diagnosis codes for sepsis crossmatch to ED timing of admit until surgical consult arrival. Need timing of request and response.

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Data Systems, Registry and Evaluation

Position Paper on Data Management and Performance Improvement Processes

GC Velmahos, M Boermeester, A Peitzman, F Coccolini

Introduction

What is not measured cannot be improved! At the heart of every credible health care program lies a database, which allows analysis of data, critical evaluation of outcomes, comparison and benchmarking, and ultimately the creation of processes that lead to continuous improvement. The development of a database is not easy. It requires human and financial resources, expertise, and commitment. Hospitals are inundated with requests by regulatory agencies for numerous unfunded mandates. One more request for a hospital-funded database must be constructed sensibly and with a supportive plan that will ensure outcomes improvement and -ideally- financial rewards, i.e. if the patient care outcomes improve because of the use of a database the cost of care will become more favourable. It is upon the Emergency Surgery community as a whole and the individual ES teams to build the argument for the development of ES Registries. Ideally, these registries will be based on a common software platform in order to ensure standardization of data collection and reporting, thus leading to meaningful benchmarking and comparisons. Additionally, such registries will pull data automatically from existing hospital databases (i.e. laboratory, imaging, etc) in order to minimize hand-entry of data points and reduce the likelihood of errors. Implementation of a robust Performance Improvement Process (PIP), again, ideally in a uniform, standardized, commonly acceptable way, will allow appropriate quality control and betterment of health care delivery in ES.

Methods

Examination of literature related to databases as well as existing registries. Luckily, there is abundant and established experience with Trauma Registries, both at the institutional and the national level. In the U.S. every Trauma Center is required to have a Trauma Registry. Data from these registries are contributed to the National Trauma Data Bank (NTDB). Currently, a more robust national database (TQIP= Trauma Quality Improvement Project) is being added and considered mandatory for Trauma Center verification. Similar systems exist in many other countries. Although such a system has not yet been developed for ES, there are efforts on the way in the individual hospital as well as the American College of Surgeons level.

Results

The Massachusetts General Hospital developed an ES Registry in 2007, based on departmental funding and contributions by the hospital's software team. The ES Registry was built to parallel the long-standing Trauma Registry but also correct certain deficiencies, which were identified over the years. It allows an easier capture of data, since about two thirds of the data are pulled into the ES Registry electronically through other hospital databases. This minimizes the work of the registrars and decreases significantly the chance of error. The ES Registry collects more outcome data than the Trauma Registry and uses NSQIP definitions to collect and standardize complications. The ACS-COT and the AAST -among others- are planning to create ES Registries.

Conclusions

It is imperative to build and validate ES Registries. As Emergency Surgery becomes a defined specialty, most likely intimately connected with Trauma Surgery, it must follow the rigorous PIP that is typically being used in Trauma Centers. There is a wealth of experience and lessons learned from previous mistakes that can be lend to ES from Trauma in order to develop a unified ES Registry and a credible PIP in short order.

Topic Title: Data Management and Performance Improvement Processes

Data Management and Performance Improvement Processes KPI 1

Title: Presence of a Emergency Surgery Registry

Description	Centers with Emergency Surgery teams should have a dedicated ES Registry
Rationale	Dedicated registries allow accurate and efficient capture of data on clinical outcomes and process of care
Target	All patients, labeled as emergency surgery patients according to specific criteria
KPI collection frequency	Once (upon completion and institution of the database)
KPI calculation	Yes or No
Reporting aggregation	
Data sources	Automated data from other databases (demographics, laboratory, imaging, etc) supplemented of specific hand-input data

Data Management and Performance Improvement Processes KPI 2

Title: Quality Control of the Emergency Surgery Registry

Description	The accuracy of the ES Registry data should be validated periodically
Rationale	There are inherent errors in the automated and hand-entered portions of every registry
Target	2-5% of the Registry's population, randomly selected
KPI collection frequency	Once every year
KPI calculation	1. Complete fields over all fields 2. Correct fields over all complete fields
Reporting aggregation	
Data sources	From the ES Registry

Data Management and Performance Improvement Processes KPI 3

Title: Appropriate use of Emergency Surgery Registry

Description	Regular standardized and ad hoc reports should be generated from the ES Registry
Rationale	There will be no use of collecting the data, if it is not analyzed and appropriately benchmarked
Target	3-4 standardized reports (mandatory) and additional reports per request (voluntary)
KPI collection frequency	Once every year
KPI calculation	Measurement of the number of reports
Reporting aggregation	
Data sources	From the ES Registry

Data Management and Performance Improvement Processes KPI 4

Title: Presence of a Performance Improvement Process

Description	A well-delineated process for PI, including appropriate meetings, procedural steps to review outcomes, and measures necessary to improve them
Rationale	The PI process must be accurately organized in order to be effective and lead to real improvements
Target	1. Document (including organizational chart) that describes PI process 2. Evaluation of cases entering into the PI process to assess compliance with the process
KPI collection frequency	Every three year
KPI calculation	1. Yes or No 2. Number of cases with appropriate PI over total number of PI cases examined by the reviewer.
Reporting aggregation	
Data sources	ES Registry, medical records, PI documents

Data Management and Performance Improvement Processes KPI 5

Title: Presence of a Multi-disciplinary PI Process

Description	To evaluate cases that cross multiple disciplines, a specific multi-disciplinary process must be developed
Rationale	Whereas cases are adequately evaluated within a team, the evaluation of the process and outcome of care may not be as robust when multiple teams are involved and the care has to be evaluated across the entire spectrum
Target	Patients who required multiple teams involved for their care
KPI collection frequency	Every three years
KPI calculation	Cases evaluated in joint multi-disciplinary meetings and improvements in care that were instituted in response to such evaluations
Reporting aggregation	
Data sources	ES Registry, medical records, PI documents

Rural Emergency Care and Transfer

Position Paper on Rural Emergency Surgery and Transfer

I. Martínez Casas, M. Sugrue

Quality outcomes in Emergency Surgery require a dynamic efficient Emergency Surgery system, coupled with surgical teams trained and competent in Acute Care Surgery. Emergency Surgery in Rural areas is characterized by a lack of human and technological resources, and the possibility of transfer to urban full-equipped centers is highly dependent on the orography and government funds destinated, that differ in every European country. Standardisation of surgical management of specific adult conditions in rural areas is, although, needed to improve results.

Methods

A review of all published articles relating to Rural Emergency Surgery and Transfer and collation of information from Societies, Colleges and Government Organizations to elaborate a SWOT analysis (Fig.1) and create a summary of key standards.

This paper will deal with the strengths, weaknesses, threads and opportunities of Rural Emergency Surgery. Each of the key standards will have a KPI developed.

Strenths	**Weaknesses**
Proximity of care facility to population Shorter waiting time in ED	Limited access to healthcare technology Lack of diagnostic tools or subspeciality consultations Shortage of Emergency Surgeons
Opportunities	**Threads**
Increase patient and provider satisfaction with emergency care Real Damage Control Education	Low volume of patients to keep training Closing of Surgical Services Lack of enough transport resources

Results

In many European countries, rural population represent the oldest, poorest, sickest and most vulnerable people. Besides, not all rural areas are the same in terms of population density or proximity to urban centers. Beyond equity in access to Emergency Surgical Care the intrinsic needs of Rural Surgical Programs may include to maintain a high level of surgical competence in the community. The availability of surgical first responder, trained to handle a variety of scenarios that require immediate intervention such as trauma or complicated hernia, must be assured.

The practice of General Surgery differs in urban and rural settings. The scope of practice in rural practitioners tends to be wider, with rural surgeons performing a range of procedures that would ordinarily be taken on by other surgical specialties in the urban setting. Several key themes are associated with the practice of rural surgery like professional isolation, frequent call coverage, and lifestyle concerns. Rural surgeons are mainly man, on average older than their urban counterparts and professional isolation is a common and ongoing concern as many rural surgeons worry about maintaining infrequently used skills or learning new techniques. Communities with fewer than 15 000 residents usually rely on General Practitioner-surgeons to deliver Emergency Surgical care and some degree of elective surgical care. GP-surgeons offer low-risk surgical patients local access to a broadbase of low-risk surgical procedures.

There is no discussion on the volume-outcome relation for complex surgical procedures. Although procedural safety is the starting point for decision of the location of a procedure, a holistic approach to risk must be applied to the context of such decision in Rural Emergency Surgery. The means and risk of patient travel, the distance to cover, patient comorbidities, the social cost of separation from family and community and immediate or long-term financial implications should be taken into account in such decision. Sending surgical cases to referral centers can have negative financial consequences for rural hospitals, where a substantial amount, up to 30% to 40%, of billed charges derived from surgery.

Trauma, Gastrointestinal bleeding, hepatobiliopancreatic pathology, postoperative complications, vascular pathology and severe soft tissue infections are among the most common diagnosis of transferred patients from rural surgical emergency services. Less frequent others are appendicitis, bowel obstruction, acute abdomen or intra-abdominal sepsis of unknown origin and so on.

The safety and efficiency of interhospital transfer is of capital importance for rural hospitals to provide higher-level care to the critically ill. Interhospital transfer is required when the needs of the patient exceed the resources of the referring hospital and aims to improve patient outcome. A safe and timely transfer is specially important for the surgical patient who may deteriorate quickly and need immediate operation or invasive intervention. Quick identification of acute surgical patients who may require high-level of care (ICU or specialist) is of paramount importance, stressing the need for an appropriate triage tool in rural hospitals to ensure faster transfer. A good communication between referring and receiving clinicians can help and a checklist system detailing necessary communication between hospitals has been shown to reduce time to definitive treatment in trauma patients.

Conclusion

This paper outlines a minimal standard for the future laying down benchmark and measurable KPIs in Rural Emergency Surgery and Transfer.

Provided its magnitude, a specific health focus on Rural Emegency Surgery and Transfer is needed in medical and political levels. A common implementation strategy may be difficult attending to political and orographic differences in European countries, but minimal standards should be given.

Topic Title: Rural Emergency Surgery and Transfer

Rural Emergency Surgery and Transfer KPI 1

Title: Hospital demonstrate a protocol for transfer severe patients to a determinate Urban Tertiary full-equiped Hospital

Description	Hospital's receiving emergency surgery patients have a policy and procedure for transfering severe patients to tertiary centers
Rationale	A protocol is needed to asure the correct procedure for transfering the patients on time for their correct care
Target	Proven document of agreement from both the rural and tertiary urban center
KPI collection frequency	Semi-annually
KPI reporting frequency	Semi-annually
KPI calculation	Yes/No written policy which 6 months verification
Reporting aggregation	Hospital
Data sources	Chair Department of Surgery

Rural Emergency Surgery and Transfer KPI 2

Title: Percentage of Surgical Emergency cases send to reference center

Description	Number of Surgical Emergency cases refered per Rural hospital per month from the total amount of Surgical Emergency Cases
Rationale	To know the amount of referals per center in order to identify local needs
Target	Mantain in the lowest level
KPI collection frequency	Semi-annually
KPI reporting frequency	Semi-annually
KPI calculation	(Number of refered cases/number of surgical Emergencies) X100
Reporting aggregation	Rural Hospital
Data sources	Chair Department of Surgery

Rural Emergency Surgery and Transfer KPI 3

Title: Rate of Acute Care Surgeons to General Practitioners or other surgical specialists in Rural centers

Description	Rate of skilled Acute Care Surgeons among the rural hospital workforce
Rationale	Help to guide the modelling of rural Surgical Emergency care delivery and to define a possible skill set for GP surgeons in communities unable to support a fellowship general surgeon
Target	Mantain certain level of Quality certified skills for Trauma and Surgical Emergency cases
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	Number of certified ACS/Total number of sugeons per rural hospital
Reporting aggregation	Hospital
Data sources	Chair Department of Surgery

Rural Emergency Surgery and Transfer KPI 4

Title: Total volume and quality of Emergency Surgical cases per Rural Hospital

Description	Absolute number of Emergency Surgical cases performed.
Rationale	To know the absolute number of Emergency Surgical cases may allow comparison with other similar Rural Hospitals
Target	Increase, in order to disminish referals
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	Number of procedures per diagnosis
Reporting aggregation	Rural hospital
Data sources	Chair Department of Surgery

Rural Emergency Surgery and Transfer KPI 5

Title: Time from diagnosis to arrival to the receiving center: Ambulance response time; Ambulance travel time

Description	Elapsed times from transfer asking to transfer arrival to rural hospital and travel time
Rationale	Interhospital transport times should be minimized in order to improve quality of care
Target	Reduce transfer times to mínimum for each rural area
KPI collection frequency	Semi-annually
KPI reporting frequency	Semi-annually
KPI calculation	Timeframe
Reporting aggregation	Receiving Hospital
Data sources	Interhospital Transfer Facility Administration

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Geriatric Emergency Care

Geriatric Emergency Surgery - better management, better results

"When an old man dies, a library is lost."African proverb

1. Introduction

The ageing of the population is a multi-factorial and complex process[1], irreversible, global and with important social and economic implications, above all in developed countries.[2]

It is indisputable that as the world population is ageing, the demand for healthcare is increasing. What is in dispute, however, is how best to manage this challenge.

Emergency surgery on elderly, due to its volume of patients, wide breadth of surgical pathology, complexity of the cases with high surgical risk[3], and also current quality standards for outcomes and resource management, represents one of the main focal areas in modern surgery.[4]

2. Background

2.1. Defining the elderly

An arbitrary numerical criterion to refer to the elderly population used by United Nations is 60+. However, most developed countries accept the chronological age of 65 years as a definition of 'elderly'. (WHO: Definition of an older or elderly person)

From the age-associated vulnerability point of view, it is more relevant to define frail elderly based on Frailty criteria[5] and also to identify high risk elderly patients based on Comprehensive Geriatric Assessment.[6]

2.2. Demographical base

During the last three decades the global ageing population has increased from 8.6 to 11.1%. In Western Europe this increase is greater, from 15.5% to 21.8%, with a prediction for 2060 of 30.6%. (World Population Ageing - United Nations, 2013)

The Annual Ageing Report of the European Commission (2012) predicts for the same period that the number of people 65+ will reach 152 million within the European Union, twice the current number and the number of 80+ will be tripled.

2.3. Impact of Geriatric Emergency Surgery (GES) on Hospital performance

A nationwide retrospective observational cohort analysis of General Surgery (GS) Department admissions and discharge data for 2014 (the most recent available) was performed. Information was retrieved from the *Spanish National Health System Data Base.* (*Ministerio de Sanidad, Servicios Sociales e Igualdad; CMBD*)

Spain was chosen as a model for the following reasons:

- it has a similar demography to the rest of the Europe (17.1% of the population was older than 65 in 2010), however the UN projection for 2050 is for 34.5%. That will make it the European country with the highest percentage of 65+,

- with 47 million inhabitants in 2014, Spain represents 9,25% of the current EU population (508 million)

- it has a National Health Service classified as the third most efficient health system in Europe (WHO), excluding populations under 100,000.

- it has easily accessible and detailed digital information.

(wider European data to follow)

Data extraction criteria were Emergency/Non-Emergency, in 4 age groups (>64, 65-74, 75-84, 85+), and parameters set were:

- Number of Admissions in General Surgery (GS) Departments

- Average Length of Hospital stay

- Number of Deaths Registered in GS Departments

Main findings showed an important variability in terms of:

- Emergency admissions per 1,000 inhabitants (from 3.5‰ in adults <65 to 15.1‰ in 85+);

- Average Length of Hospital Stay in Emergency admitted cases (from 6.57 days in <65 to more than 10 days in >65), compared to Non-Emergency admitted cases (from 3.9 days in <65 to 6.4 days in >65);

- Mortality (%) in Emergency admitted patients (from 0.36 in <65 age group to 12.87 in 85+, *27,97* times higher than in <65), compared to Non-Emergency admitted patients (from 0.09 in <65 to 2.8 in 85+), with more than *68%* of the total number of deaths registered in nationwide GS Departments, being in Emergency admitted 75+ patients (these representing only 13.4% from all admissions).

Table 1 & 2: National population, General Surgery Department Admissions, Length of Stay, Mortality.

Age Group	Population	Non Emg. Admissions in GS	Emg. Admissions in GS	Non Emg. Hospital Stay	Emg. Hostital Stay	Deaths in Non Emg. Admitted	Deaths in Emg. Admitted
15-64	27676604	126305	97048	3.91	6.57	116	447
65-74	3983597	48677	30463	5.56	10.12	176	678
75-84	3095431	34228	**34842**	6.27	10.66	345	**1802**
85+	1183365	5927	**17879**	6.4	9.67	166	**2302**
Total	46704314	215137	180232			803	5229
		393369				**6032**	

Age Group	Emg. Admissions / Total Admissions	Emg. Admissions / 1000 inhabitants	Mortality in Non Emg. Admitted patients in GS	Mortality in Emg. Admitted patients in GS
15-64	43.45%	3.5‰	0.09%	0.46%
65-74	38.49%	7.65‰	0.36%	2.22%
75-84	50.44%	11.25‰	1%	5.17%
85+	75.10%	15.1‰	2.80%	**12.87%**
			1.53%	

Figure 1: Emergency Admissions / 1,000 inhabitants

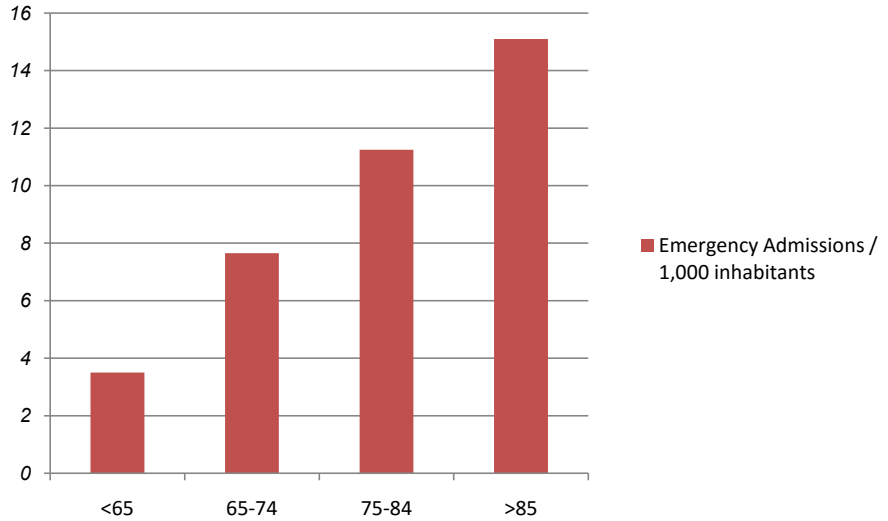


Figure 2: Length of Hospital Stay Comparison

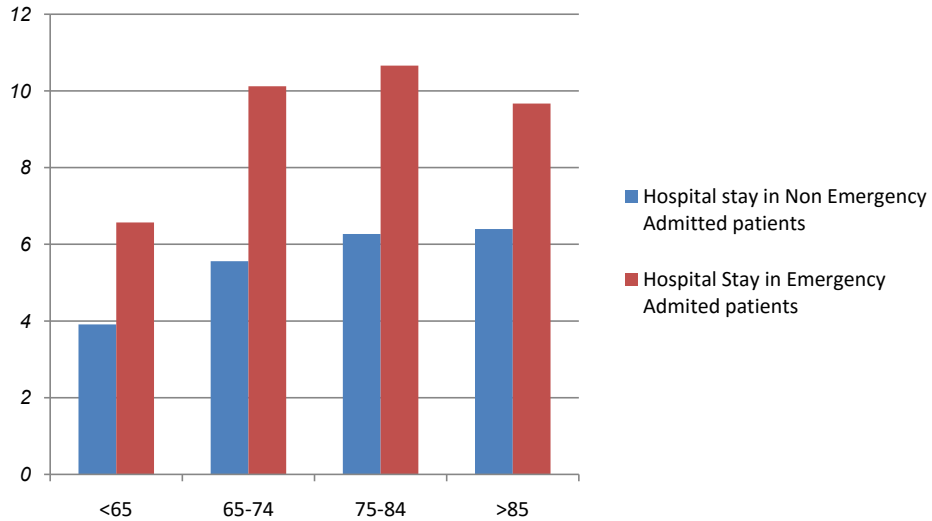
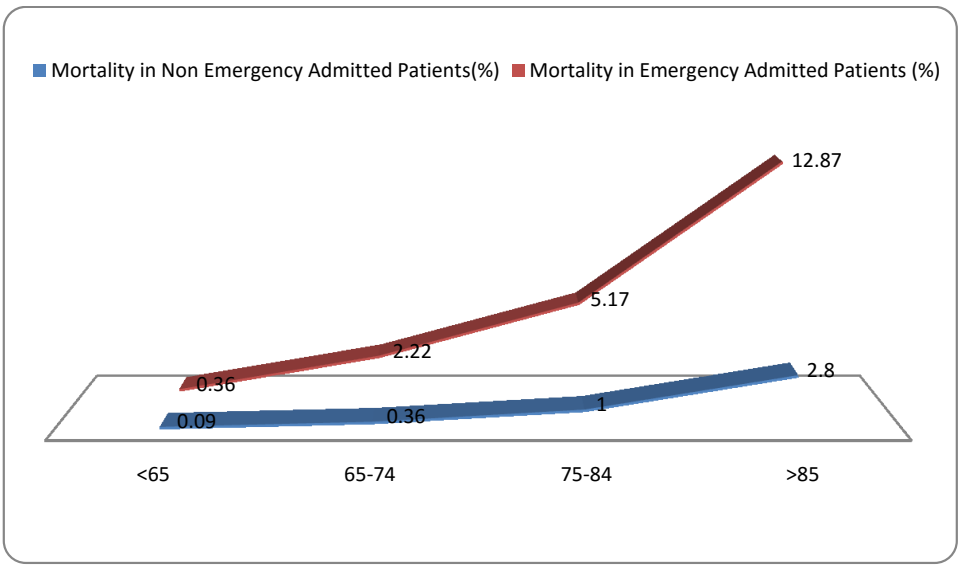


Figure 3: **Mortality in admitted patients**



2.4. Main surgical emergency pathology age group variation

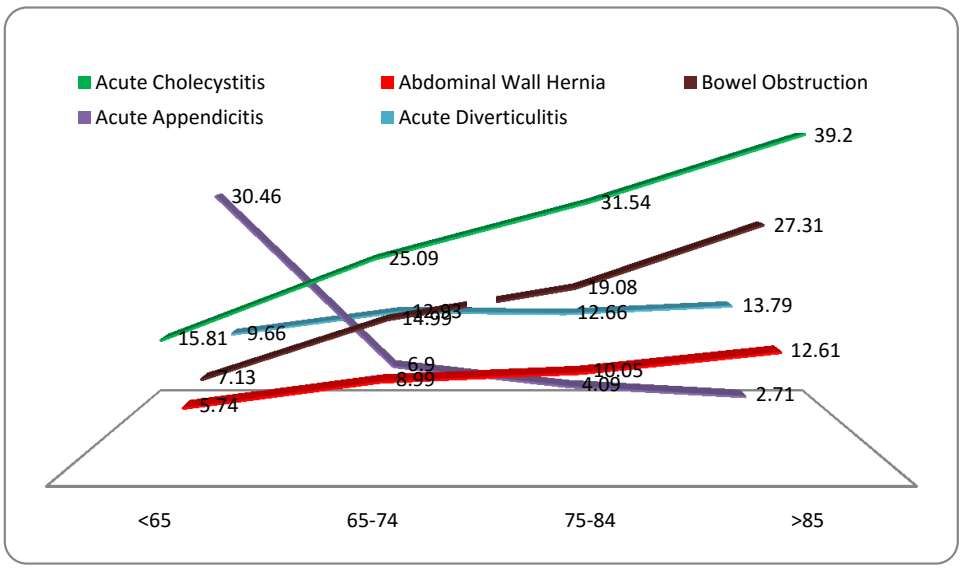
The main groups of Emergency pathology, according to the number of cases admitted (acute cholecystitis, bowel obstruction, acute diverticulitis, acute appendicitis and complicated hernia), were also analyzed by age groups.

Age alone is not a reliable criterion to assess patients on an individual level, however when analyzing outcomes for a large cohort of patients, important differences between age groups can be identified. Acute cholecystitis showed a progressive increase in terms of prevalence in surgical pathology (from 15.81% in <65 to 39.2 in 85+), bowel obstruction also increased (from 7.13% in <65 to 27.31% in 85+), with a dramatic decrease of acute appendicitis (from 30.46% in <65 to 2.71% in 85+).

Table 3: Main surgical emergency pathology age group variation

Age Group	Acute Cholecystitis	Abdominal Wall Hernia	Bowel obstruction	Acute Appendicitis	Acute Diverticulitis
15-64	15347 (15.81%)	5571 (5.74%)	6920 (7.13%)	29567 (30.46%)	9382 (9.66%)
65-74	7645 (25.09%)	2739 (8.99%)	4567 (14.99%)	2104 (6.9%)	3939 (12.93%)
75-84	10990 (31.54%)	3509 (10.05%)	6651 (19.08%)	1427 (4.09%)	4411 (12.66%)
>85	7009 (39.2%)	2255 (12.61%)	4883 (27.31%)	486 (2.71%)	2466 (12.66%)

Figure 4: Main surgical emergency pathology age group variation



3. Need for change: Hypothesis.

Base on this current snapshot of the demand in Emergency Surgery (ES) and taking into account the demographic tendency, we expect these parameters to increase, which makes it necessary to have *a proactive approach* to this challenge instead of what has been, up to now, a more reactive one.

Geriatric Emergency Surgery patients should receive more specific treatment with better results. This could be achieved by a more specialized approach focused on their specific needs.

4. Project and Group creation

The European Society for Trauma and Emergency Surgery (ESTES) responded to this need for change, by promoting a project to investigate further current evidence, to develop a new approach in this area and the GES Task Group was created for this purpose.

5. Method and literature search

PubMed/MEDLINE data base was searched using key words 'geriatric', emergency', 'surgery', 'elderly', 'assessment', 'multidisciplinary', 'ethical issues', 'delirium' and 'frailty', with emphasis on the last 5 years and General abdominal surgery. Relevant articles were selected and data extracted. Based on this preliminary search, *main sections* and *key points* were identified.

6. Fundamental aspects in GES management

From this list of key points it is possible to identify a number of fundamental *overarching elements*, not only due to their importance but also because of their age related specificity, namely: Geriatric and Frailty assessment in relation to the Surgical Risk[15,16,17], Multidisciplinary team (MDT) approach[18,19], Decision-making and the Non Operative option in GES[20], Ethical issues[21,22], Postoperative delirium prevention and control.[23,24,25]

6.1. Comprehensive Geriatric Assessment (CGA) is already proven as a fundamental multidimensional tool in evaluation and outcome prediction of elderly patients undergoing surgery, above all in Oncologic surgery[2627] and Orthogeriatrics.[28] However this is a time consuming process, needs additional diagnostic tests and consultations[29] and a focused collaboration between specialists.

Harari et al.[30] found a multidisciplinary approach in elderly elective surgical patients improved post-operative morbidity and mortality; and Partridge et al.[31] found similar results from a Systematic Review of pre-operative Geriatric assessment as a predictor of post-operative outcomes.

Table 4: Geriatric Emergency Surgery ESTES task Group abridged working plan

Main sections	**Key points** [7,8,9,10,11,12,13,14]
Preoperative assessment and **management**	Multidisciplinary team approach: *Who should be involved in GES, apart from the Surgeon and Anaesthetist?* (E.g. ICU, Geriatrician, Internal Medicine, Cardiologist, Palliative and End of life team)
	Clinical history and Medication (E.g. Anticoagulants and Antiplatelet, Diabetic and Heart medication)
	Geriatric and Frailty Assessment. *What kind of Geriatric assessment is applicable in Emergency?*
	Early diagnosis. *Aggressive imaging and limitations*
	Surgical - anaesthetic risk assessment. *How to do it?*
	Preoperative optimizing and prehabilitation. *To what extent is that possible in GES?*
Surgical decision making and **Operative management**	Non Operative Management versus Emergency surgery. *Benefits and risks.*
	Surgical technique election. *Are Minimally invasive techniques suitable for GES?*
	Damage Control Surgery. *Place in Geriatric Emergency Surgery*
	Type of Anaesthesia (E.g. General, Sedation, Epidural, Epidural)
	Pain control: Rectal sheath blockage, Epidural, PCA
	Hypothermia prevention, Nasogastric tube, Peritoneal drainage, Urinary catheter
	Thromboembolism prophylaxis
	Antimicrobial prophylaxis and treatment in GES
	Delirium control. *Recommendations and checklist*

Postoperative management	Early mobilization. *Value in elderly.*
	Early oral feeding versus Parenteral nutrition
	Perioperative fluid management
	Postoperative ileus prevention in elderly
	Postoperative complications. *Recognition and management*
Discharge strategy	Patient related outcomes and assessment
	Special discharge letters
	Indications to GP
	Indications to care givers and Elder nursing care
	Plan to review patients and minimizing readmissions.

Frailty assessment is a key element in CGA and is superior to chronological age in predicting surgical outcomes, including emergency[32,33], however there are different tools available to undertake this assessment, with varying degrees of accuracy.[34]

There is less evidence available however in relation emergency surgery and CGA. Readmissions were found to be reduced after CGA in emergency department patients 75+, in a study undertaken by Deschodt et al.[35]

A meta-analysis of RCTs in relation to elderly emergency admissions concluded that CGA improved outcomes but the 'key features of successful comprehensive geriatric assessment seem to be treatment in discrete units, with expertise in the care of older people and control over the delivery of direct care'. [36,15]

6.2. MDT approach for diagnostic and treatment

Emergency surgery on elderly patients with comorbidity, represents a real challenge.[19] Often the surgeon is faced with not only the main diagnostic but also secondary ones.[37] The interaction between these two is often based on a reciprocal aggravating mechanism, increasing the complexity to one greater than the sum of its parts.

To address this challenge, multidisciplinary effective collaboration is fundamental[38,39,40], ideally comprising of ICU Specialist, Cardiologist, Internal Medicine Specialist, Pneumologist and Geriatrician[41], apart from the Surgeon and Anaesthesiologist.[14]

6.3. Decision-making and Non Operative options in GES

Based on the nationwide retrospective analysis, more than 50% of emergency admissions in GS in 75+ patients and more than 60% in 85+, are represented by two pathologies: acute cholecystitis and bowel obstruction.

The decision-making process in frail elderly emergency surgical patients should be guided by the *minimum aggressiveness and maximum effectiveness* principle.

Early cholecystectomy has a mortality rate of 5%-30% in high risk elderly patients.[42] An alternative treatment is percutaneous Gallbladder drainage, as recommended by Tokyo Guidelines 2013.[434445]

Colorectal cancer is a common cause of bowel obstruction in the elderly when not diagnosed early. Emergency surgery, with high morbi-mortality, is avoidable by prosthesis (stent) implantation, using endoscopic methods. [464748]

6.4. Ethical issues. End of life decisions.

Limitation of Therapeutic Effort is an acceptable option and legally acknowledged within clinical practice, especially where critical care is required. It refers to either the withholding or withdrawing of life sustaining treatment, with each carrying different connotations.[49] However, the practice still evokes controversy from an ethical and resource management point of view.[20]

Furthermore, given the advances in medical practice and the increased capacity to 'prolong' life, the surgeon can be faced with a conflict between this and consideration for the patient's wishes and dignity.[50]

A survey was undertaken to investigate the opinion of surgeons, members of ESTES and AEC, from *18* European countries, with regard to decision making issues. Results showed an important heterogeneity between two extremes: the more interventionist (trying to treat the illness, taking into account the surgical indication) and the more conservative approach (a reluctance to use the operative option due to the surgical risk and relatives wishes).

6.5. Postoperative delirium prevention and control.

Delirium, recognised as the *most common post-operative complication in older adults*, is defined as an 'acute disorder of attention and cognition', being itself life threatening.[51]

Frailty is a contributing factor to the incidence of delirium. It has been assessed that 25% of the elderly surgical population are classed as frail, with 70% of older acute surgical patients having cognitive impairment and 18% post-operative delirium (POD).[5253] This percentage is higher for emergency surgery;[54] some surgical pathologies and patients with post-operative morbidity.[55]

Delirium can be prevented or treated. Prevention relies on timely Risk assessment, whilst the aim of treatment is to reduce severity and duration through early recognition.

‘Fast track’ approaches with the elderly reduced POD from 12.9 to 3.4% in one RCT[56] and Minimally Invasive Surgery has also been identified as an important contributor to POD reduction due to the type of anaesthesia and limited use of opioids.

Delirium prevention strategies include, first of all education for health care professionals, but also daily physical activity, cognitive reorientation, presence of a family member, non-pharmacologic sleep hygiene, early mobilization, adaptations for visual and hearing impairment, nutrition and fluid control, pain management, appropriate medication, adequate oxygen therapy, prevention of constipation, minimization of patient tethers (urinary catheters, periodic removal of sequential compression devices, EKG cords). (Adapted from Clinical Practice Guideline for Postoperative Delirium in Older Adults, Journal of American Geriatrics Society, 2014)[57]

7. Comparisons, Parallels and Solutions

In the branch of Internal Medicine there are three distinct age-related specialities: for children, adults and for frail elderly, Geriatrics being concerned with the diagnosis, treatment and prevention of disease in elderly patients and the problems specific to ageing.

In Surgery, there are however only two age-related specialties, Pediatric Surgery and General Surgery. Pediatric Surgery was created during the first part the 20th century, not only because of a different profile of the surgical pathology, treatment approach, patient dependence and management, but also in response to the demographic profile at that time. We can see parallels now with the elderly population which suggests the need for a new specialty[58][59]: Geriatric Surgery with its Emergency branch.

Figure 5: ***Comparisons and parallels***

Children	**Adults**	**Frail elderly**
Paediatrics	Internal Medicine	Geriatrics / Geriatric Medicine
Paediatric Surgery	General Surgery	**Geriatric surgery**

7.1. Management, Investigation and more accurate evaluation

Currently GES cases are admitted in General Surgery departments, using the same infrastructure and personnel (excepting in excellence center such as *Sinai Centre for Geriatric Surgery*).

In dedicated sub-departments in General Surgery, based on principles that reflect their needs, elderly patients could receive more specific care based on Comprehensive assessment, a tailored Multidisciplinary team, dedicated management (separate waiting lists), additional personnel (e.g. for early mobilization).[6018]

Apart from the focus on improving clinical outcome, modern management in Surgery departments is based on quality evaluation and targets, such as costs. A more accurate quality evaluation could be achieved on a more homogeneous group of patients.

8. Conclusions

It is this Paper's recommendation that GES should be treated as a sub-Specialty within Geriatric Surgery, with a dedicated infrastructure, MDT and Guidelines.

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Interaction and Connectivity with Laboratory, Radiology or ICU Gastroenterology

The role of imaging, diagnostics and therapeutics

Introduction

Imaging is now a fundamental tool in the care pathway of scheduled and unscheduled care for most disciplines in medicine and surgery. Acute surgical care can benefit from the efficient and appropriate application of modern modalities both in diagnosis and therapy of acute abdomino-pelvic disease states.

An educational training programme for acute surgical care should have imaging modules embedded at under- and post-graduate levels (KPI1). These should reflect the role of imaging in contemporary practice guidelines. This requires a meaningful engagement of radiologists and radiographers as key stakeholders in curriculum development, education and competency assessment. (KPI2).

Curricula should include a defined list of modules addressing core areas of practice including but not limited to;

Basic principles of modern imaging modalities

Radiography/Fluoroscopy/Ultrasound/CT/MRI and nuclear medicine

FAST ultrasound scanning for the surgeon

Case illustration and interpretation for core acute surgical conditions using standard modern imaging.

Radiation/MRI safety in hospital practice

Appropriateness criteria and diagnostic imaging algorithms for the acute surgical patient. These have already been developed by the American College of Radiology (ACR) and are being explored by its European counterpart ESR (ESR guide). (REF1)

Appropriateness criteria and interventional radiology therapeutics for the acute surgical patient. The role of non-operative interventions in the acute surgical patient.

Though replicated in other jurisdictions the European societies of diagnostic (European Society of Radiology –ESR) and interventional (Cardiovascular and Interventional Radiology Society in Europe –CIRSE) have already well developed curricula and competencies in imaging based on input from pan-European radiology society input. There are clear sections within these documents that could be applied to any acute surgical training module with defined competencies (Refs 2-5).

Furthermore modern acute surgical practice should reflect international best practice with close liaison with imaging departments in the active management of patients,

multidisciplinary case conferencing and outcomes assessment and quality review (KPI3). With limited resources world-wide there is also an imperative to teach and apply contemporary appropriateness criteria to ensure optimal resource use (KPI4). Imaging departments also have a potential role in the development and oversight of FAST ultrasound scanning modules to enable surgical trainees meet core standards in their surgical training (KPI5).

Summary of Imaging KPIs for contemporary Acute Surgical Care programmes

Imaging /Interventional modules within educational curricula

Radiologists as part of the multidisciplinary governing structure

Multidisciplinary conferencing and Quality Assessment meetings

FAST ultrasound training modules

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Quality Assurance and Performance Improvement

Topic Title: Quality Assurance and Performance Improvement

Quality Assurance and Performance Improvement KPI 1

Title: Early Warning Score – All emergency surgical patients should have physiological observation data measured at regular intervals appropriate for severity of presenting condition using a track and trigger (early warning) scoring system

Description	Measurement of early warning scores
Rationale	Changes in physiological parameters have been shown to herald critical illness and surgical complications
Target	80% of patients admitted to hospital should have observations measured using a track and trigger (early warning scoring system)
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of emergency surgery patients admitted to hospital **Denominator**: Number of emergency surgery patients admitted to hospital having early warning scores measured
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Data base, hospital databases

Quality Assurance and Performance Improvement KPI 2

Title: Sepsis management

Description	All patients with sepsis, or at risk pf sepsis should be managed according to published guidelines (surviving sepsis)
Rationale	Emergency surgery patients are at high risk of sepsis. Sepsis is one of the leading causes of death in emergency surgery
Target	90% of patients should receive are in accordance with surviving sepsis guidelines

	i.e. antibiotics within 3 hours for those with sepsis or suspicion of intra-abdominal soiling
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** **Denominator:**
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Data base, patients notes

Quality Assurance and Performance Improvement KPI 3

Title: Post-operative intensive care

Description	Post-operative intensive care management
Rationale	Emergency surgery constitutes high risk procedures, often in patient who are elderly, have comorbidities and/or have significant physiological derangement. Scoring systems should be deployed to predict risk of morbidity/mortality (e.g. PPOSSUM, SORT) to identify patients at highest risk. All high-risk patients should receive care on the intensive care unit post-operatively
Target	80% of patients with a predicted mortality of >5% should be cared for on a high level ward (e.g. ICU, HDU)
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** number of high-risk (>5% predicted mortality) emergency surgical patients who are transferred to the intensive care unit after emergency surgery **Denominator:** number of high risk (>5% predicted mortality) patients undergoing emergency surgery
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Data base, ICU database, patients notes

Quality Assurance and Performance Improvement KPI 4

Title: Decision-to-theatre within recommended timing for clinical urgency

Description	The time interval between the decision to operate and surgery should be appropriate for the urgency of the presenting condition
Rationale	Intra-abdominal catastrophes may be due to an array of underlying conditions, often in continuum (e.g. intestinal obstruction can lead to bacterial translocation, bowel ischaemia, perforation, peritoneal soiling and severe sepsis). The urgency of the requirement for operative management should be decided at the time of decision to operate based on the clinical condition. This urgency should be revised of the clinical condition deteriorates
Target	90% of patients should arrive in the operting theatre within an appropriate time for urgency: Immediate (1): within 2 hours of decision (e.g. acute hemorrhage, ischaemia) Urgent (2a): within 6 hours (e.g. intra-abdominla soiling/sepsis) Urgent (2b): 6 – 18 hours (e.g. acute bowel obstruction) Expeditied: >18 hours (e.g. sub-acute bowel obstruction)
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** number of patients arriving in theatre within the time appropriate for designated urgency **Denominator:** sample of emergency surgical patients presenting for surgery
Reporting aggregation	Hospital
Data sources	Emergency Surgery Data base, patients notes

Quality Assurance and Performance Improvement KPI 5

Title: Consultant led care

Description	All emergency surgery patients should be reviewed by the responsible consultant within at most 14 hours of admission and receive consultant led care in the operating theatre (both anaesthetic and surgical)
Rationale	Emergency surgical patients are at high risk of morbidity and mortality. This risk should be matched by the seniority of clinical staff managing their care.
Target	90% of patients are reviewed in person by a consultant surgeon within 14 hours of admission to hospital 90% of high risk (>5% predicted mortality) patients are cared for by a consultant anaesthetist and surgeon in the operating theatre
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** number of patients reviewed by a consultant within 14 hours of admission **Denominator:** number of emergency surgery admissions **Numerator:** number of high risk patient cared for by consultant surgeon AND anaesthetist intra-operatively **Denominator:** number of high risk emergency surgical cases
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Data base, theatre database, patients notes

Sepsis Control in the Emergency Room

Sepsis control in emergency room

Sartelli Kluger Malangoni Vincent

Introduction

Sepsis is a complex, multifactorial syndrome which can evolve into conditions of varying severity. If left untreated, it may lead to the functional impairment of one or more vital organs or systems. Therefore its adequate treatment is crucial already in emergency room.

Early detection and timely therapeutic intervention in emergency room can improve the overall clinical outcome of septic patients; reducing time to diagnosis of sepsis is thought to be a critical component in reducing mortality from multiple organ failure.

However, early diagnosis of sepsis can be difficult; determining which patients presenting with signs of infection during an initial evaluation, do currently have, or will later develop a more serious illness is challenging.

Recently the definition of sepsis (Sepsis-3)[1] returned to the traditional views that sepsis is characterized by organ dysfunction attributed to an infection.

Furthermore, the consensus group proposed the introduction of qSOFA as an alert system. Patients with at least 2 of 3 clinical abnormalities including Glasgow coma score of 14 or less, systolic blood pressure of 100 mmHg or less, and respiratory rate 22/min or greater may be prone to have the poor outcome typical of sepsis. Importantly, q SOFA does not define sepsis but provides simple bedside criteria to screen adult patients with suspected infection.

Sepsis is now defined as life-threatening organ dysfunction caused by a dysregulated host response to infection. It can be clinically represented by an increase in the Sequential Organ Failure Assessment (SOFA) score of 2 points or more[1].

Septic shock is defined as a subset of sepsis in which particularly profound circulatory, cellular, and metabolic abnormalities which are associated with a greater risk of mortality than with sepsis alone. Patients with septic shock can be clinically identified by a vasopressor requirement to maintain a mean arterial pressure of 65 mm Hg or greater and serum lactate level greater than 2 mmol/L (>18 mg/dL) in the absence of hypovolemia[1].

Under this terminology, “severe sepsis” becomes superfluous.

Sepsis should generally warrant greater levels of monitoring and intervention.

In patients with severe sepsis (now sepsis) or septic shock, the 2012 Surviving Sepsis Campaign (SSC) guidelines suggested within 3 hours[2]:

- prompt haemodynamic resuscitation,
- broad spectrum antimicrobial therapy, and
- blood cultures prior to administration of antibiotics.

Haemodynamic resuscitation

It is well known that early treatment with aggressive haemodynamic support can limit the damage of sepsis-induced tissue hypoxia and prevent the over stimulation of endothelial activity.

Early, adequate hemodynamic support of patients in shock is crucial to prevent worsening organ dysfunction and failure.

Fluid therapy to improve microvascular blood flow and increase cardiac output is an essential part of the treatment of sepsis.

A fluid challenge incorporates four determinant elements[3]:

- crystalloid solutions should be the first choice, because they are well tolerated and cheap,
- fluids should be infused rapidly to induce a quick response but not so fast that an artificial stress response develops,
- the goal should be an increase in systemic arterial pressure, and
- pulmonary edema is the most serious complication of fluid infusion.

Vasopressor agents should be administered to restore organ perfusion if fluid resuscitation fails optimizing blood flow in various organs.

It may be acceptable practice to administer a vasopressor temporarily while fluid resuscitation is ongoing, with the aim of discontinuing it, if possible, after hypovolemia has been corrected[3].

Norepinephrine is now the first-line vasopressor agent used to correct hypotension in the event of septic shock[2]. It is more efficacious than dopamine and may be more effective for reversing hypotension in patients with septic shock[2]. Moreover dopamine may cause more tachycardia and may be more arrhythmogenic than norepinephrine,

Dobutamine is the inotropic agent used for increasing cardiac output, regardless of whether norepinephrine is also being given. With predominantly β-adrenergic properties, dobutamine is less likely to induce tachycardia than isoproterenol[3].

Hypotension is the most common indicator of inadequate perfusion and restoring a mean systemic arterial pressure of 65 to 70 mm Hg is a good initial goal during the haemodynamic support of patients with sepsis[3].

Haemodynamic resuscitation has been the cornerstone of management of patients with severe sepsis and septic shock in SSC guidelines since its first draft[4].

Rivers et al.[5] in 2001 demonstrated that early goal-directed therapy (EGDT), initiated in the emergency department, reduced the in-hospital mortality rates of patients in septic shock.

EGDT involved targeting ScvO2 ≥70% (through transfusion of red cells and dobutamine. Patients should otherwise have: Central venous pressure (CVP) ≥8-12 mmHg (through crystalloid boluses), Mean arterial pressure (MAP) ≥65 mmHg (through vasopressor administration), Urine output ≥0.5 mL/kg/hour (whenever possible).

However results of recent multicentric randomized controlled trials[6-8] could not reproduce the Rivers' results, but these trials had a number of limitations[9].

An early identification of sepsis and prompt administration of intravenous fluids and vasopressors are always mandatory. However initial resuscitation should not be based on a simple, predetermined protocol.

Restoring a mean systemic arterial pressure of 65 to 70 mm Hg is a good initial goal during the haemodynamic support of patients with sepsis.

Antimicrobial therapy

A key component of the first-line management of the septic patient is the administration of IV antimicrobial therapy. Antimicrobial therapy plays a pivotal role in the management of patients with sepsis, who require immediate empiric antibiotic therapy. An insufficient or otherwise inadequate antimicrobial regimen is one of the variables more strongly associated with unfavorable outcomes in critically ill patients[8].

Empiric broad spectrum antimicrobial therapy should be started as soon as possible in all patients with sepsis (or septic shock).

Accurate diagnostic tests are essential for the correct identification of microorganisms causing sepsis.

The performance of antimicrobial susceptibility testing by the clinical microbiology laboratory is crucial both to confirm susceptibility to the empirical therapy, and to detect resistance in bacterial isolates.

At least 2 sets of blood cultures for both aerobic and anaerobic bacteria should always be obtained before starting empirical antimicrobial therapy.

Diagnosis of sources of sepsis

At emergency room patients need to be carefully examined to ensure that drainable foci have been identified. Infected collections, devitalised tissue, and devices may act as a persistent source of sepsis until removed.

In the setting of abdominal sepsis imaging studies should be performed promptly to confirm a potential source of infection and control it.

Ultrasound and computed tomography (CT) are now essential diagnostic tools in diagnosing abdominal sepsis. The diagnostic approach to confirm the source of abdominal infection in septic patients depends largely on the haemodynamic stability of the patient[9].

Computerized tomography (CT) is the imaging modality of choice to confirm the source of infection in stable patients. However, in patients with septic shock, if the diagnosis of peritonitis is made clinically (tenderness) and by US (diffuse fluid), additional CT scanning may be unnecessary and can delay surgical intervention.

Conclusion

Sepsis is a complex condition that is often life threatening. Early recognition of sepsis and early intervention are paramount in improving outcomes.

A systematic, organized multidisciplinary approach to identify sepsis and its source of infection may improve patients outcome in the emergency department also in structures with limited resources.

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Research in Acute Care Surgery

Position paper on Research in Emergency General Surgery

F Catena, M Sugrue, R Maier, AW Kirkpatrick

Introduction

As noted in other position statements in this series, quality outcomes in Emergency General Surgery (EGS) require a dynamic efficient Emergency Surgery system, multi-disciplinary teams (surgical, anesthesia, nursing, etc) trained and competent in Acute Care Surgery, as well as the resources, both in terms of the availability of these persons and the institutional resources to provide the care.

The Discipline of EGS has practically existed from the earliest provision of non-trauma surgical care, being the original core of hospital service delivery, but has only recently been acknowledged and promoted as a holistic body of dedicated surgical practice worthy of study and organization. Thus, many metrics related to this discipline remain poorly researched and controversial. When carefully studied it does appear that dedicating resources and prioritizing service delivery for acute care surgical conditions improves outcomes.

Hospitals with dedicated EGS services appear to have decreased times to operation and shorter LOS for common EGS procedures. (1) (2)However, there are many questions remaining regarding critical items such as efficiency, cost-effectiveness and value (3).Research into EGS services modeling will benefit both surgical patients, and improve surgeon career satisfaction. Ultimately research needs to identify if EGS service models provide better outcome for sick patients requiring surgery.

Thus robust high level data is required to answer these fundamental questions and to drive continuous quality improvement initiatives. Answering any and all Questions regarding any disease category, procedure, care delivery model, etc, requires accurate and complete data.

Thus the primary and highest level Key Performance Indicators (KPIs) for an Academic EGS is the demonstration of an Institutional Commitment to Research in EGS.

Thus, the aim of this paper is to generate a set of simple yet generalizable KPIs to demonstrate an Institutional commitment to Research in EGS. The first step in generating such KPIs however is deducing appropriate measurable criteria or metrics that may reflect quality or even the potential for quality across the innumerable different health-care systems and providers attempting this service.

This foundation from the Donegal Summit is hoping to generate potential KPIs which can be both debated by leaders in EGS Research and thereafter subjected to prospective validation through patient and provider outcomes. Murphy recently summarized this task, concluding that the Donabedian model of structure, process, (4) and outcomes was best used to organize perspectives of multiple stakeholders. (5)

Thus KPIs will potentially examine the research structure of an Institution, the process of how research is conducted, and ultimately whether that Institution is successful in translating research energy into the peer-reviewed literature that can potentially guide and improve patient care world-wide.

Methods

A review of all published articles relating to Research Methodology in Emergency General Surgery and collation of information from Learned Societies, Colleges and Government Organizations to create a menu of existing Methodological Research specifically related to EGS. The putative KPIs that condense and reflect these principles are reported below as material to be expertly discussed and critiqued through expert consensus opinion and evidence-based evaluation.

ResultsEGS research KPIs are one of the more important KPIs for emergency surgery. (6-11)It is clear that a healthy academic environment is necessary for an effective EGS service. (10)

Well established research activity is the driver of effective continuing medical education: moreover effective continuing medical education and continuous quality improvement initiatives are the base of of the highest standard clinical activity ensuring high-level clinical performance .It is fundamental to consider KPIs describing all of retrospective performance and outcomes . (6) (9) prospective level 1 EBM activity and tangible markers of research production.For this reason the first KPI was the mantainance of a clinical database/ registry (retrospective/ prospective) in order to have up-to-date documentation of the clinical activity along with the ability to extract data to perform all or any of retrospective analyses with univariate/ multivariate evaluation and propensity score matchings.

The “evidence based” limit of this type of research is clear but these studies constitute the basis for identifying possible prospective trials and for an effective planning of randomized controlled trials.There is also a formal requirement for regular audits of data quality/accuracy for this clinical database/ registry The second KPI focuses on the demonstration of Institutional capacity to organize at least one randomized controlled trial every 5 years.(8)

The Committee recognises that this is a very challenging KPI but considers also the importance to generate level 1 evidence-based research in emergency surgery field. (8)

Randomized controlled trials are as yet limited in surgical research but they remain the primary drivers of excellence in clinical science.

Fewer than 10% of clinical studies reported in surgical journals are RCTs,and treatments in surgery are only half as likely to be based on RCTs as treatments in internal medicine. (10) (11)

Emergency surgery centers will be required to invest resources on this type of research with the production of at least one RCT every 5 years .It is important to underline that it has to be a single center RCT or alternatively a multicenter RCT but with a contributing role.

The Committee decided to assign this modest numerical threshold recognizing that an investigator-sponsored non-industry supported RCT is an immense commitment in terms of protocol writing, ethical committee approval, clinical start- up, conduct, analysis, and publication. It is duly noted that multi-centre RCTs compound these challenges greatly.

The last 3 KPIs reflect tangible measure of scientific production/ activity. These reflect thresholds of 5 full articles in indexed journals per year, international and national scientific presentations, and committed research activity of trainees, the most valuable resource for future academic capital. (6) (7) Moreover at least 1 paper must be in medium- high impact factors journals (> 1.0)The Committee decided to include only full articles on indexed journal and not abstract books because there is no a standard quality evaluation of congress scientific presentations.There is a minimum requested standard to publish a full article on indexed journals. Although ambitious, the Committee does not think that this threshold for published manuscript targets is too high; reflecting on the current possibility to publish full

articles is remarkably increased by the huge number of indexed journals and online fast publishing opportunities.

Thus in a high-level emergency surgery center with a well organized clinical database it should not be unreasonable to find research fellows along with attendings and residents that are able to direct scientific projects that result in 5 full paper publications in indexed journals even if there are a limited number of staff.

Conclusion

This paper outlines a minimal standard for the future laying down EGS research benchmarks and measurable KPIs.

An active research program at a national, regional and institutional level in EGS will allow for optimization of the service delivery, identify gaps, and improve safety and outcome. The KPIs in this paper are a start toward this process

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Topic Title: Research in Acute Care Surgery

Research in Acute Care Surgery KPI 1

Title: Maintenance of a database of EGS with statistical reporting

Description	Creation and regular maintenance of a clinical database/ registry of all patients with an acute surgical disease admitted to the Unit
Rationale	The presence of a well organized database is fundamental for all observational studies
Target	>90% of patients must be included in the database
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients enrolled in the database **Denominator**: Number of all patients admitted to the Emergency Surgery Unit
Reporting aggregation	
Data sources	Administrative data, Medical records

Research in Acute Care Surgery KPI 2

Title: Evidence based level 1 Research

Description	Creation and development of a randomized controlled trial
Rationale	The capacity to create and develop RCT is fundamental for clinical medical science
Target	At least 1 RCT created and published every 5 years
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	Number of RCT created and published in the last 5 years
Reporting aggregation	
Data sources	Administrative data, Pubmed data

Research in Acute Care Surgery KPI 3

Title: Articles published on indexed journals

Description	Articles published on indexed journals
Rationale	The capacity to publish article on peer reviewed journal is fundamental in the research activity
Target	At least 5 articles published per year
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	Number of articles published on indexed journals per year
Reporting aggregation	
Data sources	Administrative data, Pubmed data

Research in Acute Care Surgery KPI 4

Title: The hospital has a demonstrated activity in EGS research with presentation at national/international meetings

Description	Presentation of EGS research at national/international meetings
Rationale	The capacity to present new research is fundamental to demonstrating commitment to surgery
Target	At least 3 national or international presentations per year
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	Number of presensation of EGS research at national/international meetings
Reporting aggregation	
Data sources	Administrative data, Pubmed data

Research in Acute Care Surgery KPI 5

Title: Review of surgical trainees research performance

Description	Surgical trainees research performance
Rationale	Surgical trainees need to question and challenge aspects of delivery of EGS. To achieve this while undertaking their clinical duties they must be assessed regarding their research profile.
Target	Each EGS trainee need to undertake one research project in each 6 month term they undertake in EGS
KPI collection frequency	6 monthly
KPI reporting frequency	6 monthly
KPI calculation	Documented review of the trainees research performance with feedback to trainee and training body
Reporting aggregation	
Data sources	Hospital Head of Surgical Training

Education in Emergency Surgery

Position paper on Education and Training in Emergency Surgery

M Sugrue, M Bowyer, L Lawler, I Martinez, L Pearce

Introduction

Quality outcomes in Emergency Surgery require a dynamic efficient Emergency Surgery system, coupled with surgical teams trained and competent in Acute Care Surgery. Education with known competencies must encompass interaction across all disciplines. Given the burden of Emergency Surgery in medicine globally and the opportunity to improve care this paper will outline a vision for Education and Training in Emergency Surgery.

The aim of this paper is outlines key standards and develop measurement KPIs. This foundation from the Donegal Summit will lead to a future where these can be validated with patient and provider outcomes.

Methods

A review of all published articles relating to Education and Training in Emergency Surgery and collation of information from Learned Societies, Colleges and Government Organizations to create a menu of existing education courses and platforms. This paper will deal with both under- and postgraduate education in Emergency Surgery, the interaction across different disciplines and communities. The overarching philosophies from education in emergency surgery care are shown in Table 1. Each of these key standards will have a KPI developed.

Table 1: Key Standards in Education in Emergency Surgery Care

Expectation for education culture and environment

Governance and resource management

Facilitating Learners

Supporting surgical educators

Supporting Multidisciplinary team work approach

Curricula Development Accreditation and Performance assessment

Innovation and Skills development

Access to learning opportunities in emergency surgery

Accreditation of education and competency assessment

Results

Well defined, standards and guidelines in Emergency Surgery education do not exist, despite some significant recent publications and improved implementation of training. Acute Care receiving hospitals need to accept and implement education systems which are documented and validated. Nationally agreed validation and accreditation of educational curricula should be a requirement of all acute surgical care units. (KPI1) and in undergraduate training (KPI2).

Post graduate surgical trainees need to be in practices with embedded acute surgical training competencies. (KPI3). Hospitals receiving emergency surgical patients, will need to have a formal visible and documented Emergency Surgery Training program allocated a minimum of 2 hours per month for trainee's education. The hospital will need a Director of Emergency Surgical Training. This position will resources, time and training facility. The Director of Emergency Surgical Training would be required to write an annual report of educational activities and sign off on completed competencies.

Education activities should engage with other disciplines, particularly Emergency Medicine, Radiology, Gastroenterology and Anaesthesia. This should occur daily as a standard part of workflow and as part of regular case reviews. Where the hospital may act a referral centre, the referring hospitals will need to be in the education net.

Access to relevant emergency surgery educational materials and resources may surprisingly be difficult. The hospital and system will need documented electronic knowledge transfer mechanisms. This would include an emails group, web site linkages and clearly visible emergency surgery course calendars for both educators and trainees.

Chief resident and Senior registrars in the Unit should be encouraged to undertake **European Board of Surgery Qualification in Emergency Surgery. This** 2-stage quality validation process consisting of an Eligibility assessment and an Examination leading to the award of the title „Fellow of the European Board of Surgery in Emergency Surgery – F.E.B.S./EmSurg."

A UEMS fellowship (F.E.B.S.) would offer a high-level validated quality controlled process reflecting knowledge and skills in emergency surgery.

Conclusion

This paper outlines a minimal standard for the future laying down benchmark and measurable KPIs.

Topic Title: Education in Emergency Surgery

Education in Emergency Surgery KPI 1

Title: Hospital Administration demonstrated support for Emergency Surgery Education

Description	Hospital's receiving emergency surgery patients have a policy and procedure supportive of emergency surgery education, with minimum requirements for not only for surgery, but across other disciplines including Emergency Medicine, Radiology, Gastroenterology and Nursing.
Rationale	Without continuous education, focusing on surgical staff, but across main disciplines, patient care will be sub-optimal. Surgical trainees involved in emergency care will need to have documented 1 hour per two weeks in formal emergency surgery education.
Target	1 written Policy and procedure with measurable education activity for Emergency Surgery
KPI collection frequency	Semi-annually
KPI reporting frequency	Semi-annually
KPI calculation	Yes/No written policy which 6 months verification
Reporting aggregation	Hospital
Data sources	Hospital Administration

Education in Emergency Surgery KPI 2

Title: Hospital Administration demonstrated support for Consultant and Trainee teaching of Emergency Surgery

Description	Hospital's receiving emergency surgery patients have a policy and procedure supportive of the providers of emergency surgery education, to include time allowance with remuneration.
Rationale	Provision of focused education has not been a priority in hospital ethos, falling well behind clinical care and research. Trainees themselves can be involved in education particular the more senior trainees.
Target	Written policy and procedure with documented education activity for Emergency Surgery teachers both Consultant and Trainees
KPI collection frequency	Semi-annually

KPI reporting frequency	Semi-annually
KPI calculation	Yes/No written policy which 6 months verification
Reporting aggregation	Hospital
Data sources	Hospital Administration

Education in Emergency Surgery KPI 3

Title: Medical students have a formal attachment to on call surgeons and surgical teams

Description	Medical students' education should have dealt with common surgical emergencies. They should have experienced a least 2 nights on call.
Rationale	Theoretical undergraduate education needs to be reinforced with real clinical situations in order to understand and comprehend acquired knowledge.
Target	>90% of students doing a rotation in General Surgery should experience at least 2 certified nights on call
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	Annual number of nightshifts with certified student presence / Total number of students rotating annually in the Service
Reporting aggregation	Hospital 1
Data sources	Chair Department of Surgery, Director of Surgical Training

Education in Emergency Surgery KPI 4

Title: Hospitals demonstrate an active electronic-web based continual support for sharing of information in Emergency Surgery among all group dealing with emergency surgery patients

Description	Hospitals receiving emergency surgery patients have a policy and procedure identifying electronic networks for dissemination of both existing and new educational information in emergency surgery.
Rationale	Creating a learning environment that promotes access to educational material is essential, both to up skill providers and provide immediate answers to clinical care questions.
Target	Proven electronic networks sharing educational material in emergency

	surgery
KPI collection frequency	Semi-annually
KPI reporting frequency	Semi-annually
KPI calculation	Yes/No written policy which 6 months verification
Reporting aggregation	Hospital
Data sources	Chair Department of Surgery

Education in Emergency Surgery KPI 5

Title: Ensure Attendance at Emergency Surgery Educational Course

Description	Hospitals receiving emergency surgery patients mandate that surgical providers of emergency surgery attend a minimum of one CME approved course containing streams that deal with emergency surgery care.
Rationale	Well educated emergency surgery providers with ensure the best patient outcomes. Patient safety will be enhanced. In addition staff satisfaction will increase creating a palpable positive efficient working environment.
Target	>80% doctors on call attended a CME recognised Emergency Surgery Educational course or general surgery course with an emergency stream.
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of doctors on the emergency on call roster **Denominator**: Number of doctors on the emergency on call roster who had attended a surgical course
Reporting aggregation	Hospital 1
Data sources	Chair Department of Surgery, Director of Surgical Training

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European Board of Surgery Qualification in Emergency Surgery:

The European Board of Surgery Qualification (EBSQ) in Emergency Surgery is awarded by the European Union of Medical Specialists (UEMS). It is a 2-stage quality validation process consisting of an Eligibility assessment and an Examination leading to the award of the title „Fellow of the European Board of Surgery in Emergency Surgery – F.E.B.S./EmSurg."

A UEMS fellowship (F.E.B.S.) represents a high-level validated quality controlled process and reflects certain knowledge and skills of a candidate. The title F.E.B.S./EmSurg will confirm that the holder has successfully demonstrated knowledge and skills in Emergency Surgery that, in most cases, far exceed the requirements of a national Certificate of Completion of Specialist Training

The WHO Integrated Management for Emergency & Essential Surgical Care e-learning toolkit (CD) has been developed by the Clinical Procedures Unit in collaboration with the Global Initiative for Emergency & Essential Surgical Care memberEmergency Abdominal & Thoracic Surgery for the General Surgeon

Patient Related Outcomes Measures

Patient Reported Outcome Measures in Emergency Surgery

Drake, A., Bendinelli, C., Maier, R., Murphy, S.

Introduction (300) 245

Patient reported outcome measures play an increasing role in healthcare research and policy. However there is debate on their use and impact on quality outcomes for patients following emergency surgery.

Studies have focused on clinical outcomes and less is known about how unplanned general surgical problems impact on patient reported outcomes [1]. Randomised controlled trials in surgery can be challenging to conduct, and trials in the emergency surgical setting when patients have unplanned hospital admissions are particularly difficult. One area of challenge is capturing baseline patient reported outcome (PRO) data [2]. It has been argued that if healthcare providers make greater use of patient reported outcome measures a number of potential improvements to the quality of patient care may result [3].

Since April 2009, all providers of NHS funded care in England have been required to collect preoperative and postoperative data of patients own assessments of their health related quality of life for four surgical procedures. These patient reported outcome measures (PROMs) use validated survey tools and enable the calculation of health related quality-of-life changes following surgery. It is argued that PROMs have the potential to improve patient care and resource use, by enabling comparisons between interventions and healthcare providers [4,5,6].

This paper will present the themes extracted from the literature in relation to patient reported outcome measures and the impact on quality outcomes following emergency surgery. 6 KPIs will then be presented with a view to measuring the use of PROMs in emergency surgery.

Methods (200) 236

A considerable body of literature on the concept of emergency surgery exists however there is a dearth of literature in relation to Patient reported outcome studies and emergency surgery. The aim of this review is to identify the evidence that exists regarding the impact of patient reported outcome data on advances in emergency surgery. Key issues addressed within this review are the body of literature from an international perspective and to what extent this literature has impacted on the practice of emergency surgery. The methodology for the review incorporated a fully inclusive and comprehensive search for literature pertaining to the subject and considered literature from an international, national and local perspective. The review looked for examples in Ireland, the UK, Europe, the US and globally. It covered the Health Service Executive (HSE) in Ireland, the National Health Service (NHS) in the UK, health systems from other countries such as Australia, Sweden, Canada and Finland, other public sectors, the private sector and professional organisations. Extensive

searches were undertaken of medical, nursing and social science databases. These included Swetswise, Emerald, Science Direct, WHO, Athens databases held by the HSE West, Cinhahl, Medline and databases imported through Endnote. Other sources reviewed were publications from Learned Societies, Colleges and government bodies. Literature was evaluated according to the hierarchy of evidence with papers within the review taken from various levels such as empirical papers, governmental reports and peer reviewed journal papers.

Results (700) 250

It has been argued that if healthcare providers make greater use of patient reported outcome measures in routine practice a number of potential improvements to the quality of patient care may result [3]. There are challenges to designing high quality RCTs in emergency surgery as admission to the hospital is unplanned, and patients are acutely unwell making collection of base line data difficult. Furthermore, evidence of patients' experiences of emergency surgical care is particularly lacking [7,8].

PROs can be assessed using questionnaires known as patient reported outcome measures (PROMs). It is difficult for patients in the emergency situation to complete these questionnaires due to their condition and often lack of time due to the requirement of speedy interventions. However the longterm impact of PROs is needed to establish clinical effectiveness of treatments [2]. A study conducted in 2016 [1] measured 35 PRO domains and found the most frequently measured domain was pain using the visual analogue scale as the PROM. Other PROMs identified were the Gastrointestinal quality of life index (GIQLI), Short form -36 (SF36), EQ-5D and other visual analogue tools. None of the methods used to assess PROs were specific to unplanned surgical settings. However the studies demonstrated the importance of incorporating patient reported outcome measures in the care pathway for emergency surgical procedures. Patient reported outcomes have also been evaluated in other unplanned settings such as intensive care units, traumatic brain injury and acute medical admissions [9,10]. Similar problems were identified such as lack of PROMs specific to unplanned conditions.

Conclusion (800) 100

Patient recruitment and selection of baseline PRO data within emergency surgery is achievable. Currently little is known about PROs in unplanned surgery and whether standards of reporting are being met [1]. Further work is required to optimise the collection of PRO data on this cohort. This may involve areas of future research to optimise PRO evaluation in emergency surgery.

- Develop a PROM which has been validated in an emergency surgery population
- Develop disease specific PROMs
- Develop a core outcome set for emergency surgery studies
- Conduct more research into PROMs in emergency surgery
- Further training for clinicians re PROMs

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KPIs

1. Mortality Rates for patients following emergency laparotomy
2. Patient Related Outcome Measures adopted
3. Unexpected Secondary Procedure rate (IR or reop) for post laparotomy patients
4. Mortality for rescue surgery for leaking anastamosis, post op sepsis, post op bleeding
5. Deep organ infections/abscesses
6. Complications (UTI, pneumonia, SSI, sepsis, DVT/PE, unplanned reoperation)
7. Nurse led discharge readmission rat

Topic Title: Patient Related Outcome Measures

Patient Related Outcome Measures KPI 1

Title: Mortality Rates for patients following emergency laparotomy

Description	Mortality rate up to 30 days following emergency laparotomy or laparoscopy
Rationale	International mortality varies with a mean mortality of 13% reported post emergency laparotomy. Improvements should have mortality <10%
Target	<10%
KPI collection frequency	6 monthly
KPI reporting frequency	Yearly
KPI calculation	**Numerator:** Number of emergency patients dying within 30 days of emergency abdominal surgery **Demominator**: Number of emergency surgery patients having abdominal surgery
Reporting aggregation	Regional or state/country wide, age, gender
Data sources	Administrative data, operative logs, Emergency Surgery Registry

Patient Related Outcome Measures KPI 2

Title: Patient Related Outcome Measures adopted. Satisfation scores and PROM are recorded uding a recognised outcome tool between 2 weeks and 1 year after surgery

Description	Patient related outcomes measurement is an integral part of patient care.
Rationale	To ensure care is continually improved
Target	80%
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	**Numerator:** Number of emergency patients having a PROM score recorded within 12 months of emergency abdominal surgery **Demominator**: Number of emergency surgery patients having abdominal surgery

Reporting aggregation	Regional or state/country wide, age, gender
Data sources	Administrative data, case notes

Patient Related Outcome Measures KPI 3

Title: Unexpected Secondary Procedure rate (IR or reop) for post laparotomy patients

Description	Unexpected surgery is associated with increased morbidity and mortality. Awareness of the rate is essential to understanding both the complexity of patients underlying illness and the service they are delivered.
Rationale	High unexpected secondary procedure rates indicate either higher risk cohort of patients or sub-optimal care
Target	<5%
KPI collection frequency	6 monthly
KPI reporting frequency	Yearly
KPI calculation	**Numerator:** Number of emergency patients have unexpected return to the operating room for surgery **Demominator**: Number of emergency surgery patients having surgery
Reporting aggregation	Regional or state/country wide, age, gender
Data sources	Administrative data, operative logs, Emergency Surgery Registry

Patient Related Outcome Measures KPI 4

Title: Mortality for rescue surgery for leaking anastomosis, post op sepsis, post op bleeding following abdominal surgery

Description	Mortality rates poster-operative sepsis and bleeding in patients undergoing emergency laparotomy and emergency laparoscopy
Rationale	Understanding mortality and it causes are essential to improving outcomes. It will also allow prioritization. It will provide population attributable fractions for each complication
Target	Post laparotomy/laparoscopy bleeding <6%
KPI collection frequency	Annually
KPI reporting frequency	Annually

KPI calculation	**Numerator:** Number of emergency patients having an leaking anastomotic leak, post op sepsis, post op bleeding following abdominal surgery **Demominator:** Number of emergency surgery patients having abdominal surgery
Reporting aggregation	Regional or state/country wide, age, gender
Data sources	Administrative data, operative logs, Emergency Surgery Registry

Patient Related Outcome Measures KPI 5

Title: Nurse led discharge readmission rates

Description	Reduction in readmission rates following nurse facilitated discharge
Rationale	To refine patient flow and reduce AVLOs
Target	90%
KPI collection frequency	6 monthly
KPI reporting frequency	6 monthly
KPI calculation	**Numerator:** Number of emergency patients having readmission abdominal surgery who had a nurse aided discharge **Demominator:** Number of emergency surgery patients discharged having abdominal surgery
Reporting aggregation	Regional or state/country wide, age, gender
Data sources	Administrative data, case notes, HIS

Patient Related Outcome Measures KPI 6

Title: Deep organ infections/abscesses

Description	
Rationale	Deep infection is a serious complication of primary sepsis and rate above 5% are unacceptable
Target	<5%
KPI collection frequency	Annually
KPI reporting frequency	Annually

KPI calculation	**Numerator:** Number of emergency patients having deep organ /cavity space infection/collection following abdominal surgery **Demominator:** Number of emergency surgery patients having abdominal surgery
Reporting aggregation	Regional or state/country wide, age, gender
Data sources	Administrative data, operative logs, Emergency Surgery Registry

Section 2

KPI’s only

Appendicitis

Topic Title: Appendicitis

Appendicitis KPI 1

Title: Negative appendectomy rate

Description	Percentage of negative appendectomies
Rationale	It is an indicator of diagnostic efficiency. In order to avoid useless surgery and decrease costs.
Target	< 10% of negative appendectomies
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients underwent appendectomy with negative appendectomy **Denominator:** Number of all patients underwent appendectomy
Reporting aggregation	Hospital, Hospital group
Data sources	OR registry, Medical records, Patients Chart, Hospital Discharge data, Emergency Surgery Database

Appendicitis KPI 2

Title: Perforated appendicitis rate

Description	Percentage of perforated appendicitis among patients undergoing appendectomy
Rationale	The percentage of perforated appendicitis is an indicator of diagnostic and treatment efficiency
Target	< 20% of perforated appendectomies
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients underwent appendectomy with perforated appendicitis **Denominator:** Number of all patients underwent appendectomy

Reporting aggregation	Hospital, Hospital group
Data sources	OR registry, Medical records, Patients Chart, Hospital Discharge data, Emergency Surgery Database

Appendicitis KPI 3

Title: Laparoscopic approach rate

Description	Percentage of laparoscopic approach among patients undergoing appendectomy for appendicitis
Rationale	The laparoscopic approach in acute appendicitis has been demonstrated to lead to less postoperative pain, shorter length of stay and earlier return to work and physical activity therefore lowering overall hospital and social costs, improved cosmesis, significantly fewer complications in terms of wound infection. In experienced hands, laparoscopy has been demonstrated to be more beneficial and cost-effective than open surgery for complicated appendicitis
Target	> 95% for uncomplicated appendicitis, > 80% for complicated appendicitis
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients underwent laparoscopic appendectomy **Denominator:** Number of all patients underwent appendectomy
Reporting aggregation	Hospital, Hospital group
Data sources	OR registry, Medical records, Patients Chart, Hospital Discharge data, Emergency Surgery Database

Appendicitis KPI 4

Title: Laparotomic conversion rate

Description	Percentage of laparotomic conversion among laparoscopies for acute appendicitis
Rationale	The rate of laparotomic conversion mirrors the level of surgical skills of the operator. The lower it is, the more skilled is the surgeon, both in uncomplicated and complicated appendicitis.
Target	< 5% for uncomplicated appendicitis, < 15% for complicated appendicitis
KPI collection	Annually

frequency	
KPI reporting frequency	Annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients underwent appendectomy with laparoscopic approach and converted to laparotomic appendectomy **Denominator:** Number of all patients underwent laparoscopic appendectomy
Reporting aggregation	Hospital, Hospital group
Data sources	OR registry, Medical records, Patients Chart, Hospital Discharge data, Emergency Surgery Database

Appendicitis KPI 5

Title: Postoperative morbidity rate

Description	Percentage of postoperative complications (surgical site infection or intra-abdominal abscess) after either laparoscopic or laparotomic appendectomy for either uncomplicated or complicated acute appendicitis
Rationale	The percentage of postoperative complications (especially surgical site infection and intra-abdominal abscess) is the major determinant of outcomes and costs. Higher morbidity can easily lead to longer length of stay, higher costs, later return to work and physical activities, higher social costs and, last but not least, morbidity can cause re-operations and may be associated with potential mortality. SSI is significantly more common in open appendectomy, while IAA is slightly more common in laparoscopic appendectomy.
Target	Overall Open < 10%, Overall Lap < 5%, Overall Uncomplicated open <8%, Overall Uncomplicated lap <5%, Overall Complicated open <15%, Overall Complicated lap < 10%
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients underwent appendectomy (either laparoscopic or laparotomic, for either uncomplicated or complicated acute appendicitis) that developed a post-operative complication **Denominator:** Number of all patients underwent appendectomy (either open or laparoscopic)
Reporting aggregation	Hospital, Hospital group
Data sources	Medical records, Patients Chart, Hospital Discharge data, Outpatient records

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Cholecystitis

Topic Title: Cholecystitis

Cholecystitis KPI 1

Title: Patients admitted with suspected cholecystitis should have their abdominal US done on the day of admission

Description	Performance of Abdominal US
Rationale	Timely investigation to obtain the diagnosis of cholecystitis is important. Patients presenting during working hours should be prioritized to have the US on that day. They may then be potentially scheduled for surgery the following day on the Emergency List.
Target	80% of patients presenting to Emergency Department before 1600 hours and admitted with cholecystits should have an abdominal US on that day
KPI collection frequency	Monthly
KPI reporting frequency	Monthly
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of emergency surgery patients admitted with cholecytitis, having presented to Emergency prior to 1600 who have an abdominal US **Denominator:** Number of emergency surgery patients admitted with cholecytitis, having presented to Emergency prior to 1600
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Data base, radiology reporting systems

Cholecystitis KPI 2

Title: Hospital mortality in ACC

Description	Percentage of patients with ACC dying during the first 30 days period
Rationale	At least 95% patients with ACC should survive the initial 30 days period
Target	>95% of patients with ACC surviving the initial 30 days period
KPI collection frequency	Semi-annually
KPI reporting frequency	Semi-annually
KPI	Numerator divided by denominator expressed as a percentage

calculation	**Numerator:** Number of patients with ACC surviving the initial 30 days period **Denominator:** Number of all patients with ACC admitted
Reporting aggregation	National, regional, LHO area, hospital, age, gender
Data sources	Administrative data, Medical records

Cholecystitis KPI 3

Title: Benefit and risk of laparoscopic surgery for ACC (conversion rate)

Description	Percentage of patients with ACC operated on with laparoscopy with conversion to open surgery
Rationale	Liberality in conversion indication is beneficial for patients with ACC
Target	>65% of patients undergoing laparoscopic cholecystectomy for ACC conclude laparoscopically the intervention
KPI collection frequency	Semi-annually
KPI reporting frequency	Semi-annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients with ACC operated on concluded laparoscopically **Denominator:** Number of all patients with ACC operated on laparoscopically
Reporting aggregation	National, regional, LHO area, hospital, age, gender
Data sources	Administrative data, Medical records

Cholecystitis KPI 4

Title: Laparoscopic surgery

Description	Percentage of patients with ACC operated on with laparoscopic initial attempt
Rationale	Initial laparoscopic attempt in ACC surgery is appropriate
Target	>80% of patients with ACC undergoing surgery receive an initial laparoscopic approach
KPI collection frequency	Semi-annually

KPI reporting frequency	Semi-annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients with ACC undergoing surgery receiving initial laparoscopic approach **Denominator:** Number of all patients with ACC undergoing surgery
Reporting aggregation	National, regional, LHO area, hospital, age, gender
Data sources	Administrative data, Medical records

Cholecystitis KPI 5

Title: Timing of surgery

Description	Percentage of patients with ACC operated on with operation performed within first 6 days post-admission
Rationale	Appropriate timing for operative management of ACC is within 6 days post-admission in most patients
Target	>90% of patients with ACC are operated within 6 days post-admission
KPI collection frequency	Semi-annually
KPI reporting frequency	Semi-annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients with ACC operated within 6 days post-admission **Denominator:** Number of all patients with ACC operated
Reporting aggregation	National, regional, LHO area, hospital, age, gender
Data sources	Administrative data, Medical records

Cholecystitis KPI 5

Title: Patients admitted with cholecystitis need to be assessed by a consultant grade surgeon within 12 hours of admission

Description	Documented consultant review
Rationale	Senior input in patients with cholecystitis will optimise care and expedite investigation and surgery
Target	80% of Patients admitted with cholecystitis need to be assessed by a consultant grade surgeon within 12 hours of admission
KPI collection frequency	6 monthly
KPI reporting frequency	6 monthly
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Patients admitted with cholecystitis need to be assessed by a consultant grade surgeon within 12 hours of admission **Denominator:** Total patients admitted with cholecystitis need to be assessed by a consultant grade surgeon within 12 hours of admission
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Database, patients notes

Cholecystitis KPI 6

Title: Index admission surgery is undertaken in patients presenting with cholecystitis

Description	Patients admitted with cholecystitis get surgery on their first admission
Rationale	Early surgery is indicated in most patients. A number of patients will decline or be unfit for surgery
Target	60% of patients admitted with cholecystitis get surgery on their first admission
KPI collection frequency	6 monthly
KPI reporting frequency	6 monthly
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients admitted with cholecystitis having surgery on their first admission **Denominator:** Number of patients admitted with cholecystitis

Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Database, OR registry

Cholecystitis KPI 7

Title: Surgery in patients below 80 years

Description	Percentage of patients ≤80 years with ACC operated on during acute episode
Rationale	Patients with ACC ≤80 years (without high risk due to comorbidities) should be operated during the acute episode
Target	>80% of patients admitted for ACC are operated during the acute episode
KPI collection frequency	Semi-annually
KPI reporting frequency	Semi-annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients with ACC ≤80 years operated during the acute episode **Denominator:** Number of all patients with ACC ≤80 years admitted to the hospital
Reporting aggregation	National, regional, LHO area, hospital, age, gender
Data sources	Administrative data, Medical records

Cholecystitis KPI 8

Title: Patients admitted with Cholecystitis have either an amylase/lipase performed with admission bloods

Description	
Rationale	Detection of Gallstone pancreatitis may alter treatment
Target	95% of patients patients admitted with Cholecystitis have either an amylase/lipase performed with admission bloods
KPI collection frequency	Monthly
KPI reporting	Monthly

frequency	
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of emergency surgery patients admitted with cholecystitis who have either an amylase/lipase performed with admission bloods **Denominator:** Number of emergency surgery patients admitted with cholecystitis
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Database, laboratory systems

Cholecystitis KPI 9

Title: Reporting of the outcomes from surgery

Description	Documented reported outcome from surgery
Rationale	The incidence of complication needs to be report form hospitals to maintain quality and improve outcome
Target	100% of patients undergoing cholecystectomy are entered into a hospital wide registry with data retrevable for bilel eak bleeding and bile duct injury
KPI collection frequency	6 monthly
KPI reporting frequency	6 monthly
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Reporting of the outcomes from surgery **Denominator**: 6 months
Reporting aggregation	Hospital
Data sources	Emergency Surgery Database, patients notes

Pancreatitis

Acute pancreatitis

In the majority of patients acute pancreatitis is a mild self-limiting disease. About 15% of the patients develop severe disease defined by development of persistent organ failure[1]. The mortality in acute pancreatitis is mainly associated with multiple organ failure (MOF), whereas the risk of dying is minimal in patients with no or transient organ dysfunction[2-4]. MOF develops early during the course of acute pancreatitis, over half of the patients with severe pancreatitis have signs of organ dysfunction on hospital admission and most of the organ dysfunctions develop within the first four days after admission[3, 5]. Over half of the deaths occur within the first week from onset of the disease, and deaths usually occurred within a week after manifestation of MOF[6].

Treatment modalities of MOF are supportive including fluid replacement therapy, vasopressors, mechanical ventilation and renal replacement therapy when necessary. In patients with acute pancreatitis, abdominal compartment syndrome (ACS) may aggravate MOF, and therefore, monitoring of intra-abdominal pressure (IAP) is crucial for identification of patients at risk of ACS[7]. Development of ACS should be prevented, if possible, by conservative methods. Surgical decompression is the last but the most effective way to decrease IAP and should not be postponed too late if patient has developed ACS[8, 9]. Currently, the safest temporary abdominal closure technique seems to be the mesh-mediated vacuum-assisted closure[10-12].

Patients with acute pancreatitis have a considerable risk for developing secondary infections including bacteremia, pneumonia and infection of pancreatic or peripancreatic necrosis. Extrapancreatic infections occur predominantly during the first week of illness, whereas pancreatic necrosis becomes infected later[13]. Organ failure, early bacteremia and the extent of pancreatic necrosis are associated with increased risk of infected necrosis[13]. Surgical necrosectomy is the last resort if more conservative management including percutaneous drainage fail[14].

The mortality is very high in patients with persistent organ failure complicated with infected pancreatic necrosis[15].

Statement 1. Patients with acute pancreatitis and signs of early organ dysfunction benefit from early admission to an Intensive Care Unit (ICU).

Statement 2. Nonoperative management of intra-abdominal hypertension (IAH) in an ICU environment is effective in preventing the development of abdominal compartment syndrome (ACS).

Statement 3. High delayed fascial closure (DFC) rates can be achieved with the mesh-mediated vacuum assisted closure technique.

Statement 4. Appropriately timed necrosectomy of infected pancreatic necrosis at the walled-off (WON) stage will result in significant improvement in organ functions at the early postoperative phase.

Statement 5. With modern management the hospital mortality rate of severe acute pancreatitis should remain below 20%.

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Open abdomen in acute pancreatitis

There are two clinical conditions where open abdomen can be used as a treatment strategy in patients with severe acute pancreatitis (SAP); either to treat intra-abdominal hypertension (IAH) and abdominal compartment syndrome (ACS), or as a method to treat infected pancreatic necrosis.

IAH is present in the majority of patients with SAP treated in an Intensive Care Unit (ICU), and ACS develops in a fraction of them, usually within the first few days and associated with excessive fluid resuscitation[1, 2]. Recent studies show also that intra-abdominal ischemia is common in SAP patients with ACS[3]. Therefore, monitoring of intra-abdominal pressure (IAP) is crucial for identification of patients at risk of ACS [2]. Development of ACS should be prevented, if possible, by conservative methods. Surgical decompression is the last but the most effective way to decrease IAP and should not be postponed too late if patient has developed ACS[4, 5]. Surgical decompression has a marked effect on organ function, especially among subsequent survivors[5, 6]. Although many temporary abdominal closure techniques (TAC) are in use, the mesh-mediated vacuum-assisted closure seems to have the highest fascial closure and lowest enteric fistula rates[7-10].

With the new definitions of pancreatic necrosis, the acute necrotic collection (ANC) and walled-off necrosis (WON) and better understanding of the natural progress of the disease process, the management of infected pancreatic necrosis has undergone a shift towards a more conservative approach as well as postponing surgical intervention well after 4 weeks of the onset of the symptoms[11-14]. Although in the past, the open abdomen strategy was offered as an alternative to closed drainage after open necrosectomy, retrospective studies have shown that the results of the open abdomen strategy are poor compared with closed and minimally invasive procedures[15].

Statement 1. Surgical decompression and leaving the abdomen open is a safe and effective technique to treat IAH and ACS in patients with SAP

Statement 2. Leaving the abdomen open after surgical necrosectomy for infected pancreatic necrosis should not be recommended.

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Key Performance Indicators

Abdominal Compartment Syndrome and TAC

Which is the optimum technique for temporary abdominal closure in non-trauma patients?

Marja Boermeester

- Temporary Abdominal Closure without NPWT
- NPWT not-commercial
- NPWT commercial
- NPWT with dynamic component
- Is there a role for fluid instillation?

Marja Boermeester, NL

Recommendations:

1. NPWT with a dynamic component (mesh-mediated fascial traction or dynamic sutures) give the best results in terms of delayed fascial closure, but dynamic sutures result more often in fistula. NPWT without a dynamic component (Barker's VAC or commercial products) for the use of temporary fascial closure has a moderate delayed fascial closure rate and a high fistula rate similar to mesh closure without NPWT. Newer commercial devices (e.g., Abthera) have limited data in the setting of temporary abdominal closure in non-trauma patients, but have a trend towards lower mortality. The panel suggest the use of NPWT with continuous mesh-mediated fascial traction as the preferred technique for temporary abdominal closure.
   (weak recommendation, low quality of evidence)

2. The panel suggests not to use Temporary Abdominal Closure without NPWT (e.g., mesh, Bogota bag) for the purpose of temporary abdominal closure, because of low delayed fascial closure rate and being accompanied by a significant intestinal fistula rate.
   (strong recommendation, low quality of evidence)

3. No recommendation can be made about the use of NPWT in combination with fluid instillation in situations of temporary abdominal closure due to the lack of available evidence.

Background

Several challenging clinical situations in patients with peritonitis can result in an open abdomen (OA) and subsequent temporary abdominal closure (TAC). Indications and treatment choices differ among surgeons. The risk of fistula development and the possibility to achieve delayed fascial closure differ between techniques. The aim of this study was to review the literature on the OA and TAC in peritonitis patients, to analyse indications and to assess delayed fascial closure, enteroatmospheric fistula and mortality rate, overall and per TAC technique.

Methods

This systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guideline.

Literature search

A systematic literature search was performed in Medline (PubMed), EMBASE (Ovid) and the Cochrane Central Register of Controlled Trials on 3 January 2014 to identify studies describing the open abdomen and temporary abdominal closure in patients with (secondary) peritonitis. The search strategy was constructed in consultation with a clinical librarian. Search terms related to open abdominal management and temporary abdominal closure techniques were used. No restrictions regarding language or publication date were applied. Bibliographies of all included articles and relevant review papers were searched manually for additional relevant articles. Titles and abstracts were screened by two authors independently. Disagreement on relevance was addressed by discussion and consensus. Subsequently, full-text articles were retrieved and read by both authors.

Study selection

To be eligible for inclusion, studies had to describe the open abdomen and temporary abdominal closure in patients with peritonitis of non-traumatic origin. Studies including open abdomen patients with various aetiologies were included if more than 50% of the described patients had an AO due to peritonitis, or if data concerning peritonitis patients could be derived separately. Furthermore, studies had to provide information about the applied temporary abdominal closure technique and had to report on at least two of the following outcomes of interest: delayed fascial closure rate, enteroatmospheric fistula rate and mortality. Only articles of which the full text was written in English, German, Spanish or Dutch were included. Review articles, opinion papers, case reports (< 5 patients), paediatric series, series with other than midline incisions, animal and laboratory studies and studies including ≤ 50% peritonitis patients or studies not reporting results for peritonitis patients separately were excluded. If multiple articles reported on the same patient population, only one study was included based on relevance and population size. In case articles described separate patient

series based on underlying conditions, all series fulfilling the inclusion criteria were included separately. Studies including both patients with an open abdomen and patients undergoing closed abdominal management were only considered for inclusion if separate data was available for patients with an open abdomen.

Methodological quality assessment

The methodological quality of all included articles was assed. The five-point Jadad score was used for quality assessment of randomized comparative studies.[8] For non-randomized observational studies, the nine-point Newcastle–Ottawa Scale was used.[9] Because one item on this nine-point scale was considered irrelevant regarding the subject of this systematic review ("demonstration that outcome of interest was not present at start of study"), the maximum score was eight instead of nine.

Results

Search retrieval

The search identified 74 studies describing 78 patient series, comprising 4358 patients of which 3461 (79%) had peritonitis. The overall quality of the included studies was low and the indications for open abdominal management differed considerably. Negative pressure wound therapy (NPWT) was the most frequent described TAC technique (38 of 78 series).

Weighted outcome data

Weighted percentage of patients with an aetiology of peritonitis, delayed primary fascial closure, enteroatmospheric fistula and mortality per temporary abdominal closure technique

TAC technique	**Series *n***	**Patients *n***	**Peritonitis etiology**		**Fascial closure**		**Fistula**		**Mortality**	
			%	**(95% CI)**	**%**	**(95% CI)**	**%**	**(95% CI)**	**%**	**(95% CI)**
NPWT	32	1627	82.8 †	(77.5-87.0)	51.5†‡	(46.6-56.3)	14.6†	(12.1-17.6)	30.0†	(25.6-34.8)
NPWT with fascial traction	6	463	90.3 †‡	(69.6-97.4)	73.1†	(63.3-81.0)	5.7†‡	(2.2-14.1)	21.5†	(15.2-29.5)
Dynamic retention sutures	5	77	80.1	(60.7-91.2)	73.6	(51.1-88.1)	11.6	(4.5-26.9)	11.1	(4.5-25.0)
Mesh	8	583	84.6 †‡	(72.9-91.8)	34.2†‡	(9.7-71.5)	17.2†	(9.3-29.5)	34.4†‡	(23.0-48.0)
Bogota bag	6	363	88.5 †‡	(74.1-95.4)	47.0†‡	(14.1-82.7)	10.4†	(5.9-17.8)	27.1†	(18.0-38.6)
Zipper	5	124	92.9	(85.3-96.8)	34.0†	(16.7-56.9)	12.5	(7.0-21.2)	39.1	(30.8-48.0)
Loose packing	2	42	96.6	(84.2-99.3)	NA		15.7	(7.4-30.4)	40.0†	(25.5-56.5)
Wittmann patch*	1	128	85		NA		3		24	

† = $\chi^2 < 0.1$, ‡ = $I^2 > 75\%$, * = actual numbers given instead of percentages
TAC = temporary abdominal closure, NPWT = negative pressure wound therapy, na = not applicable (combined number of patients

Temporary abdominal closure techniques

In 68 of the 78 series only one type of TAC was evaluated. The remaining 10 series consisted of patients treated with various abdominal closure techniques. Negative pressure wound therapy (NPWT) was described in 32 series (41%) of open abdomen patients.[1;5;10;12;16;17;19;20;24;25;28;29;37-39;41;42;53;55-68] Six series (8%) described NWPT in combination with fascial traction (mesh or sutures).[30;34;35;69-71] In eight series (10%) non-absorbable and/or absorbable meshes were used.[14;21-23;48;51;72;73] The Bogota bag was applied in six series (8%).[13;14;31;46;49;74] Zippers were applied in five series (6%).[32;33;44;50;75] Five series (6%) included patients treated with dynamic retention sutures.[36;40;76-78] Two series (3%) described loose packing.[26;54] The Wittmann patch was used in one series (1%).[79] Three series (4%) applied different temporary abdominal closure techniques that did not fall into one of the categories.[13;43;47]

Delayed Primary Fascial Closure

The delayed fascial closure rate was reported in 63 of the 78 included series and ranged from 3.2% to 100% with an overall weighted closure rate of 50.2% (95 per cent c.i. 43.4-57.0%, χ^2 p<0.001, I^2=90%). The weighted rates per temporary abdominal closure technique are given in Table 3. The highest weighted fascial closure rate was seen for NPWT *with* fascial traction (73.1%, 95 per cent c.i. 63.3-81.0%, χ^2 p=0.008, I^2=68%) and dynamic retention sutures (73.6%, 95 per cent c.i. 51.1-88.1%, χ^2 p=0.041, I^2=60%). Temporary abdominal closure using a mesh or zipper showed the lowest delayed closure rates (34.2%, 95 per cent c.i. 9.7-71.5%, χ^2 p<0.001, I^2=95% and 34.0%, 95 per cent c.i. 16.7-56.9%, χ^2 p=0.034, I^2=70%, respectively). In nine studies it was not clearly described if any attempts to achieve delayed fascial closure were made.[14;22;24;32;44;45;54;73;80]

Prospective studies

Twenty-two series of the included 78 (28%) were (part of) prospective studies. Temporary abdominal closure using NPWT was described in ten series, four series described NPWT combined with fascial traction. The remaining eight prospective series described the use of mesh (2), bogota bag (1), Wittmann patch (1), zipper (1) and various TAC techniques (3). The prospective series on mere NPWT (608 patients) showed a weighted fascial closure rate of 53.9% (95 per cent c.i. 42.2-65.3, χ^2 p=<0.001, I^2=77%) and a fistula rate of 9.8% (95 per cent c.i. 6.5-14.5, χ^2 p=0.228, I^2=23%). The four prospective series on NPWT with fascial traction (411 patients) showed a weighted fascial closure rate of 77.8% (95 per cent c.i. 70.4-83.9, χ^2 p=0.109, I^2=51%) and a fistula rate of 4.3% (95 per cent c.i. 2.4-7.7, χ^2 p=0.261, I^2=25%). These prospective data per closure type are in line with the overall results when the retrospective studies are included as well.

Methodological quality of included study

The methodological quality of the only randomized trial scored 3 points on the Jadad scale.[22] Regarding the remaining studies, the methodological quality was assessed using the Newcastle–Ottawa Scale (maximum score 8 points); thirty-two studies scored 3 points, eight studies 4 points, thirty-two studies 5 points and one study was awarded 7 points.

A. Randomized comparative studies

Reference	Jadad Scale (maximum of 5 points)			
	Randomization	Blinding	Withdrawals	Total
Robledo	2	0	1	3

B. Non randomized observational studies

Reference	Newcastle Ottowa Scale (maximum of 8 stars)								
	Selection			Comparability		Outcome			Total
	Representativeness of included patients	Selection of the comparative cohort	Ascertainment of exposure	Comparability of cohorts on the basis of underlying disease	Comparability of cohorts on the basis of indication for TAC	Assessment of outcome	Adequacy of follow-up length	Lost to follow-up acceptable (less than 10% and reported)	
Bertelsen	*	-	*	-	-	*	*	*	*****
Carlson	*	*	-	*	-	-	*	*	****
Fortelny	*	-	*	-	-	*	*	*	*****
Goussous	*	-	-	-	-	-	*	*	***
Haddock	*	-	*	-	-	*	*	*	*****
Huang	*	-	-	-	-	*	*	*	****
Khan	*	-	-	-	-	*	*	*	****
Pliakos	*	-	*	-	-	*	*	*	*****
Richter	*	-	*	-	-	*	*	*	*****
Zielinksi	*	-	*	-	-	*	*	*	*****
Dietz	*	-	-	-	-	-	*	*	***
Goussous	*	-	*	-	-	*	*	*	*****
Kafka-Ritsch	*	-	*	-	-	*	*	*	*****

Kafka-Ritsch	*	-	*	-	-	-	*	*	****
Kleif	*	-	*	-	-	*	*	*	*****
Perez Dominquez	*	-	-	-	-	-	*	*	***
Plaudis	*	-	*	-	-	*	*	*	*****
Pliakos	*	-	-	*	-	-	*	*	****
Rasilainen	*	*	-	*	-	-	*	*	*****
Salman	*	-	-	-	-	-	*	*	***
Acosta	*	-	*	-	-	*	*	*	*****
Caro	*	-	-	-	-	-	*	*	***
Fieger	*	-	-	-	-	-	*	*	***
Manterola	*	-	*	-	-	*	*	*	*****
Prichayudh	-	-	*	-	-	*	*	*	****
Verdam	*	-	*	-	-	*	*	*	*****
Kritayakirana	*	-	*	-	-	*	*	*	*****
Lopez-Quintero	*	-	*	-	-	*	*	*	*****
Padalino	*	-	*	-	-	*	*	*	
Schmelze	-	-	*	-	-	*	*	*	****
Shaikh	*	-	*	-	-	*	*	*	*****
Amin	*	-	*	-	-	*	*	*	*****
Balentine	*	-	*	-	-	*	*	*	*****
Gonullu	*	-	-	-	-	-	*	*	***
Horwood	*	-	*	-	-	*	*	*	*****
Özgüc	*	-	*	-	-	*	*	*	*****
Reimer	-	-	-	-	-	*	*	*	***
Wondberg	*	-	*	-	-	*	*	*	*****
Barker	*	-	*	-	-	*	*	*	*****
Kirshtein	*	-	-	-	-	-	*	*	***
Perez	*	-	*	-	-	*	*	*	*****
Rao	*	-	*	-	-	*	*	*	*****

Wilde	*	-	-	-	-	-	*	*	***
Oetting	*	-	-	-	-	-	*	*	***
Cipolla	*	-	-	-	-	-	*	*	***
Adkins	*	-	*	-	-	*	*	*	*****
García Iñiguez	*	*	*	*	-	*	*	*	*******
Martinez-Ordaz	*	-	-	-	-	-	*	*	***
Tsue	*	-	-	-	-	-	*	*	***
Schachtrupp	*	-	-	-	-	-	*	*	***
Sokmen	*	-	*	-	-	*	*	*	*****
Doyon	*	-	-	-	-	-	*	*	***
Koniaris	*	-	*	-	-	*	*	*	*****
Tremblay	*	-	*	-	-	*	*	*	*****
Zingales	*	-	-	-	-	-	*	*	***
Bailey	*	-	-	-	-	-	*	*	***
Bosscha	*	-	-	-	-	-	*	*	***
Tons	*	-	-	-	-	-	*	*	***
Wittmann	*	-	-	-	-	-	*	*	***
Gentile	-	-	*	-	-	*	*	*	****
Losanoff	*	-	-	-	-	-	*	*	***
Losanoff	*	-	-	-	-	-	*	*	***
Smith	*	-	*	-	-	*	*	*	*****
Borck	*	-	*	-	-	*	*	*	*****
Hubens	*	-	-	-	-	-	*	*	***
Ercan	*	-	-	-	-	-	*	*	***
Hakkiluoto	*	-	-	-	-	-	*	*	***
Schein	*	-	-	-	-	-	*	*	***
Wittmann	*	-	-	-	-	-	*	*	***
Ivatury	*	-	-	-	-	-	*	*	***
Hedderich	*	-	-	-	-	-	*	*	***

Anderson	*	-	-	-	-	-	*	*	***
Hollender	*	-	-	-	-	-	*	*	***

Description of temporary abdominal closure techniques

TAC Technique	Description
NPWT	A perforated plastic sheet is positioned to cover the intestine, a polyurethane sponge or damp surgical towels/pads are placed on top, between the fascial edges. The wound is covered with an airtight seal and is centrally pierced by a suction drain, which is connected to a pomp and fluid collection system. Self-made variations of this technique (using towels/gauzes) are commonly referred to as Barkers' "Vacuum Pack". Commercial available systems include VAC Abdominal Dressing (KCI), Renasys NPWT (S&N), Avance (Mölnlycke) and ABThera Open Abdomen Negative Pressure Therapy System (KCI).
NPWT with continuous fascial traction	Modification of NPWT, using a mesh or sutures sutured to the fascial edges, which can be tightened with every NPWT system change.
Dynamic Retention Sutures	Extraperitoneally placed large, non-absorbable sutures through all layers of the abdominal wall, including the skin. Sutures can be gradually tightened. May be combined with a NPWT system. Commercial available systems include ABRA Abdominal Wall Closure System (Canica Design).
Wittmann patch ('artificial burr')	Two Velcro pieces are sutured to the fascial edges and facilitate gaining access to the abdominal cavity and gradual re-approximation of the abdominal wall. May be combined with a NPWT system.
Bogota bag	A sterile irrigation bag is sutured between the fascial edges. It can be reduced in size to approximate the fascial edges.
Mesh	An absorbable or nonabsorbable mesh is sutured between the fascial edges (usually 'inlay'). The mesh can potentially be tightened gradually. Non-absorbable meshes can be removed or left in place.
Zipper	A mesh with a zipper is sutured between the fascial edges. It is comparable to mere mesh placement but allows for a more easy access to the abdominal cavity.
Loose packing	The fascial defect is covered by standard wound dressing.

TAC = temporary abdominal closure, NPWT = negative pressure wound therapy

Reference	Year	Study design	No. of patients[+]	Peritonitis etiology (%)	Indication	TAC technique	Fascial closure (%)	Fistula (%)	Mortality (%)	NOS
Bertelsen *et al.*[88]	2013	Retrospective	101	83.1	46.6% DFI, 25.7% II, 23.7% ITC, 4.0% "fascial necrosis"	NPWT	39.6	2	39.6	5
Carlson *et al.[10]*	2013	Prospective	355	72.9	Unclear	NPWT	41.1	13.8	27.3	4
			223	66.3		Various	60.1	8.5	29.6	
Fortelny *et al.[30]*	2013	Prospective	87	100	DFI	NPWT with fascial traction	78.2	3.4	26.4	5
Goussous *et al.[15]*	2013	Retrospective	79 (of 111)	81	31% "Loss of domain", 30% II, 25% "faecal contamination", 14% "hemorrhage"	Various	58.2	7.6	19	3
Haddock *et al.[52]*	2013	Retrospective	36	61.1	DCS	DRS	83.3	0	2.8	5
Huang *et al.[71]*	2013	Retrospective	40	60	55.0% ITC, 22.5% IAH/ACS, 12.5% DFI, 10.0% II	NPWT with fascial traction	60	25	na	4
Khan *et al.[53]*	2013	Retrospective	42	54.8	DCS	NPWT	73.8	9.5	19	4
Pliakos *et al.[39]*	2013	Prospective	39	100	"Sequential Organ Failure Assessment score > 7 or Mannheim peritonitis score > 29"	NPWT	59	0	35.9	5
Richter *et al.[68]*	2013	Retrospective	81	>60.5	Unclear	NPWT	80.2	16.4	30.9	5
Zielinksi *et al.[66]*	2013	Retrospective	18	73.7	39% II, 33% "Shock", 17% PR, 6% ITC	NPWT	83.3	0	11.1	5
Dietz *et al.[43]*	2012	Retrospective	62	53.2	PR	Other	33.9	4.8	40.3	3
Goussous *et al.[83]*	2012	Retrospective	173	63.6	33% II, 31% "Fecal contamination", 23% "Loss of domain", 13% "Hemorrhage"	Various	64.2	6.3	22.6	5
Kafka-Ritsch *et al.[69]*	2012	Prospective	160	93.8	"Advanced peritonitis >1 quadrant, patients requiring rapid wound closure", PR, ACS, ITC	NPWT with fascial traction	75.6	3.1	20.6	5

Kafka-Ritsch *et al.[34]*	2012	Prospective	51	100	DCS	NPWT with fascial traction	100	0	9.8	4
Kleif *et al.[35]*	2012	Retrospective	14 (of 16)	100	DCS	NPWT with fascial traction	50	0	7.1	5
Perez Dominquez *et al.[61]*	2012	Retrospective	23	78.3	Unclear	NPWT	78.3	17.4	26.1	3
Plaudis *et al.[62]*	2012	Prospective	22	72.7	ACS and/or PR	NPWT	100	13.6	4.5	5
Pliakos *et al.[12]*	2012	Prospective	31	100	Unclear	Various	16.1	54.8	45.2	4
			27	96.3		NPWT	66.7	0	37	
Rasilainen *et al.[11]*	2012	Retrospective	54 (of 104)	61.1	59% ACS, 31% ITC, 7% "prophylactic (for IAH)", 2% IAH	Various	44.4	18.5	33.3	5
Salman *et al.[76]*	2012	Retrospective	7	85.7	Unclear	DRS	85.7	0	14.3	3
Acosta *et al.[70]*	2011	Prospective	111	51.4	69.4% ITC, 26.1% DFI, 19.8% IAH/ACS, 12.6% II	NPWT with fascial traction	76.6	7.2	29.7	5
Caro *et al.[56]*	2011	Retrospective	46	67.4	"Anticipated high risk of developing IAH/ACS; intestinal edema or difficulty to close"	NPWT	21.7	17.4	32.6	3
Fieger *et al.[57]*	2011	Retrospective	82	95	Unclear	NPWT	42.7	19.5	11	3
Manterola *et al.[49]*	2011	Prospective	86	64	PR	Bogota bag	39.5	12.8	11.6	5
Prichayudh *et al.[20]*	2011	Retrospective	19 (of 73)	78.9	"Primary closure impossible or dangerous"	NPWT	10.5	31.6	na	4
Verdam *et al.[77]*	2011	Retrospective	18	83.3	Unclear	DRS	77.8	16.7	11.1	5
Kritayakirana *et al.[19]*	2010	Retrospective	35 (of 103)	51.4	II, DFI, PR, DCS, IAH, "necrotizing abdominal wall infection"	NPWT	60	17.1	31.4	5

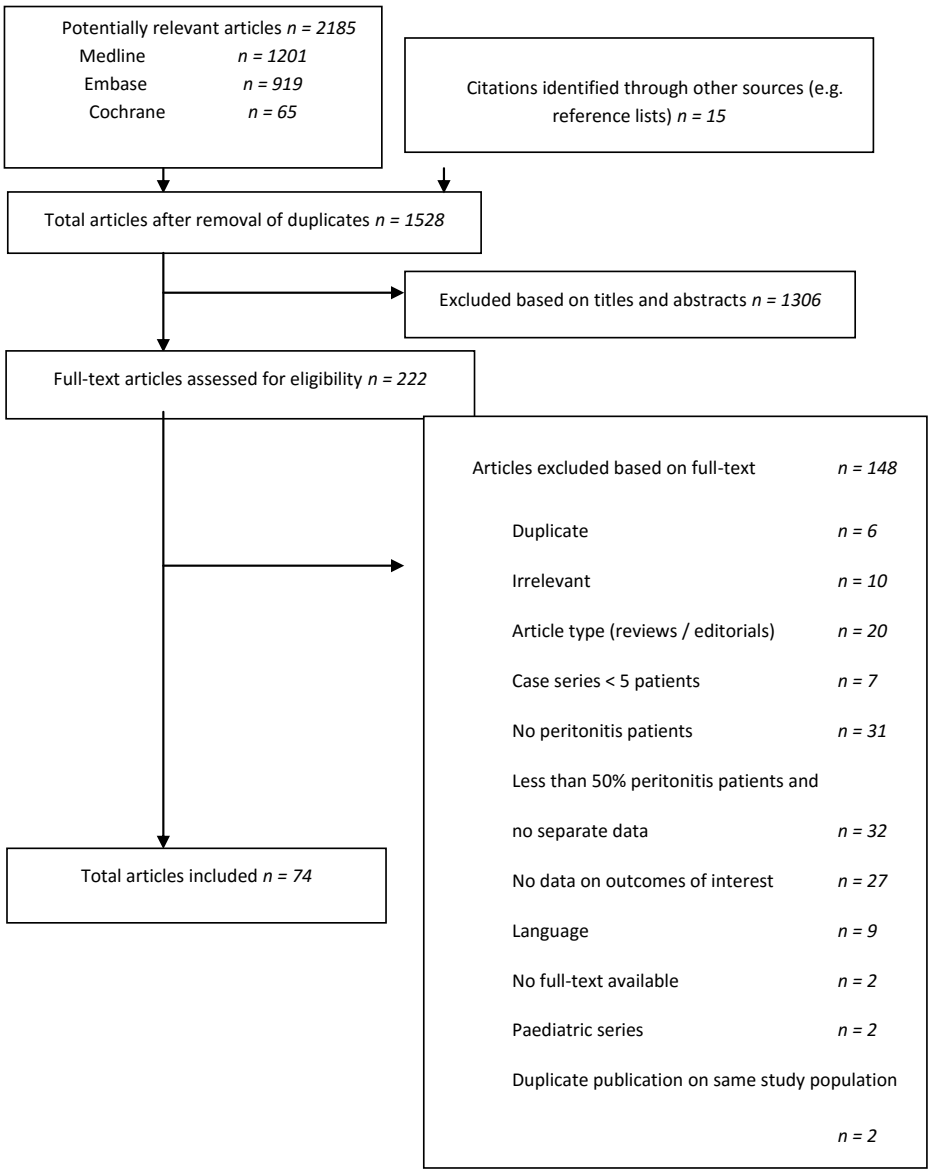
Lopez-Quintero *et al.[37]*	2010	Retrospective	19	100	"2 or more of the following: (1) fecal or diffuse peritonitis and difficult to manage with 1 operation, (2) hemodynamic instability, (3) excessive intestinal edema, (4) septic shock, (5) need for reassessment of anastomoses and (6) APACHE II score > 15"	NPWT	36.8	26.3	26.3	5
Padalino *et al.[38]*	2010	Prospective	9	100	PR and ACS	NPWT	66.7	11.1	0	5
Schmelze *et al.[41]*	2010	Retrospective	49	100	Unclear	NPWT	22.4	22.4	40.8	4
Shaikh *et al.[63]*	2010	Prospective	42	76.2	40.5% ITC, 59.5% "thought unwise to close"	NPWT	52.4	4.8	9.5	5
Amin *et al.[25]*	2009	Prospective	20	100	PR	NPWT	65	10	0	5
Balentine *et al.[89]*	2009	Retrospective	88	62.5	33.0% DFI, 17.0% PR, 15.9% II, 10.2% ITC, 9.1% IAH/ACS, 11.4% "hemodynamic instability"	Various	38.6	12.5	34.1	5
Gonullu *et al.[31]*	2009	Retrospective	37	100	DFI, IAH	Bogota bag	13.5	10.8	43.2	3
Horwood *et al.[58]*	2009	Prospective	27	96.3	ITC, DCL, IAH/ACS	NPWT	18.5	11.8	37	5
Özgüc *et al.[59]*	2008	Retrospective	74	78.4	50.0% IAH/ACS, 43.2% PR, 6.8% DCS	NPWT	44.6	0	60.8	5
Reimer *et al.[40]*	2008	Retrospective	10 (of 23)	100	Unclear	DRS	30	20	0	3
Wondberg *et al.[42]*	2008	Prospective	30	100	PR, ITC	NPWT	33.3	6.7	30	5
Barker *et al.[16]*	2007	Retrospective	120 (of 258)	68.3	65.0% PR, 12.5% ITC, 8.3% DCS,6.7% IAH/ACS, 7.5% "multifactorial"	NPWT	60.8	6.7	23.3	5
Kirshtein *et al.[46]*	2007	Retrospective	152	89.5	PR	Bogota bag	na	5.9	23.7	3

Perez *et al.[60]*	2007	Prospective	37	56.8	"High tension on the fascia, persistent bacterial contamination of the abdominal cavity, and massive bowel edema"	NPWT	70.3	2.7	37.8	5
Rao *et al.[5]*	2007	Retrospective	29	100	69.0% DFI, 17.2% ITC, 13.8% IAH/ACS	NPWT	na	20.7	34.5	5
Robledo *et al.[22]*	2007	Randomized Controlled Trial	20 (of 40)	100	DFI	Mesh	na	10	55	3•
Wilde *et al.[65]*	2007	Retrospective	11	90.9	54.5% "High risk for of IAH/ACS", 36.4% PR, 9.1% IAH/ACS	NPWT	90.9	18.2	0	3
Oetting *et al.[17]*	2006	Retrospective	22 (of 36)	100	PR	NPWT	68.2	13.6	22.7	3
Cipolla *et al.[29]*	2005	Retrospective	5 (of 17)	100	ITC	NPWT	20	20	0	3
Adkins *et al.[24]*	2004	Retrospective	81	100	Unclear	NPWT	na	14.8	33.3	5
García Iñiguez *et al.[14]*	2004	Retrospective	50	92	Unclear	Bogota bag	na	6	36	7
			50	96		Mesh	na	20	48	
Martinez-Ordaz *et al.[13]*	2004	Retrospective	21	100	"High risk for of IAH/ACS"	Bogota bag	na	28.6	38.1	3
			18	100		Other	na	5.6	38.9	
Tsuei *et al.[1]*	2004	Retrospective	46 (of 71)	93.5	Unclear	NPWT	15.2	19.6	39.1	3
Schachtrupp *et al.[72]*	2002	Unclear	40	70	Unclear	Mesh	57.5	na	25	3
Sokmen *et al.[73]*	2002	Retrospective	25	88	Unclear	Mesh	na	4	16	5
Doyon *et al.[74]*	2001	Retrospective	17	82.4	ITC, PR, DFI	Bogota bag	94.1	0	17.6	3
Koniaris *et al.*[36]	2001	Retrospective	6 (of 13)	100	Unclear	DRS	83.3	na	33.3	5
Tremblay *et al.[18]*	2001	Retrospective	50 (of 118)	92	32% ITC, 24% PR, 14%, DCS, 12% ASC, 18% other	Various	12	14	56	5
Zingales *et al.[50]*	2001	Retrospective	60	91.7	PR	Zipper	20	13.3	38.3	3
Bailey *et al.[27]*	2000	Retrospective	7	100	DFI	Various	14.3	14.3	28.6	3
Bosscha *et al.[28]*	2000	Retrospective	67	100	PR	NPWT	28.4	23.9	41.8	3
Tons *et al.[51]*	2000	Retrospective	377	67	ACS	Mesh	18	18	21.5	3

Wittmann *et al.[79]*	2000	Prospective	128	85	PR; 87% ITC, 13% II	Wittmann patch	93	2.3	18.8	3
Gentile *et al.[23]*	1998	Retrospective	11 (of 40)	100	PR	Mesh	na	54.5	45.5	4
Losanoff *et al.[47]*	1997	Retrospective	19	89.5	PR	Other	78.9	0	21.1	3
Losanoff *et al.[48]*	1997	Retrospective	29	72.4	PR	Mesh	79.3	0	20.7	3
Smith *et al.[64]*	1997	Retrospective	38 (of 93)	84.2	PR, ITC, II, DCS, ACS, DFI	NPWT	55.3	na	42.1	5
Brock *et al.[55]*	1995	Retrospective	11 (of 28)	90.9	81.8% PR, 9.1% IAH/ACS, 9.1% both	NPWT	18.2	36.4	36.9	5
Hubens *et al.[33]*	1994	Retrospective	23	100	PR	Zipper	34.8	na	39.1	3
Ercan *et al.[75]*	1993	Retrospective	10	90	Unclear	Zipper	60	0	40	3
Hakkiluoto *et al.[32]*	1992	Prospective	21	100	PR	Zipper	na	0	47.6	3
Schein *et al.[21]*	1991	Prospective	31 (of 52)	100	PR	Mesh	3.2	na	58.1	3
Wittmann *et al.[80]*	1990	Prospective	117	94.9	PR and DFI	Various	na	0	23.9	3
Ivatury *et al.*[45]	1989	Retrospective	30	56.7	PR	Various	na	10	46.7	3
Hedderich *et al.[44]*	1986	Retrospective	10	80	PR	Zipper	na	20	20	3
Anderson *et al.*[26]	1983	Retrospective	20	100	DFI	Loose packing	55	25	60	3
Hollender *et al.*[54]	1983	Retrospective	22	90.9	DFI	Loose packing	na	0	31.8	3

Summarized characteristics and outcomes of 74 included studies combining for 78 patient series

Figure 1 Flow chart showing study selection process



Is there a role for NPWT with Fluid Instillation?

There are no series published on the use of NPWT in situations of temporary abdominal closure in non-trauma patients or in trauma patients.Recently, a systematic review performed by an experts consensus group has been published.

Summary evidence of the Working Group:

Table 4. Conditions when use of NPWTi is not recommended.

Condition	Rationale
Untreated osteomyelitis, necrotic tissue with eschar present[45]	NPWTi does not replace debridement; sources of infection must be considered
Non-enteric or unexplored fistulas[45;46]	Possibility of communication with underlying vulnerable organs
Wound malignancy[45;46]	May stimulate proliferation of malignant cells
Exposed blood vessels, anastomotic sites, organs, or nerves[45;46]	NPWT can cause damage or rupture vessels due to the force of negative pressure
Use in thoracic or abdominal cavities[45]	Potential risk for altering core body temperature or fluid retention within cavity
Unstable structures (e.g., flaps or grafts)[45]	Periodic negative pressure or topical wound solution may be harmful for certain kinds of flaps/grafts
Patients at increased risk of bleeding[45;46]	Follows general contraindications for NPWT

[Negative Pressure Wound Therapy With **Instillation**: Review of Evidence and Recommendations. Kim PJ, Attinger CE, Olawoye O, Crist BD, Gabriel A, Galiano RD, Gupta S, Lantis Ii JC, Lavery L, Lipsky BA, Teot L. Wounds. 2015 Dec;27(12):S2-S19.]

Is there a difference between commercial systems and Barker's VAC / self-made VAC?Comparison of studies (including >50% AO duet o peritonitis/non-trauma) using 100% commercial device vs. those using 100% Barker's vac / self-made:

Commercial systems

13 studies (1 study no data on fascial closure) 419 patients

Fascial closure: 55,2% (95%CI 45,0-64,9%, I2=78%)

Fistula rate: 13,9% (95%CI 10,3-18,4%, I2=12%)

Mortality rate: 23,7% (95%CI 17,0-32,0%, I2=61%)

Barker's VAC / self-made

10 studies (1 study no data on mortality, 1 study no data on fascial closure, 1 study no data on fistula rate)

469 patients

Fascial closure: 58,2% (95%CI 47,7-68,0%, I2=75%)

Fistula rate: 14,7% (95%CI 10,2-20,6%, I2=63%)

Mortality rate: 32,3% (95%CI 22,6-43,9%, I2=78%)

Two additional studies with Abthera:

1 study in <50% non-trauma patient but showing a significant reduction in mortality (15% Abthera vs. 30% Barker's VAC; Cheatham ML et al, WJS 2013)

1 study published after the Atema systematic review finished data analysis: >50% non-trauma vs Barker's VAC showing a mortality rate of 22% vs. 50% (Kirkpatrick AW et al, Ann Surg 2015)

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Topic Title: Acute Pancreatitis

Acute Pancreatitis KPI 1

Title: Prevention of the need for surgical decompression for Abdominal Compartment Syndrome (ACS)

Description	Percentage of patients with acute pancreatitis with measured intra-abdominal pressure (IAP) >20 mmHg within first 3 days post-admission
Rationale	Appropriate non-operative management of intra-abdominal hypertension (IAH) should be able to prevent the development of ACS in most patients
Target	>70% of patients with early IAH should avoid progression to ACS
KPI collection frequency	Semi-annually
KPI reporting frequency	Semi-annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients with acute pancreatitis and early IAH avoiding decompressive surgery **Denominator**: Number of all patients with acute pancreatitis and early IAH
Reporting aggregation	National, regional, LHO area, hospital ,age, gender
Data sources	Administrative data, Medical Records

Acute Pancreatitis KPI 2

Title: Need for Intensive Care Unit treatment

Description	Percentage of patients with acute pancreatitis treated in the ICU
Rationale	Patients with organ failures should be admitted early to the ICU
Target	>90% of patients admitted for acute pancreatitis with early organ dysfunction (defined as SOFA score >3 within the first 24 hours) within 24 hours post-admission
KPI collection frequency	Semi-annually
KPI reporting frequency	Semi-annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients with acute pancreatitis and early organ dysfunction admitted to the ICU **Denominator**: Number of all patients with acute pancreatitis and early organ dysfunction admitted to the hospital

Reporting aggregation	National, regional, LHO area, hospital ,age, gender
Data sources	Administrative data, Medical Records

Acute Pancreatitis KPI 3

Title: Hospital mortality in severe acute pancreatitis

Description	Percentage of patients with severe acute pancreatitis dying during the initial hospital stay period
Rationale	At least 80% of patients with severe acute pancreatitis (definition: acute pancreatitis with infected necrosis and/or persistent organ failure with SOFA score >2 of renal, respiratory or cardiovascular organ systems) should survive the initial hospitalization period
Target	>80% of patients with severe acute pancreatitis
KPI collection frequency	Semi-annually
KPI reporting frequency	Semi-annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients with severe acute pancreatitis surviving the initial hospital treatment period **Denominator**: Number of all patients with severe acute pancreatitis admitted
Reporting aggregation	National, regional, LHO area, hospital ,age, gender
Data sources	Administrative data, Medical Records

Acute Pancreatitis KPI 4

Title: Delayed fascial closure (DFC) rate after decompressive laparostomy for ACS

Description	Percentage of patients with acute pancreatitis achieving DFC after decompressive laparostomy
Rationale	Successful temporary abdominal closure (TAC) techniques results in high DFC.
Target	>90% of patients undergoing decompressive laparostomy achieving DFC
KPI collection frequency	Semi-annually
KPI reporting frequency	Semi-annually

KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients with acute pancreatitis undergoing decompressive surgery achieving DFC **Denominator**: Number of all patients with acute pancreatitis undergoing decompressive laparostomy and some form of TAC
Reporting aggregation	National, regional, LHO area, hospital ,age, gender
Data sources	Administrative data, Medical Records

Acute Pancreatitis KPI 5

Title: Benefit of surgical necrosectomy

Description	Percentage of patients with infected pancreatic necrosis getting better after surgical necrosectomy (regardless of technique used)
Rationale	Necrosectomy for infected pancreatic necrosis, when performed at the right time (>4 weeks post-admission, walled-off necrosis, WON) and for appropriate indications should result in improved organ function and eventually outcome
Target	>80% of patients undergoing surgical necrosectomy should have decrease of SOFA-score of $\geq$3 points by 5th postoperative day
KPI collection frequency	Semi-annually
KPI reporting frequency	Semi-annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients with infected necrosis treated with surgical necrosectomy improving their SOFA score by $\geq$3 points by 5th postoperative day **Denominator**: Number of all patients with infected necrosis treated with surgical necrosectomy
Reporting aggregation	National, regional, LHO area, hospital ,age, gender
Data sources	Administrative data, Medical Records

Perforated Ulcer

Position Statement: Perforated Gastroduodenal Ulcers

Aim

To outline key standards and develop measurement KPIs for emergency surgery for perforated gastroduodenal ulcers.

Definition

Perforated gastroduodenal ulcers (PGDU) refers to a spontaneous perforation of the gastric or duodenal wall associated with free air (on imaging), localized or generalized peritonitis with or without associated sepsis syndrome[1].

While peptic ulcer incidence and associated complications (bleeding and obstruction) has dropped over the past decades, the perforation rate has been fairly consistent. The mortality rate in perforated gastroduodenal ulcers (PGDU) remains high (from 10-30%), with notable geographic differences[2-5]. The latter is due to demographic differences between regions, with duodenal perforations in young men being predominant in low- and middle income countries, while a shift towards gastric location in elderly and slight female predominance is seen in high-income countries. Outcome is associated with age, presence of comorbidity and strongly linked to delay in diagnosis and treatment[2]. CT is the preferred modality for imaging due to the superior accuracy and ability to detect differentials[6]. Early resuscitation and antibiotics should be emphasized and prompt surgery performed[7-9]. Surgical repair can be done as open or laparoscopic, with no differences in major outcomes[10,11]. Non-operative management may be discussed in select patients, but has low-grade evidence support and may have a high failure rate in elderly[1]. Post-op monitoring for organ failure, appropriate organ support and preferable high-dependency unit surveillance or ICU care should be considered. Reoperation rates are reported at 15-20% and most often due to leaks[12], and should be kept to a lowest possible rate. In patients not improving after surgery a persistent leak or intraabdominal collection should be aggressively diagnosed and managed, either percutaneously (collections) or by reoperation (leaks).

Topic Title: Perforated Ulcer

Perforated Ulcer KPI 1

Title: Mortality

Description	Percentage of patients with perf GDU who die within 30 days
Rationale	Patients with organ failures should be admitted early to the ICU
Target	Aim at 'zero' mortality (<5%) in the young (<55 years) and <20% in the elderly (≥55 years)
KPI collection frequency	Semi-annually
KPI reporting frequency	Semi-annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients with perf GDU undergoing surgical repair who die within 30 days **Denominator**: Number of patients with perf GDU admitted to the hospital undergoing surgical repair
Reporting aggregation	National, regional, LHO area, hospital ,age, gender
Data sources	Administrative data, Medical Records

Perforated Ulcer KPI 2

Title: Need for Intensive Care Unit treatment

Description	Percentage of patients with perf GDU treated in the ICU
Rationale	Patients with organ failure(s) should be admitted early to the ICU
Target	>90% of patients admitted for PGDU with early organ dysfunction within 24 hours post-admission
KPI collection frequency	Semi-annually
KPI reporting frequency	Semi-annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients with PGDU and early organ dysfunction admitted to the ICU **Denominator**: Number of all patients with PGDU and early organ dysfunction admitted to the hospital

Reporting aggregation	National, regional, LHO area, hospital ,age, gender
Data sources	Administrative data, Medical Records

Perforated Ulcer KPI 3

Title: Need for re-operation for a leak

Description	Percentage of patients needing reoperation for leaks after surgery
Rationale	Ensure primary repair is done safe and adequately in all patients; failures are detected early and managed
Target	Achieve <10% reoperations for leaks, by either primary open or lap approach; early reintervention
KPI collection frequency	Semi-annually
KPI reporting frequency	Semi-annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients needing reoperation for leakage **Denominator**: Number of all patients having open or laparoscopic repair for PGDU
Reporting aggregation	National, regional, LHO area, hospital ,age, gender
Data sources	Administrative data, Medical Records

Perforated Ulcer KPI 4

Title: Diagnostic delay

Description	Percentage of patients with PGDU having delay >12 hours from hospital admission
Rationale	Reduce the inhospital time-gap between patients presentation and time to diagnosis (CT); (assuming prehospital delay by either patients-delay or referring physician-delay is more difficult to standardise or monitor).
Target	>90% of patients admitted should have diagnosis and surgery performed within 12 hours post-admission
KPI collection frequency	Semi-annually
KPI reporting frequency	Semi-annually
KPI	Numerator divided by denominator expressed as a percentage

calculation	**Numerator:** Number of patients having surgery for PGDU within 12 hours of admission **Denominator**: Number of all patients with PGDU admitted to the hospital
Reporting aggregation	National, regional, LHO area, hospital ,age, gender
Data sources	Administrative data, Medical Records

Perforated Ulcer KPI 5

Title: Surgical delay

Description	Percentage of patients with PGDU treated with surgery within 12 hours
Rationale	Reduce delay to surgery
Target	>90% of patients admitted for PGDU with need of surgery should have this within 12 hrs of diagnosis
KPI collection frequency	Semi-annually
KPI reporting frequency	Semi-annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients with PGDU having surgery <12 hrs from diagnosis **Denominator**: Number of all patients with PGDU admitted to the hospital and having surgery
Reporting aggregation	National, regional, LHO area, hospital ,age, gender
Data sources	Administrative data, Medical Records

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Upper GI Bleed

Upper GI Bleeding KPI 1

Title: Patients who are admitted to hospital with Upper GI Bleeding are treated by teams with written guidelines for the management of patients with upper GI bleeding

Description	Documented not Upper GI bleeding guideline for the management of patients
Rationale	Patients presenting to Emergency with Upper GI bleeding need prompt attention and should enter a recognised pathway. The pathway and operating procedure for the hospital should have clear admission, management and follow up plan for these patients. Failure to have this will result in errors in care.
Target	100% compliance with written (hard copy or IT based) hospital protocols for the management of Upper GI bleeding
KPI collection frequency	6 monthly
KPI reporting frequency	6 monthly
KPI calculation	Yes or No
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Database, patients notes

Upper GI Bleeding KPI 2

Title: Patients who are admitted to hospital with upper GI bleeding need the cause of Upper GI diagnosed within 36 hours of admission

Description	Documented diagnosis of cause of Upper GI bleed
Rationale	Prompt diagnosis of the cause of Upper GI bleeding is important to facilitate appropriate care. It will indicate a smooth process within a hospital and also lend itself to an excellent service for the patient..
Target	80% of Patients admitted with Upper GI Bleeding have a diagnosis of the cause make within 36 hours
KPI collection frequency	6 monthly
KPI reporting frequency	6 monthly

KPI calculation	**Numerator:** Total patients with Upper GI having diagnosis of cause with 36 **Denominator:** Patients admitted with Upper GI Bleeding
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Database, patients notes

Upper GI Bleed KPI 3

Title: Patients who are admitted to hospital with Upper GI who are hypotensive <100mmHg) need to be admitted to a High dependency unit

Description	Unstable Upper GI bleeding patients are admitted d to a high dependency Unit
Rationale	Patients who are unstable with Upper Gi Bleeding have a worse outcome and need close monitoring to tailor treatment modalities , in particular serial Hb and frequent vital sign monitoring.
Target	80% of Patients admitted with an unstable Upper GI bleed (BP <100mmHg) should be in a HDU with 2 hours of arrival in Emergency Department
KPI collection frequency	6 monthly
KPI reporting frequency	6 monthly
KPI calculation	Numerator: Patients who are unstable with Upper Gi Bleeding who are admitted to a HDU Denominator: Total patients admitted with unstable Upper GI bleeding
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Database, patients notes

Lower GI Bleed

Lower GI Bleed KPI 1

Title: Patients who are admitted to hospital with blood PR need to have documented that Upper GI is not the casue with 24 hours of admission

Description	Documented not Upper GI cause
Rationale	A small percentage of patient with perceived lower GI cause of blood PR are in fact bleeding from Peptic cause , in particular gastric and duodenal ulcers.
Target	90% of Patients admitted with blood pr have a urea and creatinine ratio measured, previous history of gastroscopy or peptic ulceration documented in the notes
KPI collection frequency	6 monthly
KPI reporting frequency	6 monthly
KPI calculation	**Numerator:** Patients who are admitted to hospital with blood PR need to have documented that Upper GI is not the cause with 24 hours of admission **Denominator:** Total patients admitted Patients who are admitted to hospital with blood PR need to have documented that Upper GI is not the cause with 24 hours of admission
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Database, patients notes

Lower GI Bleed KPI 2

Title: Patients with persistent active blood Pr with a drop in Hb have active investigation of there bleeding to include a view of the mucosa sigmoid colon and or a CT angio

Description	Patients admitted with persistent blood PR are investigated to ensure the cause is found
Rationale	While lower GI bleeding invariably stops without surgery or intervention, assessment for persistent bleeding especially where there is a drop in Hb with mucosal visualization (either rigid or flexible sigmoidoscopy) coupled with CT angio offer the best chance for control
Target	80% of patients admitted with persistent active blood Pr with a drop in Hb have active investigation of there bleeding to include a view of the mucosa sigmoid colon and or a CT angio

KPI collection frequency	6 monthly
KPI reporting frequency	6 monthly
KPI calculation	Number of patients admitted with persistent active blood Pr with a drop in Hb have active investigation of there bleeding to include a view of the mucosa sigmoid colon and or a CT angio Number of patients admitted with Patients with persistent active blood Pr with a drop in Hb .
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Database, OR registry

Lower GI Bleed KPI 3

Title: Patients with blood Pr have their anticoagulants stopped on admission and are not charted for heparins in the first 12 hours post admission

Description	Patients with blood Pr have their anticoagulants stopped on admission and are not charted for heparins in the first 12 hours post admission. This would include antiplatelets agents and Warfarin
Rationale	Patients who present with blood PR may be on anticoagulants, usually for atrial fibrillation. They may have a recent stent or history of throboembloic phenomenon . Failure to stop these medications at least for the first few hours of admission could result in more significant hemorrhage
Target	95% of patients admitted for blood PR have their anticoagulants stopped
KPI collection frequency	Semi-annually
KPI reporting frequency	Number of patient admitted with blood PR who have their anticoagulants stopped at leased in the frist 12 hours post admission
KPI calculation	Number of patient admitted with blood PR
Reporting aggregation	National, regional, LHO area, hospital, age, gender
Data sources	Administrative data, Medical records

Lower GI Bleed KPI 4

Title: Patients admitted with blood PR should not received more that 3l in the frist 24 hours post admission unless actively bleeding with associated hypotension

Description	Documenting the amount of IV fluids post admission(excluded is blood transfusion in patients with a Hb less than 8)
Rationale	Over resuscitation with increase risk of further haemorrhage and dilute coagulation factors
Target	90% of patients patients admitted blood Pr do not have excessive fluid resucitation
KPI collection frequency	Six monthly
KPI reporting frequency	Six monthly
KPI calculation	**Numerator:** Number of emergency surgery patients admitted with blood PR who avoid over resuscitation **Denominator:** Number of emergency surgery patients admitted with blood PR
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Database, laboratory systems

Lower GI Bleed KPI 5

Title: Number of emergency surgery patients admitted with blood PR who undergo full colonoscopy with 3 months of primary admission

Description	Complete colonoscopy rate
Rationale	Patients who have been admitted with blood PR undergo a full colonoscopy within 3 months to ensure that a primary colon tumour is not missed.
Target	90% of emergency surgery patients admitted with blood PR
KPI collection frequency	6 monthly
KPI reporting frequency	6 monthly
KPI calculation	**Numerator:** Number of emergency surgery patients admitted with blood PR who have a complete colonoscopy within 3 months of admission **Denominator:** Number of emergency surgery patients admitted with blood
Reporting aggregation	Hospital
Data sources	Emergency Surgery Database, patients notes

Small Bowel Obstruction

Topic Title: Small bowel obstruction (SBO) – Diagnostic phase

Small bowel obstruction KPI 1

Title: Diagnostic flow on SBO suspicion (primary evaluation)

Description	To determine the priorities on the case of SBO suspicion
Rationale	The goal of the initial evaluation and assessment of the SBO patient is to exclude the presence of bowel ischemia and ensure adequate resuscitation.
Target	Identify patients that require immediate surgical intervention. Focus on basic resuscitation
KPI collection frequency	Monthly
KPI reporting frequency	Monthly
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of emergency surgery patients admitted with SBO, having presented to Emergency prior to 1900 who have underwent to primary evaluation and resuscitation **Denominator**: Number of emergency surgery patients admitted with SBO, having presented to Emergency prior to 1900
Reporting aggregation	Hospital, Hospital Group
Data sources	Patient charts, Hospital Discharge data. Emergency Surgery Database

Small bowel obstruction KPI 2

Title: Diagnostic flow on SBO suspicion (secondary evaluation)

Description	Once excluded patients that need immediate surgical intervention, diagnostic evaluation continues.
Rationale	Low mortality rates with immediate diagnosis segregating patients with no immediate risk of death. Focus on diagnosis and preparedness for elective surgery.
Target	Patients that are not in immediate risk of life. Diagnostic evaluation progress with image exams (plain x-ray/ CT scan)
KPI collection frequency	Monthly
KPI reporting frequency	Monthly
KPI	Numerator divided by denominator expressed as a percentage

calculation	**Numerator:** Number of emergency surgery patients admitted with SBO, having presented to Emergency prior to 1900 who have underwent to secondary evaluation and elective surgery **Denominator**: Number of emergency surgery patients admitted with SBO, having presented to Emergency prior to 1900
Reporting aggregation	Hospital, Hospital Group
Data sources	Patient charts, Hospital Discharge data. Emergency Surgery Database

Topic Title: Small bowel obstruction (SBO) – Diagnosis and Workup Phase

Small bowel obstruction KPI 3

Title: Suspected SBO – CT Scan

Description	All new patients presenting with suspected SBO undergo double contrast CT Abdomen and Pelvis
Rationale	To confirm the diagnosis, to differentiate between other acute abdo/pelvic pathologies, for surgery preparedness and strategy Exceptions: May not be required if diffuse peritonitis or recurrence where the decision requirement for CT will be up to the managing doctor
Target	All admitted patients with suspected SBO
KPI collection frequency	Monthly
KPI reporting frequency	Monthly
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of admissions with suspected SBO who had CT **Denominator**: Total number of new presentations with suspected SBO
Reporting aggregation	Hospital, Hospital Group
Data sources	Patient charts, Hospital Discharge data. Emergency Surgery Database, Emergency department database, Radiology records

Topic Title: Small bowel obstruction (SBO) – Management Phase

Small bowel obstruction KPI 4

Title: Clinical Management

Description	Ensure effective clinical treatment, or good preparation for surgery
Rationale	To ensure appropriate clinical treatment and timing diagnosis for raising effective definitive treatment ratio
Target	All patients with SBO diagnosis
KPI collection frequency	Monthly
KPI reporting frequency	Monthly
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients with SBO undergoing clinical management **Denominator**: Total number of patients with SBO
Reporting aggregation	Hospital, Hospital Group
Data sources	Patient charts, Hospital Discharge data. Emergency Surgery Database, Emergency department database, Radiology records

Small bowel obstruction KPI 5

Title: Surgical Management

Description	To ensure best surgical treatment option for patient admitted with SBO
Rationale	Apply best timeline surgical treatment according to primary/secondary clinical evaluation
Target	All patients with SBO diagnosis, that suits surgical criteria
KPI collection frequency	Monthly
KPI reporting frequency	Monthly
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients with confirmed SBO diagnosis that underwent surgery **Denominator**: Total number of patients with confirmed SBO
Reporting aggregation	Hospital, Hospital Group

Data sources	Patient charts, Hospital Discharge data. Emergency Surgery Database, Emergency department database, Radiology records

Workup

1. All patients being evaluated for SBO should have plain films because of the fact that plain films are as sensitive as computed tomography (CT) to differentiate obstruction versus non-obstruction (GRADE IC)
2. All patients with inconclusive plain films for complete or high grade SBO should have a CT (with intravenous and oral contrast) as CT scan gives incremental information over plain films in regard to differentiating grade of obstruction and etiology of SBO leading to changes in planned management (intravenous contrast can be omitted when a patient has an established contrast allergy) (GRADE IA)
3. Multiple signs on CT suggesting strangulation should suggest a low threshold for operative intervention (GRADE IB)
4. Water-soluble contrast study should be considered in patients who fail to improve after 48 hours of non-operative management because a normal contrast study can rule out operative SBO. (GRADE IIA).
5. Nonionic low osmolar weight contrast is an alternative to barium for contrast studies to evaluate for SBO for diagnostic purposes ((GRADE IIA).
6. If available, multidetector CT scanner and multiplanar re-construction should be used because they aid in the diagnosis and localization of SBOs. Level 3.
7. CT scan should be considered to aid in the diagnosis of small-bowel volvulus. Findings include multiple transition points, posterior location, and the ‘‘whirl’’ sign. (GRADE IC)
8. Magnetic resonance imaging (MRI) and ultrasound are an alternative to CT with similar sensitivity and identification of etiology, but have several logistical limitations ((GRADE IIA)

Management

1. Patients with plain film finding of SBO and clinical markers (fever, leukocytosis, tachycardia, metabolic acidosis, and continuous pain) or peritonitis on physical examination warrant timely surgical exploration (GRADE IA).
2. Patients without the above mentioned clinical picture with a partial SBO (PSBO) or a complete SBO can undergo nonoperative management safely. A complete obstruction has a higher level of failure and approximately 30% of these patients will require bowel resection secondary to compromised bowel (GRADE IA).
3. Patients without resolution of their SBO by day 3 to 5 of nonoperative management should undergo water soluble study or surgery (GRADE IIA)
4. There is no significant difference with regard to the decompression achieved, the success of nonoperative treatment, or the morbidity rate after surgical intervention comparing long tube decompression with the use of nasogastric tubes (GRADE IC)
5. Water soluble contrast (Gastrograffin) given in the setting of PSBO can improve bowel function (time to BM), decrease length of stay, and is both therapeutic and diagnostic (GRADE IIA).

6. In a highly selected group of patients, the laparoscopic treatment of SBO should be considered and leads to a shorter hospital length of stay (GRADE IC).
7. CT findings consistent with bowel ischemia should suggest a low threshold for operative intervention. (GRADE IA)
8. Patients with SBO should generally be admitted to a surgical service because this has been shown to be associated with a shorter length of stay, less hospital charges, and lower mortality compared with admission to a medical service. (GRADE IIC)

Large Bowel Obstruction

Topic Title: Large Bowel Obstruction

Large bowel obstruction KPI 1

Title: Patients with large bowel obstruction and have underlying diagnosis made within 24 hours of presentation

Description	Ensure effective prompt clinical treatment, and prevention of perforation
Rationale	To ensure prompt clinical treatment avoid compilations from bowel perforations and ischaemia.
Target	90% patients with LBO diagnosis
KPI collection frequency	6 monthly
KPI reporting frequency	6 monthly
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients with LBO with diagnosis made within 24 hours of presentation **Denominator**: Total number of patients with SBO
Reporting aggregation	Emergency Surgery Registry
Data sources	Patient charts, Hospital Discharge data. Emergency Surgery Database, radiology department database

Large bowel obstruction KPI 2

Title: Patients with large bowel obstruction with signs of ischaemia or peritonitis and have surgery within 12 hours of presentation

Description	Ensure effective prompt clinical treatment, and prevention of perforation and reduce mortality
Rationale	To ensure prompt clinical treatment avoid compilations from bowel perforations and ischaemia.
Target	90% patients with LBO diagnosis with signs of peritonitis or sepsis
KPI collection frequency	6 monthly

KPI reporting frequency	6 monthly
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients with LBO with diagnosis made within 24 hours of presentation **Denominator**: Total number of patients with SBO
Reporting aggregation	Emergency Surgery Registry
Data sources	Patient charts, Hospital Discharge data. Emergency Surgery Database, radiology department database

Large bowel obstruction KPI 3

Title: Leak rate in patients under primary anastomosis is less than 10%

Description	Understanding the clinical outcomes of emergency surgery is essential in improving outcome
Rationale	Identification of leak rate beyond 10% for acute surgery would suggest need for remedial action
Target	Leak rate < 10 % patients with LBO diagnosis under anastomosis during their care
KPI collection frequency	6 monthly
KPI reporting frequency	6 monthly
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients with LBO diagnosis having a leak at 30 days **Denominator**: Total number of patients with LBO surgery
Reporting aggregation	Emergency Surgery Registry
Data sources	Patient charts, Hospital Discharge data. Emergency Surgery Database, radiology department database

Large bowel obstruction KPI 4

Title: Surgical Site Occurrence is less than 15% at 30 days post-surgery

Description	SSO including wound infection, dehiscence need to be minimized through a bundle approach.
Rationale	Good prompt appropriate care with adherence to a range on evidence and consensus guidelines will optimise outcomes not only from an infective

	approach but also oncologically.
Target	<15% patients with LBO surgery have a SSO at 30 days
KPI collection frequency	6 monthly
KPI reporting frequency	6 monthly
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients with LBO diagnosis having SSO at 30 days **Denominator**: Total number of patients with LBO surgery
Reporting aggregation	Emergency Surgery Registry
Data sources	Patient charts, Hospital Discharge data. Emergency Surgery Database, radiology department database

Large bowel obstruction KPI 5

Title: Readmission rate within 30 days in less than 20%

Description	Ensure effective prompt clinical treatment, and prevention of perforation and optimal management including ostomy care will ensure patient is managed in the community
Rationale	Good care will reduce returns to hospital
Target	< 20 % patients with LBO diagnosis having surgery/stenting need readmission within 30 days
KPI collection frequency	6 monthly
KPI reporting frequency	6 monthly
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients with LBO diagnosis readmitted within 30 days **Denominator**: Total number of patients with LBO surgery
Reporting aggregation	Emergency Surgery Registry
Data sources	Patient charts, Hospital Discharge data. Emergency Surgery Database, radiology department database

Diverticulitis

Topic Title: Acute Diverticulitis (AD) – Management Phase

Acute Diverticulitis KPI 1

Title: Follow-up colonoscopy (2-4/12) post discharge in patients with diagnosis of acute diverticulitis with abscess formation

Description	Self-explanatory
Rationale	To out rule the presence of an underlying colon cancer
Target	95% of patients with diagnosis of acute diverticulitis with abscess formation having colonoscopy
KPI collection frequency	Quarterly
KPI reporting frequency	Quarterly
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** All patients newly diagnosed with acute diverticulitis with abscess formation between 2 and 4months following index admission **Denominator:** Total number of patients newly diagnosed with acute diverticulitis with abscess formation
Reporting aggregation	Hospital, Hospital Group
Data sources	Patient charts, Hospital Discharge data, Emergency Surgery Database

Acute Diverticulitis KPI 2

Title: Mortality rate associated with AD

Description	Optimising outcome
Rationale	The mortality rate among patients with Hinchey3/ 4 should be less than current international results
Target	Mortality rate <5% patient peritonitis with Hinchey3/ 4
KPI collection frequency	Quarterly
KPI reporting frequency	Quarterly
KPI	Numerator divided by denominator expressed as a percentage **Numerator:** Number of deaths in patient group with Hinchey 3/4

calculation	**Denominator:** Total number of patients with Hinchey 3/4
Reporting aggregation	Hospital, Hospital Group
Data sources	Patient charts, Hospital Discharge data, Emergency Surgery Database

Acute Diverticulitis KPI 3

Title: Bacteriological identification of abscess or flora in abscess or peritoneal cavity

Description	Optimising a targeted antibiotic regime to enhance bug kills and reduce C diff and resistance.
Rationale	To ensure appropriate targeted antibiotic treatment instituted, to avoid the emergence of antibiotic resistance, and promote antibiotic stewardship
Target	All patients with acute diverticulitis undergoing radiological or surgical drainage
KPI collection frequency	Quarterly
KPI reporting frequency	Quarterly
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients with diverticulitis undergoing radiological or surgical drainage where samples were forwarded for C+S **Denominator:** Total number of patients with diverticulitis undergoing radiological or surgical drainage
Reporting aggregation	Hospital, Hospital Group
Data sources	Patient charts, HIPE, Diverticular Disease database if maintained, Microbiology Laboratory reports

Acute Diverticulitis KPI 4

Title: Timely antibiotic administration

Description	Self-explanatory
Rationale	To ensure minimum interval between clinical diagnosis of acute complicated diverticulitis and institution of appropriate antibiotic. Early sepsis control will ensure greater survival
Target	All patients with suspected complicated diverticulitis and either localised or generalised peritonitis
KPI collection frequency	Quarterly
KPI reporting frequency	Quarterly
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients with confirmed acute complicated diverticulitis who had appropriate antibiotic management initiated within 2 hours of diagnosis **Denominator:** Total number of patients with confirmed acute complicated diverticulitis
Reporting aggregation	Hospital, Hospital Group
Data sources	Patient charts, HIPE, Diverticular Disease database if maintained, Laboratory reports

Acute Diverticulitis KPI 5

Title: Initial and serial WCC and CRP in patients with confirmed AD

Description	Self-explanatory
Rationale	As an adjunct to clinical monitoring to help monitor the effectiveness or otherwise of the therapeutic measures instituted
Target	All patients with confirmed AD
KPI collection frequency	Quarterly
KPI reporting frequency	Quarterly
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients with confirmed AD who had initial and serial WCC and CRP **Denominator:** Total number of patients with confirmed AD
Reporting aggregation	Hospital, Hospital Group

Data sources	Patient charts, HIPE, Diverticular Disease database if maintained, Laboratory reports

Acute Diverticulitis KPI 6

Title: BhCG performed in female patients of childbearing age presenting with suspected AD

Description	BhCG
Rationale	To outrule pregnancy especially left sided ectopic
Target	All female patients of childbearing age presenting with suspected AD
KPI collection frequency	Quarterly
KPI reporting frequency	Quarterly
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of female patients of childbearing age presenting with suspected AD who had a BhCG performed **Denominator:** Total number of female patients of childbearing age presenting with suspected AD
Reporting aggregation	Hospital, Hospital Group
Data sources	Patient charts, HIPE, Diverticular Disease database if maintained, Laboratory reports

Topic Title: Diverticulitis (AD) – Diagnosis and Workup Phase

Acute Diverticulitis KPI 7

Title: Suspected AD – CT Scan

Description	All new patients presenting with suspected acute diverticulitis to undergo double contrast CT Abdomen and Pelvis
Rationale	To confirm the diagnosis, to classify the stage (Hinchey 1-4), to differentiate between other acute abdo/pelvic pathologies Exceptions: May not be required if diffuse peritonitis or recurrence where the decision re. requirement for CT will be up to the managing doctor
Target	All first presentations with suspected AD
KPI collection frequency	Quarterly
KPI reporting frequency	Quarterly
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of new presentations with suspected AD who had CT **Denominator:** Total number of new presentations with suspected AD
Reporting aggregation	Hospital, Hospital Group
Data sources	Patient charts, HIPE, Diverticular Disease database if maintained, Radiology records

Topic Title: Diverticulitis (AD) – Workup Phase

Acute Diverticulitis KPI 8

Title: Suspected acute diverticulitis but with associated loose stool/diarrhoea. Stool for C+S

Description	Stool C+S obtained in patients presenting with suspected AD and associated loose stool/diarrhoea
Rationale	To out rule an infective aetiology and thus avoid delayed diagnosis and treatment
Target	All patients presenting with suspected AD and associated loose stool/diarrhoea
KPI collection frequency	Quarterly
KPI reporting frequency	Quarterly
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients presenting with suspected AD + assoc. loose stool or diarrhoea who had a stool C+S **Denominator:** Total number of patients presenting with suspected AD + assoc. loose stool or diarrhoea
Reporting aggregation	Hospital, Hospital Group
Data sources	Patient charts, HIPE, Diverticular Disease database if maintained, Microbiology reports

Mesenteric Ischaemia

Topic Title: Mesenteric Ischaemia

Mesenteric Ischaemia KPI 1

Title: Assessment of need for revascularization in Acute Mesenteric Ischemia

Description	Percentage of patients undergoing exploration for mesenteric ischemia who require vascular intervention including embolectomy and revascularization procedures
Rationale	Upwards of 30-50% of patients presenting with acute intestinal ischemia may have vascular findings defined by CT which are amenable to revascularization procedures which will prevent ongoing intestinal necrosis and improve outcome together with appropriate anticoagulation
Target	> 60% of patients with Acute Mesenteric Ischemia, if diagnosed early, may avoid extensive fatal intestinal ischemia
KPI collection frequency	Semi-annually
KPI reporting frequency	Semi-annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients undergoing vascular intervention **Denominator**: Number of all patients with intestinal ischemia based on CT angiogram
Reporting aggregation	National, regional, LHO area, hospital, age, gender
Data sources	Administrative data, Medical records

Mesenteric Ischaemia KPI 2

Title: Performance of biphasic multi-slice CT scan to establish diagnosis of suspected Mesenteric Ischemia

Description	Percentage of patients with positive biphasic multi-slice CT for findings compatible with mesenteric ischemia or necrosis
Rationale	An accurate and early diagnosis is essential for the appropriate and successful treatment of patients with acute mesenteric ischemia to improve their prognoses. With the advances in CT technology, CT has realized a high diagnostic performance and become an essential diagnostic tool in this clinical setting. For a correct diagnosis, a technically appropriate CT examination and proper interpretation of images are mandatory. Because acute mesenteric ischemia can be caused by various conditions, the CT

	findings vary widely, depending on the cause and underlying pathophysiology and the presence of associated complications. Recognition of the characteristic CT appearances and variations of each cause may help in the accurate interpretation of CT in the diagnosis of mesenteric ischemia.
Target	A finding of any one of pneumatosis intestinalis, venous gas, superior mesenteric artery occlusion, celiac and inferior mesenteric artery occlusion with distal SMA disease, or arterial embolism is 100% specific but only 73% sensitive. Alternatively, a finding of bowel wall thickening in addition to focal lack of bowel wall enhancement, solid organ infarction, or venous thrombosis is 50% sensitive and 94% specific. By using either of these criteria for the diagnosis, a sensitivity of 96% and a specificity of 94% can be achieved.
KPI collection frequency	Semi-annually
KPI reporting frequency	Semi-annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients with positive CT findings as outlined above **Denominator**: Number of patients undergoing CT for suspected Acute mesenteric ischemia
Reporting aggregation	National, regional, LHO area, hospital, age, gender
Data sources	Administrative data, Medical records

Mesenteric Ischaemia KPI 3

Title: Reducing the need for massive bowel resection in patients presenting with Acute Mesenteric Ischemia

Description	Percentage of patients with Acute Mesenteric Ischemia who undergo exploratory laparotomy based upon positive CT findings and are found to have bowel necrosis requiring resection
Rationale	Early diagnosis of acute mesenteric ischemia via CT scan, followed by prompt laparotomy and revascularization as needed, may serve to reduce the frequency of or extensive need for bowel resection in this patient group
Target	<50 % of patients with acute mesenteric ischemia will require bowel resection
KPI collection frequency	Semi-annually
KPI reporting frequency	Semi-annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients with acute mesenteric ischemia who are successfully treated without bowel resection **Denominator**: Number of all patients with acute mesenteric ischemia as

	noted by CT scan
Reporting aggregation	National, regional, LHO area, hospital, age, gender
Data sources	Administrative data, Medical records

Mesenteric Ischaemia KPI 4

Title: Liberal use of open abdomen in patients explored for acute mesenteric ischemia

Description	In patients explored for a potential diagnosis of acute mesenteric ischemia, the vast majority are at risk for ongoing ischemia or conditions are not ripe for closure of the abdomen at initial exploration.
Rationale	Appropriate use of open abdomen techniques, known to all acute care surgeons, may serve to recognize on-going intestinal ischemia, provide an opportunity for revisions of revascularization as necessary, or for additional bowel resection and timely abdominal closure when appropriate
Target	>80% of patients with a diagnosis of Acute Intestinal Ischemia should require open abdomen
KPI collection frequency	Semi-annually
KPI reporting frequency	Semi-annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients with acute mesenteric ischemia undergoing open abdomen procedures **Denominator**: Number of all patients with acute mesenteric ischemia undergoing exploration
Reporting aggregation	National, regional, LHO area, hospital, age, gender
Data sources	Administrative data, Medical records

Mesenteric Ischaemia KPI 5

Title: Prevention of Mortality in patients with Acute Mesenteric Ischemia

Description	Despite recognition of the entity for over 50 years, Acute Mesenteric Ischemia still has a recognized mortality of 50-70%
Rationale	Early recognition, use of CT angiography, Early exploratory laparotomy, revascularization as appropriate, and use of open abdomen/damage control procedures can reduce mortality
Target	Mortality of <30%

KPI collection frequency	Semi-annually
KPI reporting frequency	Semi-annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Survivors >30 days after intervention for Acute Mesenteric Ischemia **Denominator**: Number of all patients explored for Acute Mesenteric Ischemia
Reporting aggregation	National, regional, LHO area, hospital, age, gender
Data sources	Administrative data, Medical records

Abdominal Vascular Emergencies

Topic Title: Non-Traumatic Abdominal Vascular Emergencies

Abdominal Vascular Emergencies KPI 1

Title: Patients admitted with suspected non traumatic abdominal vascular emergencies (NTAVE)

Description	Timely performance of baseline laboratory tests including base deficit or lactic acid, and CT scan and/or angiography
Rationale	Timely investigation to obtain the diagnosis of NTAVE to determine if AAA, non AAA, etiology of NTAVE is essential
Target	100% of patients presenting to the Emergency Department with NTAVE
KPI collection frequency	Monthly
KPI reporting frequency	Monthly
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients timely performance of baseline laboratory tests including base deficit or lactic acid, and CT scan and/or angiography presenting to the Emergency Department with NTAVE **Denominator**: Number patients presenting to the Emergency Department with NTAVE
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Database, Radiology Reporting Systems, Laboratory Reporting Systems, ICU and Medical Unit Database

Abdominal Vascular Emergencies KPI 2

Title: Reporting of the outcomes from surgery

Description	Documented reported outcome from surgery (open or endovascular)
Rationale	The incidence of complication needs to be report form hospitals to maintain quality and improve outcome
Target	100% of patients undergoing NTAVE of open or EVAR are entered into a hospital wide registry are retrievable for acute graft occlusion, bowel ischemia, endo leak, or death
KPI collection frequency	6 months

KPI reporting frequency	6 months
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Reporting of the outcomes from surgery **Denominator:** All patients in 6 months
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Database

Abdominal Vascular Emergencies KPI 3

Title: Reporting of the outcomes from supportive medical treatment

Description	Documented reported outcome from supportive medical treatment
Rationale	The incidence of complication needs to be report form hospitals to maintain quality and improve outcomes
Target	100% of patients undergoing medical treatment for NTAVE are entered into a hospital wide registry with data retrievable for AMI, SMA, SMV, vena cava, pelvic, iliac, portal venous thrombosis
KPI collection frequency	6 months
KPI reporting frequency	6 months
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients undergoing medical treatment for NTAVE are entered into a hospital wide registry with data retrievable for AMI, SMA, SMV, vena cava, pelvic, iliac, portal venous thrombosis **Denominator:** All patients medically treated for NTAVE over 6 months
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Database, ICU and Medical Unit Database

Topic Title: Abdominal Aortic Aneurysms (AAA)

Abdominal Vascular Emergencies KPI 4

Title: Patients admitted with suspected AAA with hemodynamic instability should have US, FAST, and/or CT performed immediately

Description	Performance of US, FAST, and/or CT performed immediately

Rationale	Timely investigation to obtain the diagnosis of AAA is vital as it will result in death within 85-90% of rupture cases if not treated immediately.
Target	100% of patients presenting to Emergency Department with AAA
KPI collection frequency	Monthly
KPI reporting frequency	Monthly
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of emergency surgery patients admitted with AAA who received US, FAST, and/or CT **Denominator**: Number of emergency surgery patients admitted with diagnosis of AAA.
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Database, Radiology Reporting Systems, Emergency Department Chart Review

Abdominal Vascular Emergencies KPI 5

Title: Patients admitted with hemodynamically unstable AAA need to be assessed by a consultant surgeon within 30 minutes of admission

Description	Documented consultant review
Rationale	Consultant surgeon input in patients with hemodynamically unstable AAA will optimize care and expedite investigation and surgery
Target	100% of Patients admitted with hemodynamically unstable AAA need to be assessed by a consultant surgeon within 30 minutes of admission
KPI collection frequency	6 months
KPI reporting frequency	6 months
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Patients admitted with hemodynamically unstable AAA need to be assessed by a consultant surgeon within 30 minutes of admission **Denominator:** Total Patients admitted with hemodynamically unstable AAA
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Database

Topic Title: Non-Abdominal Aortic Aneurysms (non-AAA)

Abdominal Vascular Emergencies KPI 6

Title: Patients admitted with non-AAA abdominal vascular emergencies will undergo radiologic vascular imaging, and treated with either stenting, endovascular thrombolysis, supportive medical care, or exploratory laparotomy (for detection of bowel viability, vascular pathology or aneurysm repair)

Description	Patients should receive one of these diagnostic evaluations
Rationale	Detection of AMI, visceral aneurysm, iliac aneurysms, aortic dissection, spontaneous abdominal/ retroperitoneal bleeding, SMA thrombosis/ embolism, aortoenteric fistula, pelvic, iliac, vena cava thrombosis is essential for proper therapeutic decisions
Target	100% of patients with non-AAA abdominal vascular emergencies should be evaluated with radiologic vascular imaging and treated with either stenting, endovascular thrombolysis, supportive medical care, or exploratory laparotomy (for bowel viability, vascular pathology or aneurysm repair)
KPI collection frequency	6 months
KPI reporting frequency	6 months
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients with non-AAA abdominal vascular emergencies should be evaluated with radiologic vascular imaging and treated with either stenting endovascular thrombolysis, supportive medical care, or exploratory laparotomy (for bowel viability, vascular pathology or aneurysm repair) **Denominator**: Number of emergency surgery Patients admitted with non-AAA abdominal vascular emergencies will undergo radiologic vascular imaging, and treated with either stenting, endovascular thrombolysis, supportive medical care, or exploratory laparotomy (for detection of bowel viability, vascular pathology or aneurysm repair)
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Database, Radiology Database, Intensive Care and Medical Unit Database

Coagulation

Topic Title: Coagulation

Coagulation KPI 1

Title: Patients requiring an emergent operation on warfarin therapy should have an international normalized ratio (INR) measured at the time of initial assessment

Description	INR measurement
Rationale	An emergent operation can be complicated with bleeding which may be accentuated due to warfarin therapy because of inadequate concentrations of clotting factors II, VII, IX, and X
Target	100% of patients undergoing an emergent operation on warfarin therapy have a preoperative INR measured
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients undergoing an emergent operation on warfarin therapy who have a preoperative INR measured **Denominator:** Number of patients undergoing an emergent operation on warfarin therapy
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Database, Intensive Care Unit Database

Coagulation KPI 2

Title: Patients requiring an emergent operation with an INR >2 should have it reversed to <1.5 and a heparin bridge used if anticoagulation is essential

Description	Reverse elevated INR
Rationale	An emergent operation may be complicated with bleeding which may be accentuated due to inadequate levels of clotting factors II, VII, IX, and X
Target	90% of patients undergoing an emergent operation on warfarin therapy have a preoperative INR < or equal to 2
KPI collection frequency	Annually

KPI reporting frequency	Annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients undergoing an emergent operation on warfarin therapy with an INR < or equal to 2 **Denominator:** Number of patients undergoing an emergent operation on warfarin therapy
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Database, Intensive Care Unit Database

Coagulation KPI 3

Title: Patients requiring an emergent operation on anti-x a therapy should have therapy terminated and anti-x a levels measured

Description	Terminate anti-x a therapy and measure anti-x a levels
Rationale	An emergent operation can be complicated with bleeding which may be accentuated by inhibiting activated factor x. Spontaneous reversal of anti-x a agents is between 12 and 24 hours
Target	100% of patients undergoing an emergent operation taking preoperative anti-x a therapy have anti-x a levels measured
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** patients undergoing an emergent operation taking preoperative anti-x a therapy have anti-x a levels measured **Denominator:** patients undergoing an emergent operation taking preoperative anti-x a therapy
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Database, Intensive Care Unit Database

Coagulation KPI 4

Title: Patients requiring an emergent operation on antithrombin therapy should have therapy terminated and a thrombin time measured

Description	Terminate antithrombin therapy and measure a thrombin time
Rationale	An emergent operation can be complicated by bleeding, which may be accentuated by Inhibiting the activation of thrombin. Spontaneous reversal of antithrombin therapy is between 12 and 24 hours.
Target	100% of patients requiring an emergent operation taking preoperative antithrombin therapy have a thrombin time measured
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** patients requiring an emergent operation on antithrombin therapy with a thrombin time measured **Denominato**r: patients requiring an emergent operation on antithrombin therapy
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Database, Intensive Care Unit Database

Coagulation KPI 5

Title: Patients requiring an emergent operation on preoperative dual antiplatelet therapy should have the non-aspirin agent terminated

Description	Terminate non-aspirin agent
Rationale	An emergent operation can be complicated with bleeding, which may be accentuated with dual antiplatelet therapy. While aspirin impairs platelet function via inhibiting thromboxane A2 generation, the impact on surgical hemostasis is minimal compared to benefits in reducing unwanted vascular occlusion. But more potent antiplatelet agents that inhibit ADP expression of the GpIIb/GIIIa receptor may have a profound effect on hemostasis
Target	100% of patients requiring an emergent operation on dual antiplatelet therapy have their non-aspirin agent terminated
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI	Numerator divided by denominator expressed as a percentage **Numerator:** patients requiring an emergent operation on dual antiplatelet

calculation	therapy have their non-aspirin agent terminated **Denominator:** patients requiring an emergent operation on dual antiplatelet therapy
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Database, Intensive Care Unit Database

Coagulation KPI 6

Title: Patients required RBC transfusion for acute blood loss during an emergent operation should have coagulation function evaluated

Description	Evaluate coagulation function
Rationale	Patients requiring an RBC transfusion during an emergent operation are at risk for an underlying coagulopathy, which may exacerbate the need for more RBC transfusions
Target	90% of patients requiring an RBC transfusion during an emergent operation have their coagulation functions exacerbated
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** patients requiring an RBC transfusion during an emergent operation have their coagulation functions evaluated **Denominator:** patients requiring an RBC transfusion during an emergent operation.
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Database, Intensive Care Unit Database

Coagulation KPI 7

Title: When RBC transfusion is administered during emergency surgery, the resulting haemoglobin level should be between 7 and 10 gm unless a coagulopathy exists

Description	Maintain haemoglobin between 7 and 10 gm
Rationale	There is no evidence that a haemoglobin > 7 gm is beneficial to patients with critical illness, although there is ongoing debate whether a haemoglobin of 10 gm is desirable for patients with a coagulopathy
Target	100% of patients requiring an RBC transfusion during emergency surgery

	have a haemoglobin between 7 and 10 gm
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** patients requiring an RBC transfusion during emergency surgery have a haemoglobin between 7 and 10 gm **Denominator:** patients requiring an RBC transfusion during emergency surgery
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Database, Intensive Care Unit Database

Coagulation KPI 8

Title: A massive transfusion protocol is initiated in patients requiring emergency surgery and requiring > 10 units of RBC within 6 hours

Description	Initiate massive transfusion protocol
Rationale	A massive transfusion, defined as > 10 units of RBC within 6 hours, is associated with a coagulopathy that requires the early repletion of blood components in addition to RBC
Target	100% of patients requiring a massive transfusion related to an emergent operation have a massive transfusion protocol initiated
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** patients requiring a massive transfusion related to an emergent surgery have a massive transfusion protocol initiated **Denominator:** patients requiring a massive transfusion related to an emergent surgery
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Database, Intensive Care Unit Database

Coagulation KPI 9

Title: In patients requiring hospitalization following emergency surgery, venous thromboembolism pharmacologic anticoagulant therapy should be initiated within 48 hours of haemorrhage control of bleeding

Description	VTE pharmacologic therapy
Rationale	Patients requiring hospitalization following emergency surgery are at risk of developing a postoperative VTE and the incidence is reduced by pharmacologic anticoagulant therapy.
Target	90% of patients requiring hospitalization following emergency surgery have pharmacologic anticoagulant therapy within 48 hours of haemorrhage control
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** patients requiring hospitalization following emergency surgery have pharmacologic anticoagulant therapy initiated within 48 hours of haemorrhage control **Denominator:** patients requiring hospitalization following emergency surgery
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Database, Intensive Care Unit Database

Coagulation KPI 10

Title: Patients undergoing an emergency operation should have the presence or absence of a DVT or PE documented in their medical records

Description	VTE documentation
Rationale	Patients requiring hospitalization following emergency surgery are at risk for developing a VTE
Target	100% of patients requiring hospitalization following emergency surgery have documentation of the presence or absence of a VTE event
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** patients requiring hospitalization following emergency surgery have documentation of the presence or absence of a VTE event **Denominator:** patients requiring hospitalization following emergency surgery
Reporting	Hospital 1

aggregation	
Data sources	Emergency Surgery Database, Intensive Care Unit Database

Coagulation KPI 11

Title: Patients requiring an emergent operation who are discharged on new warfarin therapy should have a heparin bridge until adequate anticoagulation is established.

Description	Heparin bridge during initiation of warfarin therapy
Rationale	The initation of warfarin therapy may deplete anticoagulants (protein C and protein S) before an adequate reduction of procoagulants (factors II, VII, IX, and X)
Target	100% of patients requiring an emergent surgery who are discharged on new warfarin therapy have a heparin bridge for >48 hours during the initiation of warfarin
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** patients requiring emergent surgery who are discharged on new warfarin therapy have a heparin bridge for >72 hours during the initiation of warfarin **Denominator:** patients requiring emergent surgery who are discharged on new warfarin therapy
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Database, Intensive Care Unit Database

Complex Pneumothorax and Empyema

Topic Title: Complex Pneumothorax and Empyema

Complex Pneumothorax and Empyema KPI 1

Title: Performance of Ultrasound guided thoracentesis for effusions greater than 10 mm

Description	Percentage of patients with documented post-pneumonic effusions greater than 10 mm who fall into categories of gross purulence, ph<7.2 and glucose <60 mg/dl, or ph>7.2 and glucose >60 mg/dl
Rationale	While post-pneumonic effusions with less than 10 mm are expected to resolve with antibiotics alone, those with >10 mm require either: VATS for gross purulence, tube thoracostomy for ph<7.2, or simple observation for ph>7.2. This evaluation will help to direct patients to early appropriate treatment modality.
Target	Little data is available to ascertain the incidence of para-pneumonic effusions and their management based upon an appropriate algorithm. The early diagnosis and treatment of these conditions may help reduce the need for complicated VATS or mini-thoracotomy for extensive loculations resulting from delayed treatment
KPI collection frequency	Semi-annually
KPI reporting frequency	Semi-annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients with any of the three findings outlined above **Denominator**: Number of patients presenting with post-pneumonic effusions
Reporting aggregation	National, regional, LHO area, hospital, age, gender
Data sources	Administrative data, Medical records

Complex Pneumothorax and Empyema KPI 2

Title: Performance of Chest CT for persistent pleural collections after previous thoracentesis or tube thoracostomy

Description	We are interested in ascertaining the results of Chest CT performed for patients undergoing a treatment algorithm which includes early diagnosis and treatment of post-pneumonic effusions first evaluated with a combination of antibiotics, thoracentesis, and/or tube thoracostomy
Rationale	.Patients who have had a chest tube for ph<7.2 must be carefully followed for resolution of their effusions and septic course. Pleural collections which persist more than 24 hours after adequate tube placement, warrant prompt

	CT imaging for evaluation of the entire thoracic space. The goal is to prevent the development of a complex multilocular process which will necessitate invasive drainage procedures such as VATS or Thoracotomy.
Target	Generating data of the results of CT scanning of patients who follow a well-established algorithm and the results of the CT findings. These data should provide previously unknown epidemiological information to help guide and revise treatment algorithms
KPI collection frequency	Semi-annually
KPI reporting frequency	Semi-annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients with findings of either simple or complex multilocular collections **Denominator**: Number of patients undergoing CT following treatment algorithms for post-pneumonic effusions
Reporting aggregation	National, regional, LHO area, hospital, age, gender
Data sources	Administrative data, Medical records

Complex Pneumothorax and Empyema KPI 3

Title: Results of fibrinolytic therapy for simple collections noted on CT scan of less than 3 days duration

Description	We are interested in ascertaining the effectiveness of percutaneous infusion of fibrinolytic therapy for resolution of uncomplicated loculations in the chest of less than 3 days duration
Rationale	Early recognition of persistent pleural effusions, less than 3 days duration, offers the potential to use fibrinolytic therapy to release the trapped fluid via a drainage tube. The actual role of this treatment modality is debated in the literature, but it seems to be a reasonable approach for well defined collections in an attempt to avoid more invasive surgical therapy. The current algorithm suggests a combination of tPA and Dnase treatment.
Target	CT imaging can readily distinguish those patients with simple collections that may be amenable to fibrinolytic therapy as opposed to those with complex collections which warrant prompt surgical therapy. These data should provide previously unknown epidemiological information to help guide and revise treatment algorithms
KPI collection frequency	Semi-annually
KPI reporting frequency	Semi-annually
KPI	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients with findings of simple pleural collections

calculation	amenable to fibrinolytic therapy **Denominator**: Number of patients undergoing fibrinolytic therapy with successful resolution of the collection
Reporting aggregation	National, regional, LHO area, hospital, age, gender
Data sources	Administrative data, Medical records

Complex Pneumothorax and Empyema KPI 4

Title: Outcome of treatment of complex pleural collections using VATS or mini-thoracotomy

Description	Patients who have multiloculated pleural peel on CT or those with simple collections over 3 days duration or those who fail to improve following fibrinolytic therapy should be referred for VATS asap, and those who fail VATS may require mini-thoracotomy
Rationale	While the current treatment algorithm aims to reduce the need for surgical therapy, certain categories of patients, as described, will require surgical treatment for resolution of their effusions and prevent long term pulmonary sequelae.
Target	CT imaging can readily distinguish those patients with complex collections which need surgical therapy ASAP. Furthermore, those who have failed treatment algorithm for less complex collections may also require VATS
KPI collection frequency	Semi-annually
KPI reporting frequency	Semi-annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients with findings of complex collections requiring surgical therapy **Denominator**: Number of patients undergoing surgical therapy with resolution of symptoms
Reporting aggregation	National, regional, LHO area, hospital, age, gender
Data sources	Administrative data, Medical records

Septic Shock in Emergency

Massimo Sartelli, Mark Malangoni, Yoram Kluger, Jean-Louis Vincent

Introduction

Sepsis is a complex, multifactorial syndrome which can evolve into conditions of varying severity. If left untreated, it may lead to the functional impairment of one or more vital organs or systems. Therefore its adequate treatment is crucial already in emergency room.

Early detection and timely therapeutic intervention in emergency room can improve the overall clinical outcome of septic patients; reducing time to diagnosis of sepsis is thought to be a critical component in reducing mortality from multiple organ failure.

However, early diagnosis of sepsis can be difficult; determining which patients presenting with signs of infection during an initial evaluation, do currently have, or will later develop a more serious illness is challenging.

Recently the definition of sepsis (Sepsis-3) [1] returned to the traditional views that sepsis is characterized by organ dysfunction attributed to an infection.

Furthermore, the consensus group proposed the introduction of qSOFA as an alert system. Patients with at least 2 of 3 clinical abnormalities including Glasgow coma score of 14 or less, systolic blood pressure of 100 mmHg or less, and respiratory rate 22/min or greater may be prone to have the poor outcome typical of sepsis. Importantly, q SOFA does not define sepsis but provides simple bedside criteria to screen adult patients with suspected infection.

Sepsis is now defined as life-threatening organ dysfunction caused by a dysregulated host response to infection. It can be clinically represented by an increase in the Sequential Organ Failure Assessment (SOFA) score of 2 points or more [1].

Septic shock is defined as a subset of sepsis in which particularly profound circulatory, cellular, and metabolic abnormalities who are associated with a greater risk of mortality than with sepsis alone. Patients with septic shock can be clinically identified by a vasopressor requirement to maintain a mean arterial pressure of 65 mm Hg or greater and serum lactate level greater than 2 mmol/L (>18 mg/dL) in the absence of hypovolemia [1].
Under this terminology, “severe sepsis” becomes superfluous.

Sepsis should generally warrant greater levels of monitoring and intervention.
In patients with severe sepsis (now sepsis) or septic shock, the 2012 Surviving Sepsis Campaign (SSC) guidelines suggested within 3 hours [2]:

- prompt haemodynamic resuscitation,
- broad spectrum antimicrobial therapy, and
- blood cultures prior to administration of antibiotics.

Haemodynamic resuscitation

It is well known that early treatment with aggressive haemodynamic support can limit the damage of sepsis-induced tissue hypoxia and prevent the over stimulation of endothelial activity.

Early, adequate hemodynamic support of patients in shock is crucial to prevent worsening organ dysfunction and failure.
Fluid therapy to improve microvascular blood flow and increase cardiac output is an essential part of the treatment of sepsis.

A fluid challenge incorporates four determinant elements [3]:
1. crystalloid solutions should be the first choice, because they are well tolerated and cheap,
2. fluids should be infused rapidly to induce a quick response but not so fast that an artificial stress response develops,
3. the goal should be an increase in systemic arterial pressure, and
4. pulmonary edema is the most serious complication of fluid infusion and appropriate monitoring is necessary to prevent its occurrence.

Vasopressor agents should be administered to restore organ perfusion if fluid resuscitation fails to optimize blood flow in various organs.

It may be acceptable practice to administer a vasopressor temporarily while fluid resuscitation is ongoing, with the aim of discontinuing it, if possible, after hypovolemia has been corrected although the benefit of this approach is unclear [3].

Norepinephrine is now the first-line vasopressor agent used to correct hypotension in the event of septic shock [2]. It is more efficacious than dopamine and is more effective for reversing hypotension in patients with septic shock [2]. Moreover dopamine may cause tachycardia more frequently and may be more arrhythmogenic than norepinephrine.

Dobutamine is another inotropic agent that increases cardiac output, regardless of whether norepinephrine is also being given. With predominantly β-adrenergic properties, dobutamine is less likely to induce tachycardia than either dopamine o isoproterenol [3].
Hypotension is the most common indicator of inadequate perfusion and restoring a mean arterial pressure of 65 to 70 mm Hg is a good initial goal during the haemodynamic support of patients with sepsis [3].

Haemodynamic resuscitation has been the cornerstone of management for severe sepsis and septic shock in Surviving Sepsis Campaign guidelines since its first draft [4].

Rivers et al. [5] in 2001 demonstrated that early goal-directed therapy (EGDT), initiated in the emergency department, reduced the in-hospital mortality rates of patients in septic shock. However results of recent multi-center prospective randomized trials [6-8] have been unable to reproduce the Rivers' results [9].

EGDT involved reaching a target ScvO2 ≥70% (through transfusion of red cells and dobutamine. Patients should otherwise have: Central venous pressure (CVP) ≥8-12 mmHg (through crystalloid boluses), Mean arterial pressure (MAP) ≥65 mmHg (through vasopressor administration), Urine output ≥0.5 mL/kg/hour (whenever possible).

Early identification of sepsis and prompt administration of intravenous fluids and vasopressors are always mandatory. However initial resuscitation should not be based on a simple, predetermined protocol.

Restoring a mean systemic arterial pressure of 65 to 70 mm Hg is a good initial goal during the haemodynamic support of patients with sepsis.

Antimicrobial therapy

A key component of the initial management of the septic patient is the administration of IV empiric antimicrobial therapy. An insufficient or otherwise inadequate antimicrobial regimen is strongly associated with unfavorable outcomes in critically ill patients [8].
Empiric broad spectrum antimicrobial therapy should be started as soon as possible in all patients with sepsis or septic shock.

Accurate diagnostic tests are essential for the correct identification of microorganisms causing sepsis.

The performance of antimicrobial susceptibility testing by the clinical microbiology laboratory is crucial both to confirm susceptibility to the empirical therapy, and to detect resistance in bacterial isolates.

At least 2 sets of blood cultures for both aerobic and anaerobic bacteria and fungal organisms should be always be obtained before starting empirical antimicrobial therapy.

Diagnosis of sources of sepsis
In the emergency department, patients need to be carefully examined to ensure that all drainable foci have been identified. Infected fluid collections, devitalised tissue, and devices may act as a persistent source of sepsis until removed.

In the setting of abdominal sepsis, imaging studies should be performed promptly to confirm a potential source of infection.

Ultrasound (US) and computed tomography (CT) areessential tools for diagnosing abdominal sepsis. The diagnostic approach to confirm the source of abdominal infection in septic patients depends largely on the haemodynamic stability of the patient [9].

Computerized tomography (CT) is the imaging modality of choice to confirm the source of infection in stable patients. However, in patients with septic shock, if the diagnosis of peritonitis can be made clinically (tenderness) and by US (diffuse fluid), the addition of CT scanning may be unnecessary and can delay surgical intervention.

Conclusion

Sepsis is a complex condition that is often life threatening. Early recognition of sepsis and early intervention are paramount in improving outcomes.

A systematic, organized multidisciplinary approach to identify sepsis and its source in the emergency department and in other settings with limited resource may improve patient outcome .

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Septic Shock in ICU

Topic Title: Septic Shock in ICU

Septic Shock in ICU KPI 1

Title: Mortality of septic shock in patients with IAI

Description	Proportion of patients with septic shock due to IAI dying in the ICU as a consequence of IAI, septic shock is defined as per the 2016 definitions (JAMA)
Rationale	
Target	<30%
KPI collection frequency	Trended monthly
KPI reporting frequency	Monthly, annually
KPI calculation	
Reporting aggregation	Country, age, gender
Data sources	Patient records

Comment [A1]: General sepsis? Or IAI

Comment [A2]: Jan IAI and septic shock will need a definition to make it maesurbale

Septic Shock in ICU KPI 2

Title: ICU length of stay

Description	Duration of stay in the intensive care unit
Rationale	ICU admission is associated with increased morbity and mortality in patients with IAI. ICU length of stay reflects morbidity and costs associated with IAI
Target	
KPI collection frequency	Trended monthly.
KPI reporting frequency	Monthly, annually
KPI calculation	
Reporting	Country, age, gender

Comment [A3]: I suppose this is simple and very important . What is the rationale for this KPI

aggregation

Data sources Patient records

Septic Shock in ICU KPI 3

Title: Time to antibiotic therapy

Description	Interval between diagnosis of abdominal infection and administration of antibiotic therapy
Rationale	Timing of antibiotic therapy is a major determinant of outcome in septic shock
Target	< 60minutes
KPI collection frequency	Trended monthly.
KPI reporting frequency	Monthly, annually
KPI calculation	Time of start of drug administration MINUS time of diagnosis of IAI
Reporting aggregation	Country, age, gender
Data sources	Patient records

Comment [A4]: How will you differentiate between presentation and diagnosis?

Comment [A5]: I see your point – admission probably better – but then this KPI will not be applicable to patients already in the hospital

Septic Shock in ICU KPI 4

Title: Appropriateness of empirical antibiotic therapy

Description	Proportion of patients receiving appropriate antibiotic therapy (intravenously administered antibiotic with in-vitro activity to the causative pathogen – known or presumed)
Rationale	Empircal antibiotic therapy should cover pathogens recovered from the infection site
Target	> 90%
KPI collection frequency	Trended monthly.
KPI reporting frequency	Monthly, annually
KPI calculation	**Numerator:** Number of patients with receiving appropriate antibiotic therapy within 24 hours of diagnosis of IAI. **Demominator:** Total number of patients diagnosed with IAI
Reporting aggregation	Country, age, gender
Data sources	Patient records

Septic Shock in ICU KPI 5

Title: Time to source control intervention

Description	Interval between diagnosis of abdominal infection and source control intervention (not limited to a surgical procedure)
Rationale	Source control is a major determinant of outcome in IAI and should not be delayed in patients with septic shock
Target	< 6 hours
KPI collection frequency	Trended monthly.
KPI reporting frequency	Monthly, annually
KPI calculation	Time of start of source control procedure MINUS time of diagnosis of IAI
Reporting aggregation	Country, age, gender
Data sources	Patient records

Fluid Resuscitation in Septic Shock

Fluid resuscitation in Sepsis

Manu Malbrain, MD, PhD

Introduction

The quality standard for IV fluid therapy in adults in hospital specifies that services should be commissioned from and coordinated across all relevant agencies encompassing the whole care pathway. A person-centred, integrated approach to providing services is fundamental to delivering high-quality care to adults in hospital receiving IV fluid therapy.

Revised SSCG

To be completed within 3 hours of time of presentation (*defined as the time of triage in the emergency department or, if presenting from another care venue, from the earliest chart annotation consistent with all elements of severe sepsis or septic shock ascertained through chart review):*

- Measure lactate level
- Obtain blood cultures prior to administration of antibiotics
- Administer broad spectrum antibiotics
- Administer 30ml/kg crystalloid for hypotension or lactate ≥4mmol/L

To be completed within 6 hours of time of presentation:

- Apply vasopressors (for hypotension that does not respond to initial fluid resuscitation) to maintain a mean arterial pressure (MAP) ≥ 65mmHg

In the event of persistent hypotension after initial fluid administration (MAP < 65 mm Hg) or if initial lactate was ≥ 4 mmol/L, volume status and tissue perfusion needs to be re-assessed and the findings documented with:

either:

- repeat focused exam (after initial fluid resuscitation) including vital signs, cardiopulmonary, capillary refill, pulse, and skin findings.

or two of the following:

- measure CVP
- measure $S_{cv}O_2$
- bedside cardiovascular ultrasound
- dynamic assessment of fluid responsiveness with passive leg raising or fluid challenge

Re-measure lactate if initial lactate elevated

Preload

Recommendations:

Barometric preload indicators, such as central venous pressure (CVP) or pulmonary artery occlusion pressure (PAOP), should not be used to guide fluid resuscitation in septic patients.

Chasing static CVP target of 8 to 12 mmHg as resuscitation endpoint may lead to over- or under-resuscitation and should be abandoned.

Recommendation:

Transmural filling pressures or their estimates may better reflect the true preload status (especially in patients with high PEEP and IAP) and thus could be a better resuscitation endpoint

Recommendation:

Volumetric preload indicators (like right ventricular or global end diastolic volume) are superior compared to barometric ones and are recommended to guide fluid resuscitation, especially in septic patients with increased IAP

If the GEDVI is high, the measurement needs to be corrected for the global ejection fraction as this leads to a more accurate estimation of preload

Fluid Responsiveness

Recommendation:

Fluid resuscitation in septic patients should be guided by physiological parameters or tests that are able to predict fluid responsiveness

Cardiac Output

Recommendation:

By definition, when treating shock patients, CO should be monitored to identify patients with low or high CO and to assess the response to treatment

MAP

Recommendations:

Chasing a static MAP target of 65 mmHg may be too low or too high and as such MAP should be tailored individually

In patients with abdominal hypertension, abdominal perfusion pressure (APP) calculated as MAP minus intra-abdominal pressure may be a better resuscitation endpoint

Urine Output

Recommendation:

Urine output is a poor endpoint that may lead to over- or under estimation of fluid resuscitation and, as such, can no longer be recommended

However, in situations with limited monitoring techniques, it can still be used to guide fluid resuscitation

SCVO2

Recommendation:

Chasing an $S_{cv}O_2$ target of 70% in isolation does not make sense, therefore $S_{cv}O_2$ should always be seen in relation to previous history, co-morbidities and actual lactate levels

Recommendation:

An excessive positive cumulative fluid balance should be avoided

The use of extravascular lung water is recommended to guide de-resuscitation in septic patients not transgressing spontaneously from Ebb to Flow phase

Topic Title: Fluid Resuscitation in Septic Shock

Fluid Resuscitation in Septic Shock KPI 1

Title: ICU's have an intravenous (IV) fluids specialist

Description	The IV fluids specialist in the ICU has overall responsibility for training, clinical governance, audit and review of IV fluid prescribing, and patient outcomes.
Rationale	The IV fluids specialist the ICU can promote best practice, ensuring that healthcare professionals are trained in prescribing and administering IV fluid therapy, and reviewing learning from 'near miss' and critical incident reporting. This leadership role can ensure continuity of care in relation to fluid management through coordination between different hospital departments.
Target	This is an all or nothing KPI, either there is an IV fluid lead (100%) or there is not (0%)
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	Evidence that the ICU has an IV fluids lead who has overall responsibility for ensuring adequate training, clinical governance, audit and review of IV fluid prescribing, and patient outcomes.
Reporting aggregation	Hospital 1
Data sources	Local hospital database

Fluid Resuscitation in Septic Shock KPI 2

Title: Hospitals need to screen patients in ER, OR, ICU and on the wards for early signs and symptoms of sepsis

Description

Each hospital needs to check for signs and symptoms of sepsis as soon as possible. For early detection an EWS can be used (Early warning score).

National Early Warning Score (NEWS)*

PHYSIOLOGICAL PARAMETERS	3	2	1	0	1	2	3
Respiration Rate	≤8		9 - 11	12 - 20		21 - 24	≥25
Oxygen Saturations	≤91	92 - 93	94 - 95	≥96			
Any Supplemental Oxygen		Yes		No			
Temperature	≤35.0		35.1 - 36.0	36.1 - 38.0	38.1 - 39.0	≥39.1	
Systolic BP	≤90	91 - 100	101 - 110	111 - 219			≥220
Heart Rate	≤40		41 - 50	51 - 90	91 - 110	111 - 130	≥131
Level of Consciousness				A			V, P, or U

*The NEWS initiative flowed from the Royal College of Physicians' NEWS Development and Implementation Group (NEWDIG) report, and was jointly developed and funded in collaboration with the Royal College of Physicians, Royal College of Nursing, National Outreach Forum and NHS Training for Innovation

Please see next page for explanatory text about this chart.

Royal College of Physicians

NHS Training for Innovation

Rationale

Early recognition of and treatment of sepsis may result in improved outcomes. There are different EWS published and each hospital may use any of the previously published or create its own.

Target

At least 90% of all patients with suspicion of sepsis are screened with EWS before admission to ICU

KPI collection frequency

Annually

KPI reporting frequency

Annually

KPI calculation

Evidence that hospitals calculate for each sepsis patient an EWS
Numerator divided by denominator expressed as a percentage
Numerator: Number of EWS calculated in patients admitted to ICU with sepsis
Denominator: Number of patients admitted to ICU with sepsis

Reporting aggregation

Hospital 1

Data sources

ICU database

Fluid Resuscitation in Septic Shock KPI 3

Title: Adherence to SSCG bundle within 3 hours of presentation with sepsis

Description	To be completed within 3 hours of time of presentation (*defined as the time of triage in the emergency department or, if presenting from another care venue, from the earliest chart annotation consistent with all elements of severe sepsis or septic shock ascertained through chart review):* • Measure lactate and base deficit level • Obtain blood cultures prior to administration of antibiotics • Administer broad spectrum antibiotics Optional and based on co-morbidities (eg dilated cardiomyopathy) and presence of fluid responsiveness (to be assessed with functional hemodynamics (PPV, SVV) or passive leg raising test. Administer 30ml/kg balanced crystalloid for hypotension or lactate ≥ 4mmol/L or BE < -10
Rationale	Early recognition of and treatment of sepsis may result in improved outcomes. The present literature shows that adherence to SSCG bundle improves morbidity and mortality.
Target	90% of patients admitted to ICU with sepsis have 3 out of 3 early SSCG criteria fulfilled within 3 hours
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of sepsis patients admitted to ICU in which 3 out of 3 early SSCG criteria are fulfilled within 3 hours **Denominator**: Number of sepsis patients admitted to ICU
Reporting aggregation	Hospital 1
Data sources	ICU database

Fluid Resuscitation in Septic Shock KPI 4

Title: Adherence to SSCG bundle within 6 hours of presentation with sepsis

Description	To be completed within 6 hours of time of presentation: Apply vasopressors (for hypotension that does not respond to initial fluid resuscitation) to maintain a mean arterial pressure (MAP) ≥ 65mmHg In the event of persistent hypotension after initial fluid administration (MAP < 65 mm Hg) or if initial lactate was ≥ 4 mmol/L, volume status and tissue perfusion needs to be re-assessed and the findings documented with: either: repeat focused exam (after initial fluid resuscitation) including vital signs, cardiopulmonary, capillary refill, pulse, and skin findings. or one of the following: • bedside cardiovascular ultrasound • dynamic assessment of fluid responsiveness with passive leg raising or fluid challenge Re-measure lactate and base deficit if initial lactate elevated or base deficit < -5 Note: because of the critique on the evidence regarding the use of CVP and ScvO2 these parameters cannot be recommended
Rationale	Literature shows that adherence to SSCG bundle improves morbidity and mortality.
Target	90% of patients admitted to ICU with sepsis have 3 out of 3 late SSCG criteria fulfilled within 6 hours
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of sepsis patients admitted to ICU in which 3 out of 3 early SSCG criteria are fulfilled within 6 hours **Denominator**: Number of sepsis patients admitted to ICU
Reporting aggregation	Hospital 1
Data sources	ICU database

Fluid Resuscitation in Septic Shock KPI 5

Title: Registration on the use of colloids and crystalloids

Description	The IV fluid's lead collects together with the chief pharmacist data on the use of clear fluids (crystalloids) and colloids in the ICU.
Rationale	Recent recommendations of the PRAM (EMEA) state that starches cannot be used in patients with sepsis or burns because of the increased risk of acute kidney injury and need for renal replacement therapy. Recent data show deleterious effects associated with large amount of normal saline (hyperchloremic metabolic acidosis). The use of normal saline needs to be limited to 2 litres within the first week of ICU stay.
Target	<5% of patients admitted to ICU with sepsis did receive starches by accident or did receive > 2 Ltr of NS
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of sepsis patients admitted to ICU that received starch solutions or > 2L NS at any point in time (ER, OR, ICU,…) **Denominator**: Number of sepsis patients admitted to ICU
Reporting aggregation	Hospital 1
Data sources	ICU database

Abdominal Compartment Syndrome

Topic Title: Abdominal Compartment Syndrome

Abdominal Compartment Syndrome KPI 1

Title: Emergency Surgery ICU have IAP measurement done on within 24hour after admission

Description	Measurement of IAP
Rationale	Intra-abdominal hypertension is a sign of underlying intra-abdominal problem. This may or not progress to the abdominal compartment syndrome. Recognition is key and to achieve this IAP measurement needs to be undertaken in this high risk sub group
Target	80% of patients admitted to ICU have an IAP measurment doen within 24 hours
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of emergency surgery patients admitted to ICU **Denominator**: Number of emergency surgery patients admitted to ICU having IAP measured
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Database, ICU database

Abdominal Compartment Syndrome KPI 2

Title: ICU patients with either Grade 3 or 4 Intra-abdominal Hypertension (IAH) (Grade 3 IAP 21- **25 mmHg**, Grade IV: IAP > **25 mmHg**. **have evidence ACS preventative strategy**

Description	Prevention of ACS is key to good outcomes and reflects optimum care.
Rationale	ACS may be contributed by failure to gain early primary haemorrhage control. This may be as a result of a delay with surgery, sub-optimal surgical approach, and delay in interventional radiology. Other confounders might include failure in damage control, delay in massive transfusion protocol or excessive crystalloid resuscitation
Target	80% of patients with Grade 3 or 4 IAH have demonstrated one of following • Crystalloid cap <3L in first 24 hours • Haemorrahge control <90 post presentation in shock

- Balanced resuscitation with 2 hours of commencing blood transfusion

KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of Grade ¾ IAH **Denominator**: Number of meeting one of the 3 criteria in patients who present with either septic shock or major haemorrhage and are admitted to ICU
Reporting aggregation	Hospital 1
Data sources	Chair Department of Surgery, Emergency Surgery Database, ICU database

Abdominal Compartment Syndrome KPI 3

Title: Documented closure plan in operation sheet of index open abdomen operation

Description	Clear documentation of closure plan
Rationale	While an open abdomen may be a life-saving necessity, early closure is just as important. Early and successful fascial closure requires planning and active de-resuscitation. This risk of complications rises exponentially when the abdomen is left open for more than 7 days.
Target	80% of patients have a documentation plan for return to the operating theatre and partial or total closure plans
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of with an open abdomen who have a documentation plan for return to the operating theatre **Denominator** Number of with an open abdomen
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Database, ICU database, Patient's notes

Abdominal Compartment Syndrome KPI 4

Title: Hospitals entero-atmospheric fistulae rate <10%

Description	Documented presence of fistula
Rationale	Fistulas do occur as a result of many factors. Some caused by the initial event and some are iatrogenic, due in part to tissue handling or failure to maintain the abdominal domain
Target	90% of do not develop a fistula in the first 30days post index open abdomen
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of with an open abdomen who have a fistula **Denominator** Number of with an open abdomen
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Database, ICU database, Patient's notes

Abdominal Compartment Syndrome KPI 5

Title: Use of NPWT abdominal dressing in open abdomen patient

Description	Documented use of NPWT
Rationale	NPWT with or without dynamic traction has been shown to optimise outcome, result in great primary fascial closure rates and improved mortality. A subgroup of in-operative ischaemic gut patients do not merit such a dressing as is not resectable are for comfort care.
Target	80% of patients undergoing an oper abdomen have a NPWT from the index open abdomen operation
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	**Numerator:** Number of with an open abdomen who have a NPWT applied at the first open abdomen operation **Denominator:** Number of with an open abdomen
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Database, ICU database, Patient's notes

Geriatric Care

Topic Title: Geriatric Care

Geriatric Care KPI 1

Title: Emergency Surgery decision-making process tailored for Geriatric patients

Description	Application of Comprehensive Geriatric Assessment (CGA) in Emergency Surgery as a diagnostic and predictive tool
Rationale	Emergency Surgery on Elderly patients represents a high proportion of all surgical emergencies in developed countries with high levels of postoperative morbi-mortality. CGA needs to be performed preoperatively in this age group in order to make adequate surgical decisions.
Target	>75%, Interdisciplinary CGA to be introduced as an element of good practice on Geriatric Emergency Surgical patients.
KPI collection frequency	Six monthly
KPI reporting frequency	Six monthly
KPI calculation	Numerator divided by denominator expressed as a percentage: **Numerator:** Number of Geriatric Emergency Surgery patients **Denominator:** Number of Geriatric Emergency Surgery patients with a formal CGA
Reporting aggregation	National, regional, LHO Area, hospital, age, gender
Data sources	Medical records, surveys

Geriatric Care KPI 2

Title: Gallbladder drainage on elderly frail Emergency Patients with Acute Cholecystitis and Cholangitis

Description	Percentage of procedures performed on frail elderly patients
Rationale	This pathology represents one of the most frequent surgical emergencies in elderly patients and carries a high mortality rate. Percutaneous cholecystostomy offers a valuable bridge reducing the need for emergency surgery in Tokyo stages II&III.
Target	>75% of elderly frail patients with acute unresponding moderate and severe cholecystitis or cholangitis to undergo urgent gallbladder drainage.

KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	Numerator divided by denominator expressed as a percentage: **Numerator:** Number of frail elderly patients with moderate and severe cholecystitis or cholangitis **Denominator**: Number of Gallbladder drainage procedure performed in these cases
Reporting aggregation	National, regional, LHO Area, hospital, age, gender
Data sources	Medical records, institutional records

Geriatric Care KPI 3

Title: Prevention strategy for Postoperative Delirium in Elderly Emergency patients

Description	Implementation and Compliance to a Specific strategy preventing postoperative delirium.
Rationale	Elderly patients undergoing emergency surgery have a high risk of developing postoperative delirium with poor outcomes leading to increased mortality.
Target	>75%, Strategy and standardized checklist to be introduced as an element of good practice for patients with risk.
KPI collection frequency	Six monthly
KPI reporting frequency	Six monthly
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Total number of elderly patients undergoing Emergency surgery. **Denominator 1**: Total number of elderly patients undergoing Emergency surgery with a specific prevention strategy. **Denominator 2**: Total number of elderly patients undergoing Emergency surgery with a compliant prevention strategy.
Reporting aggregation	National, regional, LHO Area, hospital, age, gender
Data sources	Medical records, institutional records, surveys

Geriatric Care KPI 4

Title: Emergency Geriatric Surgery on Waiting List patients

Description	Emergency surgery due to pathology related complication arising in the period prior to scheduling elderly patients, already on Operating Waiting List
Rationale	Scheduled surgery on Elderly patients is often delayed due to preoperative multidisciplinary evaluations and administrative reasons. Shortening this period based on a complication risk assessment should avoid predictable emergency surgery.
Target	0%, No patients on the Waiting list to be operated on before scheduled surgery as a result of pathology related complication.
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	Numerator divided by denominator expressed as a percentage: **Numerator:** Number of elderly patients on Waiting list **Denominator**: Number of elderly patients, initially elective, operated on as an emergency
Reporting aggregation	National, regional, LHO Area, hospital, age, gender
Data sources	Medical records, institutional records

Geriatric Care KPI 5

Title: Early recognition of Non Operative Management (NOM) failure in elderly emergency patients

Description	Use of Clinical, Lab values and Ultrasound monitoring for Emergency surgery decision in NOM failure.
Rationale	NOM represents a valid option in elderly patients. Emergency surgery decision and timing can be optimized by early recognition of NOM failure through Clinical, Laboratory and Ultrasound monitoring.
Target	100% of NOM patients to be monitored, >85% of the NOM failures to be recognized
KPI collection frequency	Six monthly
KPI reporting frequency	Six monthly
KPI	Numerator divided by denominator expressed as a percentage:

calculation	**Numerator:** Number of elderly patients with NOM of Emergency surgical pathology **Denominator 1**: Number of monitored NOM elderly patients **Denominator 2**: Number of elderly patients with NOM failure recognized early
Reporting aggregation	National, regional, LHO Area, hospital, age, gender
Data sources	Medical records, institutional records

Paediatric Emergency Care

Topic Title: Paediatric Emergency Care – Appendicitis

Paediatric Emergency Care KPI 1

Title: Paediatric patients with suspected appendicitis should have abdominal ultrasound as the first-line diagnostic test

Description	Percentage of paediatric patients undergoing evaluation with Abdominal US for appendicitis
Rationale	CT is acknowledged as the criterion standard for the diagnosis of appendicitis. However, given concerns of radiation risks, ultrasound is the preferred initial consideration for imaging examination in children. If the results of the ultrasound exam are equivocal, it may be followed by CT. This approach is cost-effective, reduces potential radiation risks and has excellent accuracy.
Target	>90%
KPI collection frequency	Monthly
KPI reporting frequency	Monthly
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of paediatric patients undergoing ultrasound for evaluation of suspected appendicitis **Denominator**: Number of paediatric patients undergoing imaging studies as part of evaluation for appendicitis
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Database, Radiology reporting systems

Paediatric Emergency Care KPI 2

Title: Preoperative Diagnosis of Perforated Appendicitis

Description	Preoperative diagnosis of perforated appendicitis may alter the approach (e.g., surgical vs nonsurgical); it also may reflect delays in surgical care or inadequate evaluation
Rationale	Perforated appendicitis may be best treated non-operatively (e.g., drainage of an abscess, or primary antibiotic therapy for a phlegmon). It is important to recognize it in order to make a treatment decision, so an appropriate

	diagnostic evaluation is essential. In addition, delays in care may result in in-hospital perforation.
Target	>90% of patients with perforated appendicitis are identified preoperatively
KPI collection frequency	Every 6 months
KPI reporting frequency	Every 6 months
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of Patients with perforated appendicitis as preoperative diagnosis **Denominator** Number of Patients with perforated appendicitis as postoperative diagnosis
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Database, OR registry

Topic Title: Paediatric Emergency Care – Intussusception

Paediatric Emergency Care KPI 3

Title: Bowel Resection Rates in Paediatric Patients with Intussusception

Description	Bowel Resection in Intussusception
Rationale	Children with intussusception less often undergo bowel resection when treated in hospitals with paediatric surgeons
Target	<50% Bowel resection rate in children with intussusception
KPI collection frequency	Every 6 months
KPI reporting frequency	Every 6 months
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of paediatric patients undergoing ultrasound for evaluation of suspected appendicitis **Denominator**: Number of paediatric patients undergoing imaging studies as part of evaluation for appendicitis
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Database, Hospital discharge records

Topic Title: Paediatric Emergency Care –Trauma

Paediatric Emergency Care KPI 4

Title: Thoracic CT evaluation for paediatric trauma

Description	Frequency of CT use in evaluation of paediatric trauma
Rationale	Paediatric patients rarely sustain significant thoracic trauma such as descending thoracic aortic tears; most significant injuries can be diagnosed by chest x-ray.
Target	< 20% of paediatric trauma admissions undergoing thoracic CT as part of initial trauma evaluation
KPI collection frequency	Every 6 months
KPI reporting frequency	Every 6 months
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of paediatric trauma admissions undergoing thoracic CT **Denominator:** Total Number of paediatric trauma admissions
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Database, Radiology records

Topic Title: Paediatric Emergency Care –Cholecystitis

Paediatric Emergency Care KPI 5

Title: Reporting of the outcomes from cholecystectomy

Description	Documented reported outcome from surgery
Rationale	The incidence of complication needs to be report form hospitals to maintain quality and improve outcome
Target	100% of paediatric patients undergoing cholecystectomy are entered into a hospital wide registry with data retrievable for conversion to open, length of stay, bile leak, bleeding and bile duct injury
KPI collection frequency	Every 6 months
KPI reporting frequency	Every 6 months

KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of paediatric patients undergoing cholecystectomy entered into a hospital wide registry **Denominator:** Number of paediatric patients undergoing cholecystectomy
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Database, Patient's notes

Laboratory

Laboratory support for the Emergency Surgery service

Background

Laboratory tests form an essential part of the investigation and clinical management of emergency surgery patients.

International standards [Medical laboratories – Requirements for quality and competence [ISO 15819: 2012] define in comprehensive detail. the required standards for the totality of technical and management activities undertaken by the laboratory. Laboratories supporting emergency surgery services should comply with these standards and compliance should be assessed by a competent accrediting body. In addition some laboratory activities such as the supply of blood and blood products may be subject to national regulatory control.

Point-of-Care diagnostic testing [POCT] has an increasing role in the management of acutely ill patients. POCT carried out by the clinical team allows a more rapidly available test result than can be achieved by central laboratory testing and therefore may expedite clinical decision making and contribute to improved patient outcomes. However POCT has been associated with a higher quality error rate than central laboratory testing. It is therefore important that POCT is undertaken within a formal framework that complies with International standards [Medical laboratories – Requirements for quality and competence [ISO 15819: 2012 and other associated standards such as ISO 22870:2006]. A POCT service supporting emergency surgery teams should comply with these standards and compliance should be assessed by a competent accrediting body.

The organisation of emergency surgery services and laboratories will vary between hospitals. It is therefore important that there is local, ongoing dialogue so that the laboratory can understand the requirements of the emergency surgery team and agree the scope and quality of the service to be provided.

Topic Title: Laboratory - Laboratory Support

Laboratory KPI 1

Title: The laboratory providing support for the emergency surgery department is accredited by a competent accrediting body and based on ISO standards.

Description	The laboratory service supporting the emergency surgery department should comply with the 'Medical laboratories - Requirements for quality and competence [ISO 15189:2012]'. This should be assessed by a competent accrediting body.
Rationale	High quality laboratory support is essential for the management of emergency surgery patients. The quality of laboratory services should meet ISO standard 15189:2012 for quality and competence and as assessed by a competent accrediting body.
Target	The laboratory should be accredited as meeting ISO standard 15189:2012 by an appropriate accrediting body.
KPI collection frequency	Annual confirmation that the laboratory has full accreditation.
KPI reporting frequency	Annual confirmation that the laboratory has full accreditation.
KPI calculation	Yes/No
Reporting aggregation	Hospital
Data sources	Hospital Administration/Laboratory Director

Laboratory KPI 2

Title: The laboratory should provide a repertoire of tests [available on a 24/7 basis] and including those tests provided at Point –of-Care which are appropriate for the optimum management of emergency surgery patients; this should be agreed between the Emergency Surgery team and the laboratory and kept under regular [at least annual] review

Description	The laboratory should be able to provide an agreed repertoire of tests on a 24/7 basis which are necessary for the management of Emergency Surgery patients. The test repertoire to be provided will be reviewed and agreed at an annual meeting between the Emergency Surgical team and the laboratory.
Rationale	Timely availability of laboratory test results is essential for the effective management of emergency surgery patients. The required turnaround times should be agreed between the Emergency Surgery team and the laboratory and kept under review [at least annually]. Regular audit will provide assurance that the agreed turnaround times are being met.

Target	90% of test turnaround times should meet the agreed target
KPI collection frequency	Bimonthly audit of test turnaround time
KPI reporting frequency	Bimonthly
KPI calculation	**Numerator**: No of tests meeting the TAT target **Denominator**: Total No. of tests from emergency surgery patients
Reporting aggregation	Hospital
Data sources	Laboratory Director

Laboratory KPI 3

Title: Where point-of-care diagnostic testing [POCT] is used to support the management of Emergency Surgery patients, the POCT service should be accredited by an appropriate accrediting body and based on ISO standards.

Description	The use of POCT to support the management of Emergency Surgery patients should take place within the framework of a POCT service which is accredited as meeting the relevant ISO standard[s] for quality and competence. The repertoire of tests provided by Point-of-Care should be agreed between the Emergency Surgery team and the Laboratory and reviewed annually.
Rationale	POCT may play a valuable role in the management of emergency surgery patients by allowing the more rapid availability of a test result. To assure quality, POCT should only operate within a formal framework which is accredited by a competent accrediting body as meeting the relevant ISO standards.
Target	The POCT service should be accredited as meeting the relevant ISO standards by a competent accrediting body.
KPI collection frequency	Annual confirmation that the POCT service has full accreditation
KPI reporting frequency	Annual confirmation that the POCT service has full accreditation
KPI calculation	Yes/No
Reporting aggregation	Hospital
Data sources	Laboratory Director

Laboratory KPI 4

Title: The laboratory supplying blood and blood products for the management of emergency surgery patients should meet the requirements of ISO 15189:2012 [Medical laboratories – requirements for quality and competence] and those of the relevant national regulatory body.

Description	The laboratory supplying blood and blood products for the management of emergency surgery patients should meet the requirements of ISO 15189:2012 [Medical laboratories – requirements for quality and competence] as assessed by a competent accrediting body and also the requirements of the relevant national regulatory body as assessed by the relevant national regulatory body.
Rationale	It is essential that the laboratory supplying blood and blood products for the management of emergency surgery patients operates in accordance with international standards and national regulatory requirements.
Target	Annual confirmation that the laboratory has full accreditation and meets the requirement of the relevant national regulatory body.
KPI collection frequency	Annual confirmation of full accreditation and full compliance with national regulatory requirements.
KPI reporting frequency	Annual confirmation of full accreditation and full compliance with national regulatory requirements.
KPI calculation	Yes/No
Reporting aggregation	Hospital
Data sources	Laboratory Director

Wound Care

Topic Title: Wound Care – Abdominal Compartment Syndrome

Wound Care KPI 1

Title: Emergency Surgery patients under SSI Surveillance

Description	Measurement of SSI and Surgical Site Occurrence
Rationale	Optimizing patient outcome through reduction in surgical site occurrence is crucial. Understanding the prevalence of SSI and SSO is crucial to reducing complications and minimising cost. This translates to happier patients and families
Target	90% of patients laparotomy are subject to SSI surrveilance
KPI collection frequency	3 monthly
KPI reporting frequency	3 monthly
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of emergency surgery patients admitted for laparotomy who were subject to SSI surveillance **Denominator**: Total number of emergency surgery patients admitted for laparotomy
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Database, Infection control data base

Wound Care KPI 2

Title: The hospital has an antibiotic stewardship policy

Description	Hospital antibiotic stewardship policy
Rationale	The administration of appropriate and timely antibiotics is essential to reducing wound infection and also minimising antibiotic resistance and C diff.
Target	Patients undegoig emergency surgery abdominal surgery meet AB Stewardship criteria
KPI collection frequency	Annually

KPI reporting frequency	Annually
KPI calculation	Hospital reporting annually its compliance with AB stewardship policies
Reporting aggregation	Hospital 1
Data sources	Chair Department of Surgery, Emergency Surgery Database, Infection control database

Wound Care KPI 3

Title: Wound Infection rate <10% for emergency laparotomy

Description	Wound Infection rate <10% for emergency laparotomy
Rationale	Improving outcomes and reducing re-admission to hospital is vital to quality care. Ensuring I
Target	10% wound infection by 30 days
KPI collection frequency	3 monthly
KPI reporting frequency	3 monthly
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients undergoing emergency laparotomy with WI **Denominator** Number of patients undergoing emergency laparotomy
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Database, Infection control database

Wound Care KPI 4

Title: The hospital used a wound care bundle to include pre-operative, intra-operative, and post-operative key interventions

Description	Documented compliance with wound care bundle
Rationale	Wound infection can be markedly reduced by a collaborative approach in wound infection reduction

Target	90% emergency abdominal surgery have compliance with wound care bundle
KPI collection frequency	6 monthly
KPI reporting frequency	6 monthly
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients undergoing emergency laparotomy enrolled in wound bundle package **Denominator:** Number of patients undergoing emergency laparotomy
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Database, ICU database, Infection control database

Wound Care KPI 5

Title: Abdominal wound dehiscence less than 2% of all laparostomies

Description	Abdominal wound dehiscence less than 2% of all laparostomies
Rationale	Abdominal wound dehiscence is a life threatening complication of abdominal surgery. It is potentially preventable and wound care strategies will help reduce the complication
Target	2% of patients undergoig an laparotomy develop a fascial dehiscence within 30 days
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of patients undergoing emergency laparotomy who dehiscence **Denominator** Number of patients undergoing emergency laparotomy
Reporting aggregation	Hospital 1
Data sources	Emergency Surgery Database, ICU database, Patient's notes

Radiology

Topic Title: Radiology

Radiology KPI 1

Title: Negative CT Scan Rate for Acute Appendicitis

Description	Percentage of patients who had an abdominopelvic CT for suspected appendicitis reported as demonstrating no acute abnormality.
Rationale	Abdominopelvic CT examinations are a relatively high radiation dose examination and must be clinically justified. Overall study requisition appropriateness in an institution can be judged by the percentage of CT studies which do not demonstrate any acute pathology.
Target	Less than 30% of all abdominopelvic CTs for suspected acute appendicitis should be negative for acute pathology.
KPI collection frequency	Semi-annually
KPI reporting frequency	Semi-annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of abdominopelvic CT studies performed for suspected acute appendicitis which were negative for acute pathology. **Denominator**: Total number of abdominopelvic CT studies performed for suspected acute appendicitis
Reporting aggregation	National, regional, LHO area, hospital, age, gender
Data sources	Medical Imaging Archive System (PACs), Medical Records

Radiology KPI 2

Title: Investigation of Female Lower Abdominal Discomfort

Description	Percentage of reproductive age (<50yrs) females with lower abdominal or pelvic symptoms who have ultrasound as first abdominopelvic imaging test.
Rationale	Ultrasound, an investigation that does not involve ionising radiation, can often demonstrate pathologies that would explain patient symptoms, especially in the female population.
Target	Greater than 85% of females, < 50yo, referred for investigation of acute lower abdominopelvic symptoms have had an ultrasound prior to CT.

KPI collection frequency	Semi-annually
KPI reporting frequency	Semi-annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of female patients < 50yo who have an abdominopelvic CT study performed for investigation of lower abdominal/pelvic symptoms who have had an ultrasound first. **Denominator**: Total number of female patients < 50yo who have an abdominopelvic CT study performed for investigation of lower abdominal/pelvic symptoms
Reporting aggregation	National, regional, LHO area, hospital, age, gender
Data sources	Medical Imaging Archive System (PACs), Medical Records

Radiology KPI 3

Title: Time to CT in Suspected Mesenteric Ischaemia

Description	Percentage of patients suspected of acute mesenteric ischaemia who receive a CT within 90 minutes of request.
Rationale	An indicator of the adequacy of radiology service provision for acute abdominal emergencies is time to CT in time critical scenarios such as mesenteric ischaemia.
Target	Greater than 80% of all abdominopelvic CTs obtained for suspected acute mesenteric ischaemia should be obtained within 90 minutes of request.
KPI collection frequency	Semi-annually
KPI reporting frequency	Semi-annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** Number of abdominopelvic CT studies performed for suspected acute mesenteric ischaemia which are obtained within 90 mins of request. **Denominator**: Total number of abdominopelvic CT studies performed for suspected acute mesenteric ischaemia
Reporting aggregation	National, regional, LHO area, hospital, age, gender
Data sources	Medical Imaging Archive System (PACs), Medical Records

Radiology KPI 4

Title: Accuracy of Appendicitis Imaging

Description	Percentage of patients who have imaging (ultrasound, CT or MRI) and subsequent appendectomy but imaging diagnosis was incorrect. e.g. Imaging reported as acute appendicitis but histology normal.
Rationale	An indicator of the adequateness and accuracy of a radiology service in the assessment of abdominal surgical emergencies could be how closely imaging reports match histology in acute appendicitis.
Target	Less than 10% of patients who have appendectomy for suspected acute appendicitis should have non-concordant histology and imaging.
KPI collection frequency	Semi-annually
KPI reporting frequency	Semi-annually
KPI calculation	Numerator divided by denominator expressed as a percentage **Numerator:** The number of patients with non-concordant imaging and histology. **Denominator**: Total number of patients who undergo appendectomy for suspected acute appendicitis
Reporting aggregation	National, regional, LHO area, hospital, age, gender
Data sources	Medical Imaging Archive System (PACs), Radiology Information System (RIS), Histology, Medical Records

Radiology KPI 5

Title: Abdominal Plain Radiography Usage

Description	Plain radiography of the abdomen should have been performed in less than 20% of patients that proceed to an emergency laparotomy.
Rationale	Plain radiography of the abdomen is not sensitive or specific to the commonest abdominal emergencies. In the majority of cases abdominal radiography is inappropriate in the investigation of the acute abdomen, delaying more accurate investigations and possibly delaying treatment.
Target	Less than 20% of patients who have undergone an emergency laparotomy had a plain abdominal radiograph as an imaging investigation.
KPI collection frequency	Semi-annually
KPI reporting	Semi-annually

frequency	
KPI calculation	Numerator divided by denominator expressed as a percentage**Numerator:** Number of patients who have an abdominal radiograph performed prior to emergency laparotomy. **Denominator**: Total number of patients who have had an emergency laparotomy.

Emergency Theatre

Operating theatre use in emergency surgery

Emergency surgery comprises the management of trauma-induced and disease-based surgical emergencies as well as management of surgical complications including so called rescue surgery forming a major part of surgical volume in major surgical centers[1]. Even though complications occur in approximately same frequency in most hospitals, failure to rescue is major determinant of survival and dedicated emergency surgeons form a crucial part of the surgical rescue capability[2]. Because timely surgery is crucial for good outcome in emergency surgery patients and in order not to disrupt the flow of elective surgery, structural separation of elective and emergency surgery, the use of dedicated daytime operating theatres, and the implementation of a universal, urgency-based classification of emergency operations ("traffic light codes") have been shown to reduce night-time surgery, improve the effective use of operating theatres during office hours and shorten preoperative delays in patients requiring urgent surgery[3].

Statement 1 Emergency and elective surgery should be managed separately in major surgical centers where large volumes of elective and emergency surgery is performed.

Statement 2 Using one or more dedicated daytime emergency surgery theatres shortens preoperative delays and improves outcomes.

Statement 3 Dedicated emergency surgeons are an integral part of a well-functioning emergency surgery unit.

Statement 4 Urgency-based classification of emergency operations ("traffic light codes") is needed to secure timely interventions and inter-specialty equality in surgical emergencies.

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Health Care Systems

Topic Title: Health Care Systems

Health Care Systems KPI 1

Title: Presence of an institution policy and procedure manual on Emergency Surgery care

Description	An institutional policy and procedure manual
Rationale	A hospital policy related to delivery of Acute Surgical Care outline the standing operating procedure for processes, responsibilities and common conditions (e.g. trauma, acute abdominal pain) will improve outcome
Target	A manual is visual for inspection either electronically or in hard copy
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	NA
Reporting aggregation	Hospital
Data sources	Hospital Administration

Health Care Systems KPI 2

Title: The Hospital Emergency Service undergo verification and accreditation by an external body

Description	Quality assessment and accreditation
Rationale	Quality indicators, performance, staffing, outcome, through-put can be measures for an external body to assess the quality of care of the Hospital Emergency Service.
Target	On a national level accreditation requirements and a structure to implement the reviewing bodies need to be established by the professional community
KPI collection frequency	Biannually
KPI reporting frequency	Biannually

KPI calculation	NA
Reporting aggregation	Hospital
Data sources	Hospital Administration

Health Care Systems KPI 3

Title: The hospital report its Emergency Surgery KPIs to national health authority with a responsibility for acute care

Description	Core Emergency Surgery KPIs listed in the consensus
Rationale	Formal assessment and reporting of the core KPIs as well as the ability to benchmark performance will improve patient outcome
Target	Yearly report on Emergency Surgery KPIs
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	NA
Reporting aggregation	Hospital
Data sources	Hospital Administration

Health Care Systems KPI 4

Title: The hospital is part of a designated regional and national network in Acute and Emergency Surgery Care

Description	Network structure of Acute and Emergency Surgery Care
Rationale	Emergency Services within a region and on a national level need to organise in way that takes into account the level of acute care as well as maximum distance/time for patients with an urgent condition to reach qualified care, either by helicopter, ambulance or by themselves depending on the severity of the condition. Time to adequate treatment is related to outcome.
Target	A manual is visual for inspection ether electronically or in hard copy

KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	NA
Reporting aggregation	Hospital
Data sources	Hospital Administration

Health Care Systems KPI 5

Title: The hospital has an Acute Surgery Care Committee which is multidisciplinary and meet at least 3 times a year

Description	Acute Surgery Care Committee
Rationale	A multidisciplinary hospital Acute Surgery Care Committee with all stakeholders involved in emergency surgery, from the emergency department, core emergency specialties, operating rooms, and radiology will align this care and will anticipate and act quickly on problems or structural disruptions in the patient flow. Also the consensus minimum standards and principles of framework required for resources and designation of emergency surgical services are evaluated on a regular basis.
Target	Formal body installed by the hospital board; transcripts of the Committee meetings including an annual report
KPI collection frequency	Annually
KPI reporting frequency	Annually
KPI calculation	NA
Reporting aggregation	Hospital
Data sources	Hospital Administration

	**Dr Luca Ansaloni** **Chief of Surgery Papa Giovani Hospital Bergamo** **President of WSES**
	**Mr. Paul Balfe** Graduate of Trinity College Medical School Dublin Post-Grad Qualifications: Trinity College Dublin, Royal College of Surgeons in Ireland Currently Consultant General and Gastrointestinal Surgeon, St. Luke's Hospital, Kilkenny Ireland
	**Dr. Cino Bendinelli** Dr Cino Bendinelli is an Italian graduate General Surgeon who specialises in Trauma surgery and Endocrine surgery. He gained extensive trauma surgical experience in war zones such as Afghanistan, Sierra Leone and Cambodia before settling in Australia in 2007. He was Trauma Fellow at Liverpool Hospital and then appointed Deputy Director of Trauma at John Hunter Hospital in 2008. Dr Bendinelli has a particular interest in traumatic brain injury and chest trauma and has published extensively in leading international scientific journals and book chapters. He has also published on Endocrine Surgery and was Endocrine Research Fellow at Brown University, USA.
	**Dr. Walter Biffl** Dr. Biffl earned his Bachelor of Science degree from Duke University, and Medical Degree from the George Washington University. He performed his surgical training at the University of Colorado Health Sciences Center, including a two-year NIH-sponsored Trauma Research Fellowship. Upon completion of residency he accepted a faculty position at Denver Health Medical Center with the University of Colorado. In 2002 he moved to Providence, RI, where he spent five years as Chief of the Division of Trauma and Surgical Critical Care at Brown Medical School. He returned to Denver Health in 2007 where he served as Associate Director of Surgery and Assistant Director of Patient Safety and Quality. He moved to Hawaii in November 2015 to serve as Medical Director of Acute Care Surgery at The Queen's Medical Center, and Professor and Associate Chair for Research in the Department of Surgery at the John A Burns School of Medicine of the University of Hawaii.

	**Prof. Marja Boermeester** Marja Boermeester is professor of surgery and a clinical epidemiologist at the Academic Medical Center (AMC) in Amsterdam, and principal investigator of many multicentre trials on diagnostics and treatment of abdominal infections (e.g. RELAP, OPTIMA, ESCAPE, OPTIMAP, DIABOLO). She received many grants (e.g. 10 national Health Care & Efficacy Research Grants) and trials were published in international high-ranked publications (NEJM, JAMA, Radiology, BMJ). Her core business in GI / HPB surgery is surgery of abdominal infections and intestinal failure surgery. She runs a successful Intestinal Failure Team in the AMC Amsterdam, with referrals from all over the country. She is member of the Academic Medical Center Research Council and Principal Investigator at the AMC, member of the writing committee of the Dutch Pancreatitis Study Group (DPSG), Principal Investigator of the DPSG section Chronic Pancreatitis, and member of several guideline committees (Antibiotics in Sepsis, Acute Diverticulitis, Peri-operative Patient Safety, and Diagnostics of Acute Abdominal Pain). Also national coordinator Pancreas Pearl at the String of Pearls Initiative (PSI); Councilor-at-large of the Surgical Infection Society Europe (SIS-E); member of the WHO Steering Committee on Global Guidelines for Surgical Site Infections. She has founded the SURgical Patient Safety System (SURPASS) checklist.
	**Prof. Mark Bowyer** Retiring after 22 years of active duty military service as a Trauma and Combat Surgeon, Dr. Bowyer remains the Chief of Trauma and Combat Surgery at the Uniformed Services University of the Health Sciences (the military medical school) in Bethesda, MD. In this role, he is responsible for the training of current and future military doctors learning to care for those in harms way. As a faculty member of Advanced Trauma Life Support, Definitive Surgical Trauma Care, Definitive Surgical Trauma Skills, Emergency War Surgery, Advanced Trauma Operative Management, and Advanced Surgical Skills for Exposures in Trauma (ASSET), Dr. Bowyer is an international force in trauma education. As one of the principle architects of the ASSET course he has shepherded it's promulgation to over 100 course sites over the last 6 years. His active practice of trauma surgery at the Washington Hospital Center in Washington DC, one of the busiest trauma centers in the United States, and experiences as "Trauma Czar" in Iraq, provide him with credible real life experiences that he enthusiastically brings to the classroom.
	**Dr. Fausto Catena** From 2000- 2011 Consultant General Surgeon at the Dept. of General, Emergency and Transplant Surgery with particular interest in emergency- trauma surgery, colorectal surgery, oncologic surgery, hernia surgery, kidney transplantation, sarcoma and carcinomatosis (HIPEC) and mininvasive surgery of the St Orsola- Malpighi University Hospital Bologna Italy. From 2012 Chief Department of Emergency and General Surgery

	Parma University Hospital ITALY. He wrote more than 600 scientific papers, (more than 200 on pubmed, H index = 32)) 22 book chapters and 5 Books (one Emergency Surgery Manual and 2 volumes Trauma Book Springer ed). Dr Catena won 19 national and international scientific prizes. He performed thousands medium- high level surgical procedures. (ICD 9 CM codified) He is Editor in Chief of the World Journal of Emergency Surgery (IMPACT FACTOR 1,47), Former Editor of European Surgical Research, Editor Open Cardiovascular and Thoracic Surgery Journal, Editor World Journal of Gastroenterology, Editor of the Turkish Journal of Trauma and Emergency Surgery, Editor Journal of Tumor, Editor Global Journal of Surgery, Editor African Journal of Emergency Medicine, Editor di Transplantation Technologies and Research, Editor of Journal of Solid Tumors, Editor of Journal of Acute Disease, Editor Emergency Care Journal, Editor Edorium Journal of Transplantation , Editor BioMed Research International, Editor Turkish Journal of Surgery, Editor Journal of Infectious and Non Infectious Diseases, Editor Austin Journal of Infectious Diseases and Member of the Committee on Publication Ethics. Dr Catena was invited speaker in about 150 national and international Congress and chairman in about 70 national and international Congress; he was also teacher in about 70 Postgraduate Courses. He organized about 50 national- international Congress and Postgraduate Courses . He was contract Professor of the School of Specialization in General Surgery of Bologna University and Surgical Instructor for Residents in General Surgery. He was contract Professor in Emergency Surgery of the School of Specialization in Orthopedics of Bologna University. He performed 8 Surgical Stages in Foreign Countries. He is member of about 20 National and International Scientific Societies, Past President of the Italian Society of Young Surgeons, General Secretary of the World Society of Emergency Surgery, Member of the Executive Committee of the Italian Society of Surgical Physiopathology, Member of the Executive Committee of the Italian Society of Geriatric Surgery, past Member of the Executive Committee of the Italian Society of Digestive Pathology and Past President of ESYS- European College of Surgeons- Italian Chapter From 2012 he is Fellow of Royal College of Surgeons UK In 2013 he had the italian national certification as full professor of general surgery. Research activity is focused on emergency surgery (acute cholecystitis, adhesions, intrabdominal infections, trauma),renal transplantation (graft preservation), oncologic surgery (GIST and carcinomatosis- HIPEC), colorectal surgery (elective and emergency colorectal cancer, diverticular disease) and abdominal wall surgery (biological prostheses) Dr Catena is world opinion leader in emergency surgery: he wrote more than 10 guidelines- position papers in this scientific area

	Dr. Federico Coccolini SPECIALIST IN GENERAL and EMERGENCY SURGERY, with final grade of 70/70 cum laude, University of Milan Medical School, Milan, Italy. November 2011 – until now: permanent appointment as Medical Officer, Consultant Surgeon at the Unit of General and Emergency Surgery, at the Department of Emergency, General and Trasplant Surgery of the "Papa Giovanni XXIII" Hospital (former "Ospedali Riuniti" Hospital) of Bergamo (Italy). Particular interests: emergency surgery, trauma surgery, day-case surgery, advanced oncolgy, oncologic gastrointestinal surgery, laparoscopic and minimally invasive surgery, tissue engineering and experimental surgery, evidence based medicine and evidence based surgery. Principal investigator of some international trials (i.e. IROA-International Register of Open Abdomen, IRBP-International Register of Open Abdomen).
	**Dr. Jan De Waele** Jan De Waele is a surgery-trained intensivist with a specific interest in infections in critically ill patients and works at the surgical ICU of the Ghent University Hospital in Belgium. Clinical interests include infections and abdominal catastrophes such as the abdominal compartment syndrome. His research activities currently focus on optimizing antibiotic therapy in severely ill infected patients to improve outcome and combat resistance development. He is active in several societies: he is currently chairing the Infection Section of the ESICM and president of the Belgian Society of Intensive Care Medicine.

	**Dr. Marc DeMoya** After attending medical school at Temple University, he completed his General Surgical residency at St. Barnabas/Jersey City Medical Center in New Jersey. He went on to complete his trauma/critical care fellowship at the Ryder Trauma Center/Jackson Memorial Hospital in Miami and has been on faculty since completion of his fellowship in 2005 at the Massachusetts General Hospital. He is an Associate Professor and is the Trauma/Acute Care Surgery fellowship Program Director, Medical Director of the SICU, Clerkship Director for the Harvard Medical School Surgical clerkship, and Associate Program Director for the General Surgical Residency. He has published over 100 peer-reviewed articles and several chapters and has received numerous grants from the department of defense for trauma and simulation research.
	**Dr. Salomone Di Saverio** Dr. Salomone Di Saverio MD FACS FRCS is a young Consultant Surgeon with an extensive clinical and scientific experience. He is a Consultant Surgeon, performing elective General Surgery Procedures and Team Leader Consultant in Acute Care-Trauma Surgery. Clinical Head for Laparoscopy in Trauma Surgery in the Trauma Surgery Unit, Trauma Center Maggiore Hospital Bologna. Vice-Chairman of the Trauma Surgery Unit. He is currently involved as Editorial Board Member of several Scientific Journal including BJS and many others. He is an external Clinical Reviewer for NEJM, The Lancet, BMJ, Annals of Internal Medicine, Annals of Surgery, and many others peer reviewed journals. Leading Editor of not a Trauma Surgery book and Acute Surgery book published by Springer. Clinical Mentor and Teacher for residents and Trainees at University of Bologna, as well as faculty member in DSTC and other national and international surgical courses. Performed to date more than 3600 major surgical procedures, mainly as first operator,more than 1000 in laparoscopy. Described and published several original or innovative surgical techniques in both open and laparoscopic surgery. Leading author of several International WSES guidelines, including those on ASBO, Perforated and Bleeding Peptic Ulcers and Acute Appendicitis
	**Ms. Anne Drake** Anne is currently the Director of Nursing & Midwifery at Letterkenny University Hospital, Republic of Ireland. Prior to joining the HSE Anne had extensive experience in the NHS. Anne has a PhD, MSc, BSc (Hons) and has a specialist interest in developing leadership capacity within the professions of Nursing & Midwifery.

	**Dr. Gustavo Fraga** Associated Professor of Surgery. Coordinator of Division of Trauma Surgery, School of Medical Sciences, University of Campinas
	**Dr. Ali Hallal** Dr Ali Hallal, is currently a an assistant professor of clinical surgery at the American University of Beirut Medical Center (AUBMC) where he works as Trauma , Upper GI surgeon and Intensivist. He is the program director for the trauma and surgical intensive care fellowship at the AUBMC. He had his Trauma and Critical Care fellowship training at Jackson Memorial Hospital Miami USA, and Upper GI training at ST Thomas' Hospital London. He worked as a consultant surgeon at King's College Hospital London where he developed the acute care service before joining the AUBMC in 2011. His main interests are surgical education, research in trauma system, sepsis and esophageal cancer.
	**Dr. Colm Henry** Dr Colm Henry is National Clinical Advisor for the Acute Hospitals Division in the HSE since 2014. Prior to this appointment, he was National Lead for the Clinical Director Programme in the HSE. He was Clinical Director of the Mercy University Hospital in Cork from 2009 to 2012 and was appointed as Consultant Geriatrician to the same hospital in 2002
	**Prof. Tim Hodgetts** Brigadier Tim Hodgetts is an emergency physician with over 20 years of operational experience, leading the UK specialty of military emergency medicine from infancy to maturity and treating the victims of conflict in Northern Ireland, Kosovo, Iraq and Afghanistan. He has published and lectured extensively in the fields of pre-hospital emergency care, disaster medicine, and resuscitation of the critically injured, and has designed and propagated national and international curricula in these subjects. Brigadier Hodgetts' academic career includes the positions of inaugural Defence Professor of Emergency Medicine at the Royal College of Emergency Medicine, Honorary Professor of Emergency Medicine at the University of Birmingham, Visiting Professor in the School of Health Sciences at City University London, and Penman Professor of Surgery at the University of Cape Town. In 1999 he was made Officer of the Order of St John for services to humanity in

	Kosovo; in 2006 he was the UK national 'Hospital Doctor of the Year'; in 2009 he was made Commander of the British Empire for his contribution to combat casualty care; and in 2010 he received the Danish Defence Medal for Meritorious Service for his clinical leadership of the Danish-US-UK field hospital in Afghanistan. From 2004-2010 he served as the Queen's Honorary Physician. From 2011-2013 he was the Medical Director with NATO's Allied Rapid Reaction Corps. His current appointment is as Medical Director to the UK Defence Medical Services.
	**Dr. Li Hsee** Dr Li Hsee is a Fellow of Royal Australasian College of Surgeons and American College of Surgeons. He is a Consultant Trauma and Acute Care Surgeon and the head of Acute Surgical Unit at Auckland City Hospital, New Zealand. He is also the current chair of New Zealand Trauma Committee of RACS.
	**Dr. Sam Huddart** UK NHS Consultant Anaesthetist in Guildford, and post-graduate researcher (University of Surrey) with an interest in healthcare quality improvement in Emergency Surgery.
	**Dr. Nissanka Jayawardhana** Dr. Jayawardhana is presently employed by the Department of Health, Sri Lanka as a Consultant General Surgeon for fourteen years. During this period he has been working in District General Hospitals Trincomalee and Kegalle and District Base Hospitals Avissawella and Wathupitiwala – serving a wide area of the beautiful island country. He obtained the MBBS degree from North Colombo Medical College 1992. Later he obtained Master of Surgery Degree from University of Colombo and the fellowships of the surgical colleges of Edinburgh and Sri Lanka. He also worked as a specialist registrar in General surgery in James Paget Hospital NHS Trust, Great Yarmouth, UK before appointed as a consultant general surgeon in Sri Lanka upon his return to the island. His work include attending to various types of surgical abdominal emergencies both traumatic and non-trauma related, among many other areas as the head of the surgical team throughout this period. He is also engaged in training of general surgical trainees of the Postgraduate Institute of Medicine for more than ten years. He serves as an examiner in MD - Surgery Examination conducted by the Postgraduate Institute of Medicine of Sri Lanka and also in the International MRCS Examination of the RCS Edinburgh. He is a resource person for the National Trauma Management Course in Sri Lanka. Dr. Jayawardhana has been an active member of the specialty board for general surgery of the Post Graduate Institute of Medicine of Sri Lanka and a council member of the College of Surgeons of Sri Lanka from 2013 to date.

	**Prof. Andrew K Kirkpatrick** Dr. Kirkpatrick is a Professor in both the Departments of Surgery and Critical Care Medicine at the Foothills Medical Centre of the University of Calgary,and is the former Medical Director of Regional Trauma Services. Dr. Kirkpatrick graduated Magna Cum Laude from the University of Ottawa, with fellowships in Surgery and Critical Care at the University of Toronto with a Master's degree in Epidemiology at the University of British Columbia. He is President of the Abdominal Compartment Society and a past-President of the Trauma Association of Canada. Dr. Kirkpatrick has more than 350 peer-reviewed articles and book chapters, mainly concerning intra-abdominal hypertension, telemedicine, emergency sonography, hypothermia, aerospace medicine and occult pneumothoraces. He retains a reserve commision in the Canadian Forces and has served oversees on Unated Nations Missions on several occasions. He has consulted on Scientific Research to the Canadian Space Agency, NASA, and the National Research Council of Canada. He is a former Paratrooper and Flight Surgeon and currently maintains a current pilots license.
	**Dr. Jeffrey Kashuk** Jeffry Kashuk, MD,FACS is a senior surgeon at Assuta Hospital, Ramat HaChayal, Tel Aviv, and Herziliya Medical Center, Herziliya, Israel. He is a Professor of Surgery at Tel Aviv-Sackler School of Medicine, Tel Aviv, Israel. Born and raised in the United States, Jeff developed a noteworthy academic career in the USA before choosing to to emigrate to Israel. He is experienced in all areas of surgery and critical care, and has contributed to the development of the surgical subspecialty of Acute Care Surgery and Surgical Critical Care in the United States and worldwide. As a specialist in general surgery, he routinely performs all general surgery procedures, but is particularly skilled at caring for patients with acute surgical emergencies, and those patients who require surgical critical care. His research, which has emphasized problems associated with blood coagulation after injury, has been recognized world-wide; he is the author or co-author of nearly 100 peer-reviewed articles or book chapters.

	**Dr. Yoram Kluger** Dr. Kluger graduated from the School of Medicine of the Hebrew University in Jerusalem and completed his general surgery residency at Hadassah Medical Center. He further trained in surgery at the Allegheny Medical Center in Pittsburgh, PA, USA. Dr. Kluger was the founder and director of the Rabin Trauma Center at Tel Aviv Medical Center and the first in Israel to establish a dedicated hospitalization center for multiple injured patients. He is recognized worldwide for his research on medical preparedness and medical infrastructure management in mass casualty incidents. Dr. Kluger's main interests are surgical oncology and trauma surgery. He is the medical director of the pancreatic surgery service at Rambam Health Care Campus, and a clinical Associate Professor at the Ruth and Bruce Rappaport Faculty of Medicine of the Technion-Israel Institute of Technology. He was recently appointed Chairman of the department of surgery at the faculty of medicine.
	**Dr. Leo Lawler** Medical graduate UCD House officer training MMUH/SVUH/Mayo Clinic Rochester Radiology residency Mallikrodt Institute/Washington University Cross sectional fellow Johns Hopkins Interventional fellow Johns Hopkins Mater Misericordiae University Hospital 2006 - present Honorary consultant OLHSC/Temple Street/Rotunda
	**Prof. Ari Leppaniemi** Ari Leppäniemi (MD, PhD, DMCC, Professor h.c.) is the Chief of Emergency Surgery at the Helsinki University Hospital Meilahti, Finland. His background training includes General and Gastroenterological Surgery with subsequent training and diplomas in Prehospital Medicine, Emergency Medicine, Disaster Medicine and International Health Care. He has worked as a Field Surgeon for the International Red Cross for civil wars of Cambodia, Sudan and Afghanistan, and as a Volunteer Surgeon for the United Nations Development Programme in Tuvalu and as Senior House Officer for the Department of Community Medicine in Zaria, Nigeria. He is the Past-President of the European Society for Trauma and Emergency Surgery (ESTES), Finnish Society of Surgery, International Association for Trauma Surgery and Intensive Care (IATSIC), and the Ambroise Pare International Military Surgery Forum (APIMSF). He is the Editor-in-Chief of the Scandinavian Journal of Surgery, Editor of the European Journal of Trauma and Emergency Surgery, and Associate Editor of the World Journal of Surgery. He has published over 160 original articles, more than 200 review articles, book chapters and dissertations, and more than 150 editorials, letters, commentaries and other articles, mostly on abdominal trauma, acute pancreatitis and abdominal compartment syndrome. His hobbies include fishing, badminton, and jazz.

	**Ms. Paula Loughlin** Paula Loughlin is a Consultant in General and Colorectal surgery in Altnagelvin Hospital in Derry/Londonderry. Having qualified from University College Dublin in 1996 she completed basic psychiatry training followed by a period of time working in Australia. Having completed her basic surgical training in Glasgow Paula did a period of research,with the late Professor Timothy Cooke, in Glasgow Royal Infirmary. She was conferred with an MSc in medical science from the University of Glasgow in 2009. Paula was appointed to the Northern Ireland higher surgical training scheme in 2007 and following completion obtained FRCSI in 2013. She was appointed to her consultant post in Altnagelvin in 2013. Altnagelvin is the only hospital in Northern Ireland which has been accredited by the BSGE as an endometriosis centre and Paula is the nominated colorectal surgeon. Her other interests include laparoscopic surgery, colorectal cancer and medical education. She is the undergraduate surgical tutor.
	**Dr. Peter MacMahon** Dr MacMahon obtained his subspecialist radiology training at Massachusetts General Hospital (MGH) in Boston USA, which included a clinical fellowship in the field of Emergency Radiology. This fellowship involved both the imaging of traumatic and non-traumatic emergency conditions in adults as well as in children. Currently he is a Consultant Radiologist at the Mater hospital in Dublin with specialist interests in Emergency, Musculoskeletal and Neuro imaging. Dr MacMahon has developed a range of clinician support tools with regards to appropriate emergency imaging and current research interests include methods of optimising the speed at which advanced imaging can be performed in the Emergency Department in the critically unwell patient.
	**Prof. Ron Maier** Dr. Maier is the Jane and Donald D. Trunkey Professor of Trauma Surgery, and Vice-Chair of the Department of Surgery at the University of Washington. In addition, he is the Director of the Regional Trauma Center, and Surgeon-in-Chief at Harborview Medical Center, the Level I Trauma Center in Seattle supporting four Northwest states representing one quarter of the landmass of the US.

	**Prof. Mark Malangoni** Mark A. Malangoni, MD, FACS is Associate Executive Director of the American Board of Surgery. Dr. Malangoni received an undergraduate degree in Zoology cum laude from Indiana University and his Doctor of Medicine degree from the Indiana University School of Medicine. He completed a residency in Surgery at the Indiana University School of Medicine and is certified by the American Board of Surgery in Surgery and Surgical Critical Care. Dr. Malangoni is an Adjunct Professor of Surgery at the University of Pennsylvania School of Medicine and was formerly Professor of Surgery at the Case Western Reserve University School of Medicine and Chairman of the Department of Surgery at MetroHealth Medical Center in Cleveland, Ohio, positions he held for more than 20 years. Dr. Malangoni is a member of the Board of Regents of the American College of Surgeons. He has been Chair of the Advisory Council for General Surgery and Chair of the Board of Governors of the American College of Surgeons, as well as Vice-Chair of the Residency Review Committee for Surgery. Dr. Malangoni is a Past-President of the Central Surgical Association, Surgical Infection Society, Ohio Chapter of the American College of Surgeons, and the Cleveland Surgical Society; has served as Vice President of the American Association for the Surgery of Trauma, is a past Chair of the American Board of Surgery and serves as a Senior Director of both the American Board of Surgery and the American Board of Emergency Medicine.
	**Dr. Manu Malbrain** Manu Malbrain (1965) qualified as MD from the Catholic University of Leuven, Belgium in 1991. He is married to Bieke Depré and they have 3 sons: Jacco, Milan and Luca. As of May 1st 2013 he became the medical hospital director of the ZNA "Ziekenhuis Netwerk Antwerpen" Stuivenberg and ZNA St-Erasmus hospitals in Antwerp, Belgium. He is the manager and director of the Medical and Surgical ICU, the High Care Burn Unit and a hyperbaric oxygen chamber of the ZNA Stuivenberg/St-Erasmus. He is a critical care physician (qualified in 1996) with a basic training in internal medicine (qualified MD in 1991). He is actively involved in the European Society of Intensive Care Medicine (ESICM) where he chaired the Working group on abdominal problems (WGAP) within the POIC section (2009 -2013) and studied the effects of raised intra-abdominal pressure (IAP) in general ICU patients for the last 20 years. He finished the Patient Acute Care Training (PACT) module on abdominal problems together with Jan De Waele. He was the Scientific program Chair together with Michael Sugrue of the 2nd World Congress on Abdominal Compartment Syndrome, Noosa, Australia, Dec 6-8 in 2004. He was the chairman of the 3rd WCACS in Antwerp, Belgium, March 22-24 in 2007 (www.wcacs.org). He is the founding President and Executive Committee member since 2004 and actually the Treasurer of the World Society on Abdominal Compartment Syndrome (WSACS at www.wsacs.org). Together with Niels Van Regenmortel, he is co-founder of the International Fluid Academy (www.fluid-academy.org) and co-chaired the first 5 iFAD

	meetings end of November each year. Besides IAP, his favourite topic is less invasive (hemodynamic) monitoring and fluid management and he enjoys his active involvement in (bedside) teaching and education of medical trainees and students. He is member of the Medical Advisory Board of Pulsion Medical Systems for the last 10 years. In 2003 he was the first ESICM Chris Stoutenbeek Award winner in Amsterdam with a study protocol on different intra-abdominal pressure measurement methods and he successfully defended his PhD doctorate's thesis in 2007 on the same topic (KU Leuven). He is author and co-author of more than 250 peer-reviewed articles, reviews, editorials, book chapters and even two complete books on ACS.
	**Mr. Ken Mealy** Consultant General Surgeon Wexford General Hospital, Ireland, Joint Lead National Clinical Programme in Surgery, Clinical Director of the National Office of Clinical Audit , Vice President Royal College of Surgeons in Ireland.
	**Dr. Ernest E Moore** Ernest E. "Gene" Moore, M.D. has been the Editor of the Journal of Trauma and Acute Care Surgery since 2012, and was the Chief of Trauma at the Denver General Hospital for 36 years, Chief of Surgery for 28 years, and the first Bruce M. Rockwell Distinguished Chair in Trauma Surgery. He continues to serve as Vice Chairman for Research and Professor of Surgery at the University of Colorado Denver. Under Dr. Moore's leadership, the Rocky Mountain Regional Trauma Center at Denver General became internationally recognized for innovative care of the injured patient, and its trauma research laboratory has been funded by the NIH for 25 consecutive years. Dr. Moore has served as president of nine academic societies, including the Society of University Surgeons, American Association for the Surgery of Trauma, International Association for the Trauma and Surgical Intensive Care, and the World Society of Emergency Surgery. His awards include the Robert Danis Prize from the Society of International Surgeons, Orazio Campione Prize from the World Society of Emergency Surgery, Philip Hench Award from the University of Pittsburgh, Florence Sabin Award from the University of Colorado, the Lifetime Achievement Award from the Society of University Surgeons, the Lifetime Achievement Award for Resuscitation Science from the American Heart Association, the American College of Critical Medicine Distinguished Investigator Award, the Distinguished Service Award from the Shock Society, and the Lifetime Service Award from the International Association for Trauma and Surgical Intensive Care. He has honorary fellowships in the Royal College of Surgeons of Edinburgh, the Royal College of Surgeons in Ireland, the Royal College of Surgeons of Thailand, and the American College of Emergency Physicians; and is an honorary member of the Brazilian Trauma Society, Colombian Trauma Society, Eastern Association for the Surgery of Trauma, European Society for Trauma and Emergency Surgery and Trauma Association of Canada

	Editor, Journal of Trauma
	**Dr. Maurice O'Kane** Dr O'Kane graduated in medicine at the University of Edinburgh and undertook postgraduate training in Scotland, N. Ireland and France. He has been a consultant chemical pathologist in Altnagelvin Hospital since 1996. Dr O'Kane is visiting professor at Ulster University and Director of Clinical Practice at the Association for Clinical Biochemistry and Laboratory Medicine. He is Director of Research at the Western Health and Social Care Trust and Chief Executive of the Clinical Translational Research and Innovation Centre. His research instruments include point-of-care testing and clinical biochemical aspects of diabetes mellitus and genetic lipid disorders.
	**Mr. Mihai Paduraru** Mr. Mihai Paduraru, PhD, MSc, MD, is a Consultant Surgeon specializing in General and Emergency Surgery, currently working in a General Hospital in Castilla - La Mancha, Spain. Following Masters Degrees from Carol Davila University – Bucharest, Zaragoza University – Spain and Cardiff University – UK, and a Doctorate from Carol Davila University and Complutense University – Spain, with research and development focus in Geriatric Emergency Surgery, he is currently coordinating a European Society of Trauma and Emergency Surgery (ESTES) Project. He has international teaching experience in Emergency Surgery with the Modular UltraSound ESTES Course team and membership of professional bodies in Spain and the UK, including European and Spanish Association of Endoscopic Surgery.
	**Prof. Andrew Peitzman** Mark M. Ravitch Professor of Surgery Executive Vice-Chairman, Department of Surgery University of Pittsburgh

	**Dr. Bruno Pereira** PH.D., Master Degree in Surgery Associate Professor of Surgery & Surgical Critical Care - University of Campinas - Brazil Director, Disasters Committee - Pan American Trauma Society WSACS Ambassador FACS, FCCM
	**Mr. Amal Priyantha** Consultant Gastrointestinal Surgeon, Teaching Hospital, Colombo South. Past president, Gastroenterological and Endoscopic Society of Sri Lanka Chair person, Board of Study in Gastrointestinal Surgery, Postgraduate Institute of Sri Lanka.
	**Dr. Massimo Sartelli** Dr Massimo Sartelli is Consultant Surgeon at the Department of Surgery, Macerata Hospital, Italy. He is author and co-author of 8 manuals of general-emergency surgery. In the last years he has devoted his updating to the study of surgical sepsis. He is deputy editor of the "World Journal of Emergency Surgery" and member of the Board of Directors of the "World Society of Emergency Surgery" (WSES). In last years he coordinated WSES guidelines for management of intra-abdominal infections and soft tissue infections. He designed and coordinated three prospective studies describing the epidemiological and treatment profiles of patients with cIAIs worldwide.
	**Mr. Michael Sugrue** A Fellow of both the Irish and Australasian College of Surgeons. He qualified in 1981 from University College Galway in 1981 with many undergraduate honours and awards. Michael obtained his MD in 2002 for his work on Intra-abdominal Pressure and Renal Failure, on which he has published widely. He is ex-president of World Society Abdominal Compartment Syndrome and was convenor of the 2nd and 4th World Congress on the Abdominal Compartment Syndrome He has achieved many awards for pursuit of educational initiatives included the ESR Hughes Medal from Australasian College of Surgeons in 2008. He was a Consultant Surgeon for 15 years at Liverpool Hospital in South West Sydney and Professor of Surgery at UNSW Sydney. He was a cornerstone in the development of DSTC and had taught on over 20 courses around the world. He enjoys patients

	and surgery the most and is a very hands-on, technically interested surgeon. He has published over 200 articles. Michael Sugrue is currently General and Breast Surgeon in Letterkenny University Hospital and Galway University Hospital Ireland. He works on call 1 week in 5 in a busy general on call position. He has developed two recent courses in Emergency Surgery EASC which has now been run in 4 countries and the Open Abdomen course. He lives with Pauline in historic Ramelton in Donegal. He enjoys a surf. He is Co-convenor of the Critical Surgical Abdomen Conference July 22-26th 2016 hopes you might attend this exciting 4 day meeting in Dublin and Donegal .
	Dr. Scott Thomas Dr. Thomas received his medical degree from Indiana University School of Medicine and completed his residency in general surgery at St. Joseph Mercy Hospital in Ann Arbor, Michigan and The Royal North Shore Hospital in Sydney, Australia. He also completed his trauma fellowship at The Royal North Shore Hospital in Sydney. Board certified in surgery, Dr. Thomas is Chair of the Committee on Trauma for Indiana, Chief of Trauma Services for Beacon Health System and Medical Director of Trauma services at Memorial Hospital of South Bend, Indiana.
	**Prof. George Velmahos** George C. Velmahos, MD, PhD, MSEd received his medical degree and a doctorate from the University of Athens Medical School in Athens, Greece. He is a Fellow of the American College of Surgeons, American College of Critical Care Medicine, Royal College of Surgeons of Edinburgh, and Royal College of Physicians and Surgeons of Glasgow. Dr. Velmahos is the John F. Burke Professor of Surgery at Harvard Medical School and Chief of Trauma, Emergency Surgery, and Surgical Critical Care at Massachusetts General Hospital, both in Boston, Massachusetts. He is the Trauma Program Leader for the Center for Integration of Medicine with Innovative Technology (CIMIT), and is the Founder of the Center for Early Trauma Research at Massachusetts General Hospital. Dr. Velmahos is a member of the American Surgical Association, Society of University Surgeons, American Association for the Surgery of Trauma, Society of Critical Care, Society of Clinical Surgery, Surgical Biology Club, Western Surgical Association, New England Surgical Society, International Society of Surgery, and many others. He is the Chair of the International Committee of the American College of Surgeons as well as serving on many executive committees and held office in numerous societies and professional medical organizations. Recipient of multiple teaching awards from the University of Southern California & Massachusetts General Hospital, he is the Associate Editor of the World Journal of Surgery, serves on the Editorial Board of Surgery, Archives of Surgery, World Journal of Emergency Surgery, and Journal of Trauma. He is a reviewer for nearly all major surgical

	and critical care journals. He received the honorary title of Master of Critical Care from the Critical Care Society. Dr. Velmahos has published over 400 peer-reviewed articles, over 45 books and book chapters, scores of abstracts, editorials, clinical communications, and online educational modules, and has delivered over 150 invited lectures or presentations at national and international conferences. He is involved in international outreach activities through his hospital and the American College of Surgeons.
	**Dr. Liam Woods** A native of Dublin, Liam is a UCD graduate and a qualified Chartered Accountant. Prior to joining the health services, he worked in the private sector in an accounting and consultancy organisation. He joined the health services in 1999 as Financial Director of the Eastern Regional Health Authority, serving in this post until the ERHA became part of the Health Service Executive in January 2005. Liam has been the Director of Finance of the HSE for an eight year period, Director of Health Business Services for a year and appointed as National Director of Acute Hospital Services (Interim) in January 2015.
	**Dr Jean-louis Vincent** Dr Vincent is Professor of intensive care medicine at the University of Brussels (Université Libre de Bruxelles) and intensivist in the Department of Intensive Care at Erasme University Hospital in Brussels. He obtained his PhD degree at the University of Brussels in 1982. He is President of the World Federation of Societies of Intensive and Critical Care Medicine (WFSICCM) and a Past-President of the European Society of Intensive Care Medicine (ESICM), the European Shock Society (ESS), the Belgian Society of Intensive Care Medicine (SIZ), and the International Sepsis Forum (ISF). He was a Council member of the Society of Critical Care Medicine (SCCM) from 2011-2013. He is member of the Belgian Royal Academy of Medicine. Dr. Vincent has signed more than 900 original articles, some 400 book chapters and review articles, 1000 original abstracts, and has edited 102 books. He is co-editor of the “Textbook of Critical Care” (Elsevier Saunders) and the “Encyclopedia of Intensive Care Medicine” (Springer). He is the editor-in-chief of Critical Care, Current Opinion in Critical Care, and ICU Management & Practice and member of the editorial boards of about 30 other journals, including Critical Care Medicine (senior editor), the American Journal of Respiratory and Critical Care Medicine (AJRCCM), PLoS Medicine, Lancet Infectious Diseases, Intensive Care Medicine, Shock, and the Journal of Critical Care. Dr Vincent has received several awards: the Distinguished

	Investigator Award of the Society of Critical Care Medicine, the College Medalist Award of the American College of Chest Physicians, the Society Medal (lifetime award) of the European Society of Intensive Care Medicine, the prestigious Belgian scientific award of the FRS-FNRS (Prix Scientifique Joseph Maisin-Sciences biomédicales cliniques), and the Lifetime Achievement Award of the Society of Critical Care Medicine. He was awarded the title of Baron by King Albert II of Belgium in 2013.His name appears more than 1000 times in Pubmed, and his work has been cited more than 110,000 times; his H-index is 140.

Emergency Surgery Performance Quality and Outcome Consensus Summit

Lough Eske Castle Donegal Ireland

Monday 25th July 2016

www.wses.org.uk

Program

Welcome and Introduction

0800- M Sugrue L Ansaloni G Velmahos

805-815 Resources and Designation of Emergency Surgery Service
Hsee Velmahos Crowley Mealy

825-835 Acute Care Unit Structure
Ansaloni Maier E Moore

845-08.55 Reception and Triage
Hodgetts Coccolini Soreide Balfe

905-915 Data systems, registry and evaluation
Velmahos Boermeester Peitzman Coccolini

925-935 Interaction and connectivity with Laboratory,Radiology OR ICU Gastro

Leppaniemi	**(OR) 2min each presenter 5 key points**
MacMahon	(Radiology)
O Kane	(Laboratory)
Malbrain	(ICU)
Steele	(Gastroenterology)

945-955 Quality Assurance and Performance improvement and Innovation
Huddart Hodgetts Malbrain Woods

1030-1100 Morning Tea

Chair E Moore M Boermeester Woods

1100-1110 Sepsis control in Emergency Room
Coccolini Sartelli Kluger Malangoni Vincent

1120-1130 Research in Acute Care Surgery
Catena Kirkpatrick Maier **Coccolini**

1140-1150 Education

Sugrue Bowyer Lawler Martinez

1200-12.10 Patient related outcomes measures
Drake Maier Bendinilli Murphy

Emergency Surgery Performance Quality and Outcome Consensus Summit

12.20-12.40 Future discussion planning for framework of KPI ‘s in Acute Care Surgery

Chair Pietzman Maier Henry

KPI’s will have been circulated as part of Summit Proceedings prior to meeting
Each topic will have 5 Key Performance indicators KPI’s. These will have been reviewed the attendees prior to meeting. They are not intended to be definitive rather act as the start of a new era in Emergency Surgery Care Improvement.

Disease Specific Process and Outcome KPIs

Session 2 Overview only; There will be NO individual presentations

Disease Specific Process and Outcome KPIs

Di Saverio	Appendicitis
Ansaloni	Cholecystitis
Leppaniemi	Pancreatitis
Soreide	Perforated Ulcer
Kelleher	Upper GI Bleeding
Steele	Lower GI Bleeding
Pereira	Small Bowel Obstruction
Sugrue	Large Bowel Obstruction
Balfe	Diverticulitis
Kashuk	Mesenteric Ischaemia
Thomas	Abdominal Vascular
Moore	Coagulation
Kashuk	Pneumothorax and Empye
Sartelli	Septic shock in Emergency
De Waele	Septic shock in ICU
Malbrain	Fluids in septic shock
Sugrue	Abdominal Compartment Syndrome
Paduraru	Geriatric Emergency Care
Biffl	Paediatric Emergency care
Maier	Triage
O Kane	Laboratory (Bloods)
Malbrain	Fluids
MacMahon	Radiology
Steele/Sugrue	Gastroenterology (Bleeders)

Vincent	ICU (Admission)
Leppaniemi	Emergency Theatre
Boermeester	Health Care Systems

12.45	**Synopsis of the Meeting**	**Catena**
12.50	**Future direction**	E Moore R Maier (5 min each)

Close of Meeting 1300

Lunch 1300 **Afternoon free for relaxation and explore beautiful Donegal**

Health Service Executive

Royal College of Surgeons Ireland

Letterkenny University Hospital

UnitedHealth Group Letterkenny

Donegal County Council

Donegal Clinical Research Academy

Resource Reference List kindly provided by EASC course

Appendicitis

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