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Time for metrics in emergency surgical care – the role of an emergency surgery registry

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Abstract

There is abundant local, national, and international evidence that clinical decision-making in emergency general surgery (EGS) is frequently sub-optimal, and this has a negative impact on the quality and safety of care and patient outcomes. The barriers to achieving high-quality, safe, and effective EGS care across health systems are manifold and multifactorial. It is suggested that emergency surgery registries may provide a suitable foundation to enable interventions that lead to improvements in quality in this area.

Data from surgical registries may serve multiple purposes, including improving the quality of healthcare and the enhancement of patient safety. The increasing sophistication and analytic capabilities of clinical registries and databases contribute considerably in all of these domains due to their use of accurate, credible, risk-adjusted, and concurrent clinical data, which are acquired for these specific purposes.

The emergency surgery outcomes advancement (eSOAP) project commenced during late 2018, with the aim of establishing the feasibility of prospective data capture on all EGS admissions and assessing the outcomes and impact of clinical pathways for patients admitted to EGS services in Letterkenny University Hospital (Republic of Ireland), Altnagelvin Hospital (Northern Ireland), and Raigmore Hospital (Scotland).

eSOAP seeks to address deficits in EGS care by enabling an assessment of patient outcomes, enhancing the quality and safety of patient care, and providing an effective template for EGS registry development. It will achieve this through the provision of meticulous, valid, risk-adjusted, and concurrent clinical data. The comprehensive information within the eSOAP registry will promote transparency in respect of the functioning of individual surgical teams and services and increase understanding of the complex systems involved in the delivery of EGS care.

Key words: emergency general surgery, surgical registries, surgical outcomes, emergency surgery quality and safety.

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One of the major challenges for health services worldwide is managing the variations in care delivery associated with emergency general surgery (EGS) [1, 2]. Frequently, the standards of care delivered to these patient groups are considered to be suboptimal and heuristic [3, 4]. Patients with emergency surgical conditions need prompt attention, early diagnosis, and excellence in treatment to ensure good outcomes. To achieve these goals, a system with adequate planning, resourcing, and monitoring has to be in place. There is abundant local, national, and international evidence that clinical decision-making in EGS is frequently sub-optimal, and this has a negative impact on the quality and safety of care and patient outcomes. EGS patients are characterised by extremely demanding intraoperative and perioperative complexities, which are exacerbated by a paucity of evidence-based guidelines, pathways [5], and quality metrics [6]. It is suggested that emergency surgery registries may provide a suitable foundation in enabling interventions that influence quality improvements in this area.

CONTEXT: DEFINING THE PROBLEM

It has been reported previously that EGS, and its associated burden, accounts for more than half

of the surgical workload across the National Health Service (NHS) [6] and half of all surgical mortality within the United States [7]. This is compounded by an inefficient triage of patients presenting with abdominal pain, wide variability in diagnostic pathology testing rates between clinical teams, and wide variability in outcome rates following emergency surgery. This marked variation in outcomes and the provision of care is exacerbated by the high-risk nature of the specialty. For example, Saunders *et al*. [8] found that mortality for emergency laparotomy ranged from 3.6 to 41.7% in 35 NHS hospitals, while a report from the National Emergency Laparotomy Audit (NELA), published in 2015, found stark variation in compliance with key standards, such as early input by senior clinicians, timely antibiotic therapy, and documentation of risk of death. NELA identified the overall mortality rate for emergency laparotomy as 15%. In a review by Watson *et al*. [9] it was indicated that in more than 1 in 10 cases, patients with a high-risk diagnosis, who underwent a major EGS procedure during the study period, died in hospital within 30 days of their surgical intervention.

Mortality rates associated with EGS are particularly conspicuous when contrasted with those for elective procedures. In addition, Gale *et al*. [10] undertook a large retrospective study covering a 10-year period, across acute hospitals within the United States. This underlined the burden of conditions requiring EGS and identified that EGS activity accounted for 7–11% of hospital admissions. Within the north-west of Ireland, it is estimated that emergency surgery cases account for over 10% of all patients admitted to hospital. Patients requiring emergency surgical care are frequently the sickest, are older, and have significant co-morbidities and poorer outcomes. There are approximately 150,000 emergency surgery patients admitted annually in the island of Ireland [11, 12].

The global burden of death and disability associated with emergency general surgical conditions is considerably higher than that for contrasting health conditions that attract significantly increased attention and investment. For example, the annual number of deaths from emergency surgical conditions (nearly 1 million) is considerably higher than the number of maternal deaths globally (250,000).

General surgery as itself is not truly a specialty in Ireland. It has been replaced by general surgeons with a special interest in additional specialities, which include colorectal surgery, upper gastrointestinal surgery, breast and endocrine surgery, and hepatobiliary and transplant surgery.

THE PURSUIT OF QUALITY

The barriers to achieving high-quality, safe, and effective emergency general surgical care across health systems are manifold and multifactorial. Within the United States of America previous indications [1] had suggested that specific national quality targets for EGS were being realised. This work had advocated the application of a quality improvement approach, founded upon the Donabedian Model, and introduction of accepted guidelines to EGS care. Despite this early optimism, more recent evidence [13] reveals both a lack of adoption of agreed-on criteria for the optimal care of EGS patients across a majority of acute hospitals, and extensive variation regarding the processes of care. These barriers can be primarily classified as related to both organisational and provider-level factors; for instance, issues aligned to inflexible hospital infrastructures and/or the presence or absence of a dedicated surgical team. These factors impact negatively upon intended improvements in accessibility, quality, and cost-effectiveness of EGS care.

Additional significant components, recognised by Daniel *et al*. [13], have the capacity to heighten risk and increase the likelihood that patients will be in receipt of suboptimal care. These comprise a lack of access to advanced imaging, absence of proactive EGS quality initiatives, lack of dedicated operating theatre time for unscheduled cases, and surgeons not freed of elective responsibilities while covering EGS services. An examination of empirical literature reveals a composite of alternative constituent features, which also have the potential to play a critical role. Lim *et al*. [14] and Chana *et al*. [15] propose that prompt availability of both a consultant surgeon and operating theatre can reduce both patient length of stay and potential complications for EGS conditions.

A further study [6], employing a retrospective cohort analysis of 69,490 EGS patients admitted between 2007 and 2012, examined variation in outcomes for EGS patients in Australia, the United Kingdom, and the United States of America. In particular, the authors focused upon hospital-level and patient-level variables and how these may impact both patient outcomes and the delivery of high-quality care. In particular, Chana *et al*. identified the role played by hospital structures in establishing and maintaining variations in care. This revealed a number of domains within which EGS care could be enhanced, including intensive care unit capacity and consultant workload. Advances in these domains alone resulted in significant improvements in patient mortality and underline the multidisciplinary nature of EGS care. These findings are supported by further work undertaken within the UK [16]. Significant improvements that can impact positively upon the quality of care delivery have also been demonstrated through the adoption of a quality-driven and team-oriented approach [17].

Within the context of EGS care in Ireland, over 50% of all general surgical activity nationally occurs in Model 3 Hospitals [18]. This is an index of 17 hospitals, including Letterkenny University Hospital, that admit similar groupings of acute medical and surgical patients. Facilities at Model 3 Hospitals include an Acute Medical Assessment Unit (AMAU), a 24-h ED, and Intensive Care Unit. The analysis of consultant manpower within these hospitals indicates a system under pressure.

A number of contemporary and pivotal strategic reports relating to EGS care in Ireland [19, 20], the United Kingdom [3, 9, 21], Great Britain and Ireland [22], and the United States [23] provide a contextual backdrop to the ongoing challenges and limitations across the scope of EGS. These reports have emphasised the need for improvements in the delivery of the quality and safety of EGS care whilst outlining possible mechanisms through which this transformation can be achieved. They also refer to the overriding need to enhance the patient experience of EGS care.

In a review of the standards of emergency surgical service provision [3] the authors highlight the current paucity of data to benchmark improvement in this group of patients. This stands in sharp contrast to a range of elective procedures where audit results indicate year on year improvements. The report further identifies the need and opportunity to both agree on optimal pathways and to develop quality indicators and performance measures for patients requiring unscheduled surgical care.

Sugrue *et al*. [24] outline work undertaken in order to underpin progress in this area. An Emergency Surgery Performance Summit was convened in 2016 under the leadership of the World Society of Emergency Surgery. The aim of this summit was to establish a solid foundation for future progress in this area predicated upon key performance indicators in clinical and systems delivery. Consequently, there was effective recognition of key aspects of emergency surgery that require consideration in order to frame an optimal approach towards care delivery and definitive KPIs.

This is an approach consistent with Watson *et al*. [9], who have advocated the systematic use of protocols and pathways in EGS. Interestingly, they also propound the introduction of new roles in EGS such as advanced nurse practitioners (ANPs), which, they indicate, can make a significant impact on the quality of care delivered to EGS patients.

EGS REGISTRY

Internationally, trauma registries have played a significant role during the past 50 years in enhancing trauma care delivery [25]. Within the United States these were originally established to advance research in this area whilst also characterising patterns of injury and outcomes. This approach has been cultivated during this period with the evolution of an extensive and systematic National Trauma Data Bank (NTDB). Trauma registries have been principally responsible for transforming the context for trauma systems and care by initiating quality improvement processes, including benchmarking, and creating an appreciation of risk-adjusted outcomes. Congruent with trauma registries, Beher *et al*. [25] contend that surgical registries can be both developed and implemented in the same manner.

Surgical colleges including RCSI [19, 20] have acknowledged the impact of models of care and clinical registries in improving the delivery of surgical care. However, these reports also underline a requirement for relevant urgent transformation of EGS services focusing on the implementation of multi-disciplinary clinical care pathways; data generation to demonstrate the variation between surgical specialties and their outcomes; rapid access to diagnostic services; and accurate EGS information systems, audits of process, and clinical outcomes, including patient-reported outcomes.

In a recent examination of the past, present, and future of Emergency General Surgery in the USA, Lyu *et al*. [26] outline the significance of prospectively collected clinical data in order to suitably risk-adjust for the disparate EGS patient population. It is contended that the initiation of a robust EGS registry will facilitate both researchers and surgeons to engage in large, risk-adjusted studies to generate EGS-specific benchmarks and risk stratification systems. In tandem with this, increased access to technological advances, including apps that support clinical decision-making, provides a context for the development of key performance indicators that are specific to the related structures and processes within EGS.

The provision of high quality and safe EGS care is a complex matter impacted by multifarious elements [27]. Not least among these is lack of access to the type of thorough and pragmatic datasets outlined above by Lyu *et al*. [26]. This point has been previously supported by the American College of Surgeons (2013) in stating the case for a redesign of surgical care through the use of clinical registries. This will allow for the development of transparent metrics and identification of priority areas for improvement within EGS care.

Evans *et al*. [28] have previously defined a clinical registry as a system for acquisition of a defined minimum dataset from patients who experience a specific procedure or therapy, are diagnosed with a disease, or use a health care resource. Larsson *et al*. [29] have argued for a more expansive definition

that acknowledges clinical registries as significant institutional catalysts for interventions to enhance outcomes over time. This recognises the role played by these registries in the analysis of variation in care delivery and, based upon this, the identification and adoption of "best practice".

Data from surgical registries may serve multiple purposes including improving the quality of healthcare and the enhancement of patient safety. The increasing sophistication and analytic capabilities of clinical registries and databases contribute considerably in all of these domains due to their use of accurate, credible, risk-adjusted, and concurrent clinical data, which is acquired for these specific purposes.

Clinical registries (examples Table 1) are generally established with a view to monitoring the quality of care, benchmarking performance, describing variations in patterns of treatment, and for conducting research [30]. These points have been further underlined by a cluster of authors who have emphasised the impact of registries upon health service research [31], health outcomes [32], adherence to clinical guidelines [33, 34], cost of care delivery [29], improving healthcare processes, and providing details of patient-reported outcomes [35].

However, there is predominantly a paucity of empirical evidence to support the impact of registries as interventions for improving health outcomes. In a systematic review of the impact of clinical registries on quality of patient care and clinical outcomes, Hoque *et al*. [30] found limited evidence of studies that evaluated registries as an intervention to improve healthcare quality. Moreover, although those that did apply this approach reported positive findings overall; these were limited in number. There was also an issue regarding study design because most of these studies employed a before-and-after, quasi-experimental study design, which proved ineffective in attributing causality to the registry.

Stey *et al*. [36] undertook a distinct systematic review that focused upon surgical registries and how they may be used to improve the quality of surgical care. The review included 18 registries that were consistent with the study inclusion criteria. Similarly to Hoque *et al*. [30] there was reported evidence of multiple studies that indicated that surgical care had been improved by registry participation. Due to the study design, however, the authors were also unable to confirm why surgical care was perceived to have improved or what registry mechanisms were responsible for this causative effect.

Despite these acknowledged limitations, the registry concept continues to attract attention as a crucial means for improving both quality and outcomes related to the delivery of surgical care. This viewpoint is emphasised by Sedrakyan *et al*. [37] within a "Lancet" commentary that linked surgical registries with advancements in the quality of care delivery. Surgical registries facilitate access to comprehensive data on procedures, practices, and outcomes, which enables an appreciation of how suboptimal outcomes may be ameliorated. Sedrakyan *et al*. [37] outline key characteristics of an effective surgical registry, which include the need for continuous data collection, data infrastructure, establishing quality indicators, and outcome feedback to practitioners to enable improvements in health care.

Similarly, Larsson *et al*. [29] have also previously affirmed the impact of clinical registries on systematic quality improvement whilst also reducing total health care costs for a specific condition. This supports accountability within surgical teams by locating the responsibility for improved quality firmly in their domain and focusing attention upon the common goal of improved value in health care. An example of how registry data is used for systematic quality improvement is furnished by the American College of Surgeons (2013). The case of Albany Medical Centre is posited where high levels of cardiac complications were indicated relative to vascular surgery. Registry data indicated that post-surgery patient care was managed by an intern without cardiology in-hospital follow-up. Following a multidisciplinary risk assessment and development of an action plan, a cardiac anaesthesiologist was involved for each major vascular case, and a vascular ICU with intensivists was introduced. Subsequently, data confirmed that cardiac complications trended down to an expected rate.

Establishing a robust emergency surgical registry can facilitate collaboration with both national and international partners that will augment research and quality improvement endeavours. The WIRES project (WSES International Registry of Emergency

TABLE 1. Examples of clinical registries within the United States

American College of Surgeons National Surgical Quality Improvement Program (ASC-NSQIP)
Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSA-QIP)
Society of Thoracic Surgeons (STS) Cardiac Surgery Registry
Society of Thoracic Surgeons (STS) Thoracic Surgery Registry
Massachusetts Data Analysis Center (Mass-DAC) Cardiac Surgery Initiative
Trauma Registry American College of Surgeons (TRACS) Burns Registry
American College of Surgeons National Trauma Data Bank (ACS-NTDB)
Scientific Registry of Transplant Recipients (SRTR)
Vascular Study Group of New England (VSGNE) and Society of Vascular Surgery Patient Safety Organization (SVS-PSO)

General Surgery) is an example of this and has been established to enable access for EGS surgeons to register their activity and to develop a worldwide register of surgical emergencies [38]. This will provide an opportunity for evaluation of macro data facilitating stratification, evaluation, and improvement of outcomes.

Registries themselves are not a panacea for all the unanswered questions within emergency surgical care, and they come with limitations that have been previously outlined. Nonetheless, there is substantial evidence that registries have demonstrated the potential to drive quality improvement. They can provide real-time analysis of emergency surgical care, thus establishing areas for improvement and the predominant quality of care provided. The data generated can become a vital repository in supporting future research efforts. Additional research is needed to better understand the role of surgical registries for quality improvement and development of patient-centred strategies to increase long-term follow-up.

EMERGENCY SURGERY OUTCOMES ADVANCEMENT PROJECT (eSOAP)

The challenges confronting EGS services in the Republic of Ireland, Northern Ireland, and Scotland are coherent with those highlighted previously in England [9]. Essentially these are relative to concerns around training, workforce, and operational issues. These are central to variations in the outcomes that have been identified across EGS and have been amplified by both the Health Service Executive/Royal College of Surgeons in Ireland (2013) and the Nuffield Trust/Royal College of Surgeons of England (2016).

Watson [9] has once again raised the fundamental necessity to address matters relating to the quality of EGS care. An example from the National Emergency Laparotomy Audit (2015) is propounded, which identified that almost 50% of patients admitted across England and Wales with peritonitis and requiring surgery had yet to receive the first dose of antibiotics after 3.5 hours. Furnished with this evidence of variation in patterns of care, it would appear logical that a consistent approach towards the application of EGS key performance indicators and clinical pathways would substantially impact upon the quality of care delivered and produce more positive outcomes for patients.

The eSOAP project commenced during late 2018 and is situated within the Centre for Personalised Medicine, Clinical Decision Making, and Patient Safety (CPM). This is supported by the European Union's PEACE IV Programme, managed by the Special EU Programmes Body (SEUPB) and is a cross-border collaborative project involving Northern Ireland, the Republic of Ireland, and Scotland. The CPM focuses on five disease areas, which are: emergency surgery, acute kidney injury, cardiovascular disease, diabetes, and dementia.

The aim of eSOAP is to establish the feasibility of prospective data capture on all EGS admissions and assess the outcomes and impact of clinical pathways for patients admitted to EGS services in Letterkenny University Hospital (Republic of Ireland), Altnagelvin Hospital (Northern Ireland), and Raigmore Hospital (Scotland). The project is led by a consultant surgeon within each of these organisations. It is a quasi-experimental study designed to collect both retrospective and pseudo-anonymised prospective cohort data to establish an overview of the pattern, presentation, and management of current emergency surgery cases that account for over 10% of hospital admissions [7]. The study will also involve the development and application of a live EGS registry, established from the prospective cohort data. Primary project outcomes include in-hospital mortality, in-hospital morbidity, hospital length of stay, intensive care unit length of stay, and unplanned readmissions at 30-days post discharge.

The registry aims to capture all patients admitted to hospital with an EGS diagnosis, i.e. patients who are admitted directly to the emergency surgery service (via ED or GP) or patients who are referred to the emergency surgical team from another inpatient team (e.g. medicine). Patients will not be included if they are trauma, urology, vascular, or gynaecological admissions. Similar to the WIRES project [38], no sample size has been calculated for the eSOAP project, because this is a prospective cohort study that aims to recruit as many EGS patients as possible onto a registry for evaluation by a surgical research team.

The registry has been established upon a minimum dataset (Figure 1) of 38 data entry points coupled with modules in cholecystitis, appendicitis, small bowel obstruction, pancreatitis, and laparotomy (Figure 2), allowing for more detailed major data recording. This also expedites standardisation of comparisons between groups. In addition, key performance indicators across a spectrum of surgical emergencies have been added, and the registry will in time facilitate the development of clinical care pathways for the five conditions referenced above. It is further anticipated that clinical decision supports will also be developed that will eventually interact with intelligent systems and allow reporting of outcomes, both risk and non-risk adjusted, for centres potentially nationally and internationally. The registry is built on a REDCap platform that supports both online and offline research data

Minimum Data Set						
Demographics						
Database no						
Unique ID						
Age					Text box	
Gender					DD	
Consultant Surgeon					DD	
Residence pre admission					DD	
Presenting Complaint					DD	
Provisional Diagnosis					DD	
Include in study					DD	
Emergency Department						
Date					DD	
Referred by					DD	
Registered Time					DD	
Triage Time					DD	
Time Referred					DD	
Time Seen					DD	
Emergency Department Observations						
Pulse	/min	SpO2	%	BP	mmHg	
RR	/min	Temp	C			
Co-Morbidities						
Anti-Coags				DD		
Admission Lab Value Information						
WCC	DD	Hb	DD	CRP	DD	
Amylase	DD	GGT	DD	Creat	DD	
INR	DD	Base Excess/Deficit	DD	Lactate	DD	
Imaging						
CXR				DD		
PFA				DD		
US	DD	Booked	DD	Performed	DD	Reported DD
CT	DD	Booked	DD	Performed	DD	Reported DD
MRI	DD	Booked	DD	Performed	DD	Reported DD
Disposition						
Moved to	DD	Date	DD	Time	DD	
Antibiotics			DD			
Surgery			DD			
Surgery						
Date Booked	DD	Time Booked	DD			
Date of Surgery	DD	Time of Induction	DD			
ASA Score			DD			

Surgeon	DD
Procedure	DD
Findings	Text Box
Post-Op	
Destination	DD
Complications	DD
Complication Classisification/Clavien-Dindo	DD
Final Diagnosis	DD
Discharge Date	DD

FIGURE 1. eSOAP registry minimum dataset

Laparotomy Module	
Pre-op	
Time from onset of symptoms?	DD
Pre-op Risk stratification	
Was a frailty score used?	DD
If yes what frailty score was used?	DD
What was the score?	DD
Was there a risk prediction score used for morbidity pre-operatively?	DD
If yes what risk prediction score was used?	DD
What was the score?	DD
Intra-op	
Senior surgeon grade	DD
Consultant present/supervising	DD
Procedure	
Is this the first surgical procedure of this admission?	DD
What is the indication for surgery?	DD
Main procedure	DD
Second procedure	DD
Third procedure	DD
Procedure approach	DD
Operative findings	DD
Describe the peritoneal contamination present	DD
Please indicate if the contamination was	DD
Was the abdomen left open or closed?	DD
If open was intermittent peritoneal dialysis fluid used?	DD
Was a negative pressure wound therapy dressing used?	DD
If abdomen left open was it documented in clinical notes when a planned return to the operating theatre would be?	DD
Post-operative	
Total length of post-operative critical care stay	
Was the patient assessed by a specialist from the elderly medicine in the post-operative period	DD
Did the patient have an unplanned or planned return to theatre following emergency laparotomy?	DD
What was the main indication for the unplanned return to theatre?	DD
What was the main indication for the planned return to theatre?	DD
Did the patient have an unplanned move from the ward to a higher level of care within 7 days of surgery?	DD

FIGURE 2. eSOAP registry laparotomy module

capture and reporting. Patients who are initially included but later excluded will be recorded on the REDCap system, with the reason for exclusion documented.

Our development of the EGS registry is concentrated upon pre and post phases, which allow for systematic data capture and analysis of biomarkers and the variations in care that influence the outcomes associated with EGS. Key Performance Indicators and clinical care pathways will be developed. Over the period of the project these developed pathways will be implemented, evaluating the change in pattern outcome for patients, producing significant research in the field of Emergency Surgery data collection, registry, Key Performance Indicators, care pathways, and outcomes.

The study phases include:

Phase i: Collection of prospective patient data; development of registry; development of baseline dataset; development of KPIs.

Phase ii: Analysis of data registry; care pathway redesign for five conditions; implementation of redesigned care pathway; collection of prospective patient data; evaluation of impact of redesigned care pathways upon in-hospital mortality, in-hospital morbidity, hospital length of stay, intensive care unit length of stay, and unplanned readmissions at 30-days post discharge.

Statistical analysis

Statistical analysis will be led by the principal investigator. All statistical analysis will be in line with the measurement type and outcome measures expected. Descriptive statistics will be generated to inform the appropriate statistical analysis techniques (parametric or non-parametric). Relationships between scores will be examined using correlation measures. Statistically significant differences will be examined using inferential statistics.

Ethical considerations

There are a number of ethical considerations that require attention within the study. Issues include: informed consent as an ongoing process for all concerned; safeguards to ensure no harm comes to the participants; and aspects relating to respect for persons incorporating the right to withdraw and assurance of confidentially and anonymity. Participant information leaflets encompassing written consent were provided to all participants to concentrate these requirements. The study will be conducted in accordance with the Declaration of Helsinki and according to local and regional ethical standards. Ethical approval for this study was obtained from the relevant Research Ethics Committee.

Data storage

The eSOAP clinical research team work collaboratively with hospital information management officers to identify daily admission and discharge reports relevant to EGS. All patient information is pseudo-anonymised and coded at source in that all personal or identifying details are removed and confidentiality ensured. At no point will any personal information be reported.

Routine clinical patient information is captured on encrypted electronic devices utilising the REDCap mobile application. Each participant is given a unique study ID that will be stored with the pseudo-anonymised patient data. The information is collated from a number of different sources including written patient notes and online hospital systems such as the Integrated Patient Management System (IPMS), National Integrated Medical Imaging System (NIMIS), and iSoft Clinical Manager (iCM). The de-identified patient information will be synced with a CPM secure server, based at Ulster University (Magee Campus), for storage and analysis. A review of the individual datasets will be undertaken to ascertain any incorrect or missing data before analysis.

All computer data will only be accessed on password-protected and encrypted computers. This will limit access to data collected in order to prevent unauthorised consultation, alteration, disclosure, or erasure of data. All hard copies of data will be kept under locked conditions, designed for the purpose. The Principal Investigator will act as custodian for all study data. Participants will not be identifiable in any data published from this research. The dissemination of data will be carried out in agreement with the intellectual property arrangements that are in place for this research. Data will be stored in this secure format for a minimum period of six years and will be safely destroyed once it is no longer required [39].

CONCLUSIONS

There is an established requirement to generate quality care metrics that are apposite to the distinct context of EGS. Shafi (2015) [4] has previously underlined this along with the need for relevant clinical guidelines and care pathways that are integrated within routine clinical practice. Simultaneously, there is a clear requirement to generate prospective outcome and safety data that enable quality measurement within services and benchmarking across hospitals and health systems. These aspirations are impeded by the absence of a national EGS registry globally.

eSOAP seeks to address these deficits by enabling an assessment of patient outcomes in EGS, enhancing the quality and safety of patient care, and providing an effective template for EGS regi-

stry development. It will achieve this through the provision of meticulous, valid, risk-adjusted, and concurrent clinical data. Societies not just surgical, such as American Association for the Surgery of Trauma (AAST) and European Society for Trauma and Emergency Surgery (ESTES), World Society of Emergency Surgery (WSES) but also critical care societies have an onus to collect and analyse data to advance care in emergency surgery. The comprehensive information within the eSOAP registry will promote transparency in respect of the functioning of individual surgical teams and services and increase understanding of the complex systems involved in the delivery of EGS care. Accordingly, this should also inspire these teams and services to take back control of the quality of EGS care and influence enhanced accountability.

Emergency surgical registries are important instruments that can positively impact patient outcomes and promote the art and science of outcome analysis, quality improvement, and patient safety [40]. This should facilitate surgeons and their teams in delivering superior standards of care to their patients.

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