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REVIEW

Anesthesia and Perioperative Medicine

Peri-operative Assessment of Patients admitted for Emergency or high Risk Surgery (PAPERS) Proforma: A tool to standardize assessment and minimise error

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Abstract

Acutely unwell patients who may require emergency surgery may deteriorate suddenly and precipitously. In that eventuality, the assessment, diagnosis and treatment of this cohort can be challenging. The rapidly changing pathophysiology of the peri-operative patient may cognitively overload the attending clinicians. Furthermore, until stabilised, a comprehensive assessment of the patient is unlikely to be feasible or appropriate. So, vital data may be overlooked. In emergency situations, suboptimal management decisions may cause significant morbidity and mortality. Fortunately, standardisation and careful design of documentation (i.e. proformas and checklists) can enhance patient safety. Indeed, the World Health Organization's Safer Surgery Checklist has been proven to improve post-operative outcomes. So, extrapolating this concept, I have developed a checklist proforma to guide the assessment of acutely unwell patients who may require emergency surgery. This proforma also promotes the systematic recording and presentation of patient data. This can facilitate the retrieval of the specific information required for the management for these patients. Moreover, this framework for clinical reasoning can identify the need for organ support and thereby guide decisions about escalation of therapy..

Keywords: *assessment, diagnosis, documentation, emergency surgery*

Several acute and chronic diseases require surgical intervention. Indeed, worldwide, circa 313 million surgical procedures are performed per annum [1]. Worryingly, global estimates suggest that over 4 million patients die within 30 days of these procedures [2]. Thus, perioperative mortality currently accounts for nearly 8% of all deaths worldwide [3]. Yet, this is just the tip of the iceberg. Ten times as many have significant non-fatal complications [4]. This peri-operative morbidity reduces quality of life and increases mortality [4].

A co-ordinated strategy to reduce peri-operative morbidity and mortality is therefore required [2]. To this end, a paper was published by the Anaesthetists' Royal College in Great Britain [4]. This visionary manuscript highlights the requirement for a nationwide perioperative medicine initiative in Great Britain [4].

In this context it is important to recognise that the assessment of those acutely unwell patients whom may require emergency surgery can be extremely challenging. This cohort of patients may deteriorate precipitously whilst being reviewed. In such situations, rapidly changing pathophysiology generates torrents of new diagnostic data. The management of critically ill patients in the peri-operative period involves initial resuscitation (supportive therapy and treatment of the primary critical illness), stabilisation, monitoring and prevention of complications of critical illness and surgery [5]. To achieve this effectively requires a thorough assessment and analysis of a patient's condition [5]. Surgeons, anaesthetists, intensivists and the allied healthcare professionals involved in the care of this complex high risk cohort, therefore, ultimately expend inordinate resources abstracting vital clinical data from medical records. Time and resources that could, perhaps, have a greater impact on outcomes if they were directed towards supportive therapy and treating the cause of the deterioration.

Supportive care

Regardless of the indication for emergency surgery clinicians must aggressively maintain the respiratory and cardiovascular systems [5]. To achieve this organ supporting therapies (e.g. oxygen, and intravenous fluids) must be manipulated frequently and expediently in response to changes in the patient's status [5].

Treatment of primary illnesses

The patient characteristics that initiated consideration of emergency surgery (e.g. sepsis) clearly require treatment [5]. To achieve this, a limited list of possible diagnoses, targeted diagnostics, and focused management is generally sufficient for most patients [5]. However, in those acutely unwell patients with multisystem disease who may require expedient emergency surgery, a top-to-bottom, systems-based approach facilitates the organization of a management plan that is both comprehensive and compartmentalized [5]. This is particularly important as, in this situation, surgeons often focus on the technical aspects of the surgery rather than taking a holistic approach to patient assessment.

Treatment of primary illnesses

In hospitalized patients the importance of monitoring vital signs cannot be overstated. This is particularly true for patients who are being prepared for emergency surgery [5]. Moreover, several other monitors (i.e. dynamic measurements of end tidal carbon dioxide)

and physiological measures (i.e. lactate) may provide more data on organ function [5]. The bedside assessment of this cohort of patients can be further refined by the application of focused ultrasound performed by the treating physicians at the point-of-care.

However, detailed analyses (i.e. full chart review, re-taking the history, top-to-bottom examination and imaging performed in the radiology suite) can only be completed once the situation is under control. So, despite not having a full deck of cards; teams of surgeons, anaesthetists and intensivists must play their hand to calm the pathophysiological milieu. Yet, they must never lose sight of the surgical intervention that the deteriorating patient may ultimately require. It is important to recognize that error rates are greatly magnified by constantly switching tasks [2]. In this context the consequences of 'missing the wood for the trees' may be devastating.

Perioperative diagnostic errors

The opinions of surgeons, anaesthetists and intensivists may be biased by pre-existing labels [7]. Thus, handovers from emergency physicians or indeed other surgeons may jaundice even fresh surgical assessments such that errors of omission or commission are perpetuated.

With stress and poor communication, facts can easily be misconstrued. So much so, in the heat of the moment, surgical teams may overlook basic aspects of patient care [8,9]. This is certainly not helped by lack of uniformity of the collection, entry and presentation of data in medical records [10]. The sequelae of these deficiencies is that the rapid retrieval of the most relevant information documented by healthcare professionals is nigh on impossible to extract in an emergency [10].

Diagnostic errors are increased by inadequate assessments. The domino effect of suboptimal therapy precipitates morbidity and mortality [10]. Fortunately, careful design of documentation (i.e. proformas and checklists) and systematic presentation of clinically relevant data can enhance patient safety [11]. In the surgical setting this has been exemplified by the World Health Organization's Safer Surgery Checklist [10].

As a result, surgical teams worldwide have embraced the use of checklists to ensure that crucial details (e.g. which kidney should be removed) are not forgotten during an operation. Indeed, several studies have suggested that the use of the World Health Organization's Safer Surgery Checklist improves peri-operative outcomes [12,13].

Furthermore, there is also data showing that critically ill patients admitted to intensive therapy units (ITU) also benefit from the use of checklists [14,15].

ITU pre-optimisation of prior to emergency surgery

The optimisation of a patient prior to emergency surgery may require admission to ITU for organ support [5]. Yet in this setting it is equally important to remember to initiate preventive therapies. These include prophylactic interventions to prevent nosocomial infection, ulceration (gastrointestinal tract and pressure) and venous thromboembolism [5]. The use of checklists for these 'boring' interventions has been shown to improve outcomes in critically ill patients [14,15].

Checklist proformas for the assessment of critically ill patients

I have, therefore, produced a collection of proformas to guide a systematic approach to the management of unwell patients [10]. Although initially intended for use with ITU patients [10], they have been modified for use in peri-operative patients. This is because the retrieval of relevant data about acutely unwell peri-operative patients can be greatly facilitated recording data on a structured proforma. The systematic presentation of patient characteristics expedites decisions on the provision of organ support and structures diagnostic reasoning. In the present paper I describe the Peri-operative Assessment of Patients admitted for Emergency or high Risk Surgery (PAPERS) Proforma which I have developed for the specific use by surgical teams.

Transformation of the proformas

These forms have changed significantly over the last two decades [10]. These modifications have resulted from experience with the use of these forms and discussion with colleagues in a range of healthcare systems worldwide [10]. These centres of excellence include The American Hospital, Dubai; King Abdulaziz Medical City, Riyadh, Saudi Arabia; King Khalid University Hospital, King Saud University Medical City, Riyadh, Saudi Arabia; Kingsmill Hospital, Mansfield, UK; Lister Hospital, Stevenage, UK; Oxford University Hospitals, UK; Queen Alexandra Hospital, Portsmouth, UK; Queen Mary's Hospital, Sidcup, UK; Queen's Hospital, Romford, UK; Royal Brompton Hospital, London, UK; Royal Free London Hospitals, UK; Royal London Hospital, UK; Royal National Orthopaedic Hospital, Stanmore, UK; St Helena General Hospital, St Helena; Stoke Mandeville Hospital, Aylesbury, UK; University College Hospital, London, UK and Victoria Hospital, Kirkaldy, UK [10]. Different iterations of these documents are in use in most of these organizations [10].

Variations in the proformas

The proformas' designs reflect the settings for which they should be used [10]. The previously described ITU and HDU forms [10], should be used to assess patients admitted in critical care areas. Deteriorating peri-operative patients on general wards, being assessed by surgical teams, although unstable, are unlikely to be receiving advanced organ support. As the risk of medical errors is high in this population; careful assessments for both the aetiology and sequelae of deranged physiology are required. So, the PAPERS proforma contains dedicated space for measurements of amylase, brain natriuretic peptide (BNP), creatine kinase (CK), D-dimers and troponin. These biomarkers act as aide memoires for non-surgical complications that are common in the peri-operative period. Surgical on call teams should also consider patient disposition (e.g. follow up; refer to ITU or sign off). The form therefore includes a dedicated section where this can be documented.

Abbreviations used in the PAPERS proforma

Most of the abbreviations used in the PAPERS proforma are in common use. The same abbreviations have been used in the previously described proformas [10]. However, to prevent any confusion I have described them here. However, these can be modified if necessary. Activated partial thromboplastin time (aPTT); airway pressure (AP); albumin (Alb); alanine transaminase (ALT); alkaline phosphatase (Alk P); arterial partial pressure of carbon dioxide ($PaCO_2$); arterial partial pressure of oxygen (PaO_2); aspartate transaminase (AST); base excess (BE); bicarbonate (HCO_3); bilirubin (bili); biochemistry (BIOCHEM); blood pressure (BP); brain natriuretic peptide (BNP); capillary refill time (CRT); central venous oxygen saturation ($ScvO_2$); central venous pressure (CVP); chest x-ray (CXR); C-reactive protein (CRP); creatine kinase (CK); deep vein thrombosis (DVT); dermatology (DERM); echocardiogram (Echo); electrocardiograph (ECG); end tidal carbon dioxide (ET CO_2); expiratory positive airway pressure (EPAP); fibrinogen (fibrino); fluid balance (Fluid Bal);

fraction of inspired oxygen (FiO2); gamma-glutamyl transferase (GGT); gastric residual (GAST RES); Glasgow Coma Score (GCS); glucose (Gluc); haematology (HAEM); haemoglobin (Hb); heart rate (HR); highest temperature in the preceding 24 hours (T Max ºC); high flow nasal oxygen (HFNO2); inspiratory positive airway pressure (IPAP); International Normalised Ratio (INR); interventional radiology (IR); invasive positive pressure ventilation (IPPV); jugular venous pressure (JVP); lower limb (LL); mean arterial pressure (MAP); microbiology (MICRO); musculoskeletal (MSK); nasogastric tube (NG); nil by mouth (NBM); per os (po); non-invasive ventilation (NIV); oxygen saturation (SpO2); peri-operative assessment of patients admitted for emergency or high risk surgery (PAPERS); platelets (plt); procalcitonin (PCT); prothrombin time (PT); proton pump inhibitor (PPI); renal replacement therapy (RRT); respiratory rate (RR); temperature (Temp); tidal volume (TV); upper limb (UL). These abbreviations have been described previously [10].

Conclusion

Proformas can reduce surgical teams' workload. They also improve data quality and facilitate its retrieval.. Any healthcare system can freely adapt the PAPERS proforma (Supplementary file) for local use. Standardizing assessments before and after emergency surgery should facilitate recognition of deteriorating patients and enhance decision making.

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Name: .....
MRN: .....
Sex: ..... D.O.B.: .....

Peri-operative Assessment of Patients admitted for Emergency or high Risk Surgery

Date/Time: ..... **Date of Admission:** ..... **Ceiling of Therapy** ..... **DNAR:** .....

Recent surgery:	**Diagnosis/Impression:**
Condition:	☐ **Non-surgical causes of presentation considered**

ASSESSMENT SECTION

NEUROLOGY / EYES

GCS: /15 E ( ) V ( ) M ( )

Pupils: R L

Mental State:

Delirium Score:

Motor Power: UL (/ 5) LL (/ 5)

Pain Sites / Score:

Other neurology:

Rehabilitation pathway:

Analgesia / Sedation:

Imaging:

RESPIRATORY

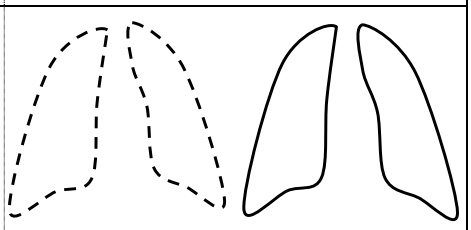
Airway: **Days on HFNO2 / NIV:**

Ventilation

SpO_2	FiO_2	MODE	EPAP	IPAP	TV RR
					/

ABG Date & Time

Oxygenation		Ventilation		Acid Base	
PaO_2	PaO_2/FiO_2	Pa CO_2	pH	HCO_3	BE



Examination **CXR**

Imaging:

Secretions:

CARDIAC

Last Vital Signs

HR / Rhythm	BP / MAP	CRT	CVP / JVP	Heart Sounds

Perfusion Fingers/Toes:

Oedema:

Lactate: **$ScvO_2$:**

Cardiac / vasoactive medication:

ECG:

Troponin:

CK:

Echo / Imaging:

BNP:

FLUID BALANCE / RENAL / GI TRACT

NG

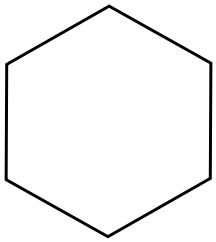
Feed: NBM / PO / NG / TPN

Glucose:

Sounds:

GAST RES:

Bowels Opened:



Imaging:

Urinary Catheter:

Urine Dip:

Amylase:

Fluid Balance Yesterday

Input Today	Output Today
Crystalloid:	**Urine:** / /
	☐ **Diuretics**
Colloid:	☐ **RRT**
Blood:	**Drains:**
	Other:

Imaging:

This space has been left blank for insertion of a hospital logo

Name: .....

MRN: .....

Sex: ..... D.O.B.: .....

BIOCHEM / HAEM / MICRO

Na^+	K^+	Mg^{2+}	Ca^{2+}	PO_4^{2-}	Cl^-	Urea	Creat	Alb	Bili	AST ALT	Alk P GGT	Gluc
										/	/	

Hb	Plt	PT INR	aPTT	D-Dimer Fibrino.	WBC Neut	Lymph Eosin	CRP PCT	T Max °C
		/		/	/	/	/	

Positive Cultures - Date / Source / Organism

Line Site Day/State Keep

Antibiotic / Days / Level

Microbiology Review

DERM / MSK

☐ **Pressure areas intact?** *If Not document site & stage of pressure sores*

Imaging:

DRUG CHART

☐ **Medication Review (Record Changes):**

Allergies:

CARE BUNDLE

☐ **DVT Prophylaxis?** *If No Why?*_____ **Vein Ultrasound**_____

☐ **Head Elevation 30°?** *If No Why?*_____

☐ **PPI / Full Enteral Nutrition?** *If No Why?*_____

ACTIVE PROBLEMS

Comorbidities & Operations:

MANAGEMENT PLAN

TARGETS	Plan	Comment
SpO_2 PaO_2 $PaCO_2$ MAP pH Urine Fluid Bal Temp Glucose Hb K^+ Mg^{2+} Na^+ Ca^{2+}	☐ For Emergency Surgery / IR ☐ Request anaesthetic review ☐ Request HDU / ITU admission ☐ Refer to surgical specialty ☐ Surgery on call follow up ☐ For Elective Surgery / IR ☐ Not for surgical intervention ☐ Refer to CCOT ☐ Refer to medical team ☐ Sign off	

Trainee Name, Signature & Pager	Consultant Name, Signature & Telephone Number	Nurse Name & Signature

PAPERS