**Rapid response based Emergency Structured Exam Tool (RESET): Utility of a cognitive aid to optimise recognition of and response to evolving or established shock**

**Situation:** Suboptimal recognition and response to evolving or established shock seems to be a persistent challenge in many hospital specialities.

**Background:** Case note review and clinical case load provide exposure to weaknesses in performance at a system level.

**Assessment:** In keeping with established recommendations and guidelines, rapid response like care frameworks are used for recognition and rescue of seriously ill patients in Health and Social Care Trusts throughout NI. However, suboptimal care of seriously ill patients is a persistent problem reported in repeated confidential enquiries, national audits and observational studies. Failure to recognise or rescue is the final common pathway to nearly all unanticipated morbidity and mortality. Unplanned clinical assessment is the most vulnerable point in this framework and personal QI experience reveals problems with content, context, clinical suspicion and contingency planning as four main themes contributing to a suboptimal review and missed opportunities. Further examination of notes frequently reveals inadequate contextual consideration of clinical findings with low clinical suspicion for evolving shock. Finally, failure to formulate adequate contingency plan for follow up or employ protocoled fluid management as recommended NCEPOD and NICE compounds the problem of failures to recognise or rescue patients from evolving or established shock. If left unchecked there will be continued avoidable morbidity and mortality. Importantly, personal experience in other trusts suggests this in not a localised problem.

**Recommendation:** Finding a solution is clearly a significant challenge. Junior doctors are the main targets for educational intervention. They are keen for regular case based learning. Feedback from teaching at the foundation forum supports this. Structured clinical noting tools or checklists for unplanned assessment are also potential solutions. There is evidecence that structured documentation improves the quality of medical care. My personal interest lies in the development of an electronic Rapid response based Emergency Structured Exam Tool (RESET) but the project is nascent and is therefore not an immediate fix. In the interim, I have produced a cognitive framework (Table) that could help recognition and rescue by combining the above themes with essential elements of a comprehensive cardiovascular ABCDE assessment. This could be modified and incorporated in a structured noting document (a paper based RESET) for use as a review tool (see below).

| ABCDE Assessment & Resuscitation Cognitive Framework | | |
| --- | --- | --- |
| Assessment / Resuscitation element | Potential items in structured noting tool | Comments |
| 1. **Pulse & pressure: isolated values are of no value. Think of trends, patterns and postural changes. (content)** | 1. ***HR & BP recent (<15mins) / repeated at time of review (Y/N)*** 2. ***Evidence of adverse trend in HR / BP or pattern such as reducing pulse pressure (Y/N)*** 3. ***Evidence of orthostatic changes (Y/N)*** 4. ***Signs of extremes in venous pressures such as venous guttering or grossly elevated JVP*** 5. ***Signs of hyperdynamic circulation?*** | **Pulse & pressure: Avoid focusing on absolute numbers. Consider trends, assess for orthostatic change & sunken veins (venous guttering) if concerned about hypovolaemic shock.**  **Hyperdynamic signs of bounding pulse and dilated peripheral veins in septic shock are also important.** |
| 1. **Peripheral perfusion: assessment of skin, brain and renal signs of abnormal (low) cardiac output. (content)** | 1. ***Evidence of abnormal colour or temperature gradient in limbs (not just CRT)***    * ***How severe?*** 2. ***Any alteration in mental state including confusion, agitation or delirium.*** 3. ***Oliguria: established / evolving*** | **Perfusion: Skin colour and temp gradient more subtle but often established earlier than prolonged CRT in the course of low cardiac output.**  **Altered mental state is a subtle sign of reduced cerebral perfusion and not limited to decreased LOC. It occurs late if young and early if older.**  **Renal hypoperfusion is not very useful in evolving shock but established oliguria can reflect pre-renal insult from reduced perfusion.** |
| 1. **Peripheral oedema & fluid balance: overt losses can be identified from drains. Occult losses can be inferred from an increasingly positive fluid balance with signs of evolving or continued haemodynamic disturbance. (content)** | 1. ***Estimated to have a deficit:***     * ***Where from & is it an on-going loss?***    * ***How much?*** 2. ***Overall fluid balance so far today?***    * ***>20ml/kg positive?***    * ***Overall fluid balance from admission*** 3. ***Evidence of peripheral oedema?***    * ***How extensive?*** 4. ***Evidence of pulmonary oedema?***    * ***How extensive?*** | **Peripheral oedema & fluid balance: large volumes are concerning. Consider potential occult loss / shifts.**  **Note current fluid requirements to maintain adequate pressures and how effective this is.. Remember estimated blood volume in non-pregnant adult is 70ml/kg. Try and think of your on-going fluid management in this context.** |
| 1. **Point of care tests: useful for evidence of anaemia, metabolic acidaemia or acute cardiac pathology (content)** | 1. **VBG/ABG: Hb & Hct, Glu & lac, BE & HCO3, pH, PO2 & PCO2** 2. **ECG to exclude obvious / severe ischaemia or dysrhythmia** | **Point of care tests: Hb, Lactate, BE, ECG will highlight anaemia, metabolic acidaemia and severe myocardial ischaemia or dysrhythmia.** |
| 1. **Pathophysiology & procedural context: This should alter clinical index of suspicion and contextual interpretation of above findings. (context)** | 1. ***Any persistent abnormal obs or high news*** 2. ***Pain not in keeping?*** 3. ***Recent significant event (i.e. major surgery, bleeding, chemotherpay)*** 4. ***Poor cardiopulmonary or other reserve*** 5. ***Physiologic compensation or pharmacological masking likely?*** | **Pathophysiology & procedural context: consideration of this should alter clinical index of suspicion and contextual interpretation of above findings. High NEWS, red-flag or pain not in keeping suggest unidentified problems. Severe co-morbidity and recent high risk events/procedures alter underlying risk and potential reserve.** |
| 1. **Problem & probability: Consider the underlying problem. Clinical condition is usually dynamic. Is it established or evolving issue? What is the cause or potential differential? (clinical index of suspicion)** | 1. **Is there evidence of established shock**    * **What is the cause**    * **How certain is it as a differential** 2. **If not, is there a potential evolving problem**    * **What is the cause**    * **How certain is it as a differential** | **Cardiovascular compromise is a spectrum ranging from a requirement to increase DO2 within capacity to overt shock. A patient’s position on this spectrum is dynamic and progress depends on patient, pathology and procedural risk factors.** |
| 1. **Protocol based fluid & other specific management with planned review: contingency planning is essential when signs of shock are indeterminate and patient is not low risk. (contingency planning)** | 1. **NICE CG174 / Surviving sepsis fluid resuscitation** 2. **Major haemorrhage protocol if needed** 3. **Antibiotics / other specific treatment as indicated by underlying cause of compromise** 4. **Document an explicit management & monitoring plan, using special instructions on fluid balance chart if needed.** | **Protocoled treatment & fluid resuscitation: NICE Clinical Guideline 174 / Surviving sepsis guidelines / Major haemorrhage protocol!**  **Other specific management as indicated, including early antibiotics if septic.**  **Monitoring plan should include follow up interval and triggers for interim review.** |

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| Rapid response based Emergency Structured Exam Tool (RESET) P1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **ID** | **Patient** | | | | | Name (first) | | | | | | | | | Name (second) | | | | DOB | | | | Age | | | | HCN | | | | |
| **Professional** | | | | | Location | | | | | | | | | Date Time (24hr) | | | | Name (print) | | | | Spec & Grade | | | | Prof. Reg. Number | | | | |
| **Situation & Background** | **Problem precipitating Review** | | | | | | |  | | | | | | | | | | | | | NEWS | | Time called | | | | Time attended | | | | |
| **Patients**  **Primary Problem** | | | | | | | Reason for inpatient treatment? | | | | | | | | | | | | | | | | | | | Date admitted | | | | |
| **PMHx,**  **Procedures & Progress:** | | | | | | | Comorbidities: None ☐ mild ☐ moderate ☐ severe ☐(specify below)  Drugs (inc allergies)/recent therapy | | | | | | | | | | | | | | | | | | | | | | Weight | |
| Height | |
| **Assessment** | **A** | AVPU | | | |  | | | | | | | | | | Adverse anatomy ie obesity, short neck, | | | | | | | | | |  | | | | | |
| Added airway sounds | | | | | | | |  | | | | | | Abnormal effort: looks like struggling – consider fast bleep | | | | | | | | | |  | | | | | |
| **Patent** ☐ **/ At risk** ☐ **/ Not threatened** ☐ **/ Obstructed** ☐ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **B** | Rate | | | | Symmetry | | | | | | Volume | | | | Pattern | | Percussion / Palpation | | | | | | | Auscultation | | | | SpO2 | | FiO2 |
|  | | | |  | | | | | |  | | | |  | |  | | | | | | |  | | | |  | |  |
| **Evidence of distress** ☐ **/**  **failure** ☐ **/** **not compromised** ☐ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **C** | Pulse & pressure (consider trend) | | | | | | | | | | | | | Peripheral perfusion | | | | Peripheral oedma / balance | | | Pathophysiol Risk / red flag? | | | | | | Point of care test | | | |
| HR | | | SBP | | | | DBP | | | | MAP | |  | | | |  | | |  | | | | | |  | | | |
|  | | |  | | | |  | | | |  | |
| Postural change | | | | |  | | | | | | | |
| **Shocked** ☐**/**  **hyperdynamic** ☐ **/** **not compromised** ☐ **/**  **at risk**☐ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **D** | GCS | | | | | | | | | Pupils | | | BM | | | Dlerium Ax | | | | | Meningism? | | | | | | FAST/other? | | | |
| E | |  | | | | | | |  | | |  | | |  | | | | |  | | | | | |  | | | |
| V | |  | | | | | | |
| M | |  | | | | | | |
| **Global disturbance** ☐ **/ focal neurology** ☐ **/** **not compromised** ☐ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **E** | | Abdominal exam | | | | | | | | Drains, lines & tubes | | | Exercise tolerance | | | | | | Care packages / disability | | | | Frailty assessment | | | | Escalation status | | | |
|  | | | | | | | | | | |  | | | | | |  | | | |  | | | |  | | | |
| **Adcditional comment / relevant exam** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Acute surgical pathology** ☐ **/ Sepsis** ☐ **/** **Other problem** ☐ | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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| **RESET P2** | | | | | | | | | | | | | | | | | | | | |
| **ID** | **Patient** | | Name (first) | | | Name (second) | | | | | DOB | | | | Age | | HCN | | | |
| **Professional** | | Location | | | Date Time (24hr) | | | | | Name (print) | | | | Spec & Grade | | Prof. Reg. Number | | | |
| **Assessment Continued** | **Ix** | **Recent Labs – Date and Time:** | | | | | | | | | | | | | | | | | | |
| FiO2/flow & device for ABG: | | | | | | | | | | | | | | | | | | |
| PaO2 |  | pH | |  | PaCO2 | |  | HCO3 | |  | BE |  | | Lac | |  | HCt |  |
| Na |  | K | |  | Cl |  | | Ur | |  | Cr |  | | CRP | |  | AMY |  |
| Hb |  | Plt | |  | Wcc |  | | Neut | |  | PT |  | | APTT | |  | Fib |  |
| Other (TNT, LFT, BNP, CK) | | |  | | | | | | | | | | | | | | | |
| ECG (Date and Time): | | | | | | | | | | | | | | | | | | |
| Recent Imaging (Date and Time): | | | | | | | | | | | | | | | | | | |
| Recent microbiology / serology samples (Date and Time): | | | | | | | | | | | | | | | | | | |
| **Impression** | **Think Sepsis, but remember there are other causes of evolving or established shock!** List problems or differential diagnosis.. | | | | | | | | | | | | | | | | | | |
| **Risk (estimated) of further deterioration:**  **High ☐** **/ Intermediate ☐ /** **low** **☐** | | | | | | | | | | | | | | | | | | |
| **Recommendations** | **Treatment**    **O2** ☐ **Fluids** ☐ **Blood O&S** ☐ **Urometry** ☐ **Lactate** ☐ **Antibiotics** ☐ | | | | | | | | | | | | | | | | | | | |
| **Tests** | | | | | | | | | | | | | | | | | | | |
| **Assessment / review** | | | | | | | | | | | | | | | | | | | |
| **Monitoring** | | | | | | | | | | | | | | | | | | | |