MedSTAR Flight Lights –

Development of an aeromedical tool for early recognition of the deteriorating patient during pre-flight inter-hospital transfer (IHT) assessments

Natalie Hincksman  RN, Grad Cert Hlth (Critical Care), Grad Cert Nurs Sc (Retrieval Nursing),
Clinical Practice Consultant – Retrieval Nurse

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Background

> MedSTAR absorbed RFDS pre-flight IHT assessments in SA from 11/02/13
  • To be performed by Clinical Practice Consultant - Nurse Retrieval Coordinators (NRCs)

> RFDS Project role – 2 weeks lead up
Project role - objectives

- Identify and address risks for patients and organisation
  - Knowledge deficits / inexperience
  - Implement safety systems
  - Compliance with National Competency Standards for Nursing Practice.
  - Workflows (inter-agency)
  - Inter-agency work instruction
  - Reference points for staff
  - Inter-hospital Transport Evaluation form
  - Trials of forms
  - Training/Education
  - Launch support
Risks – focusing on knowledge

> MedSTAR Nurse Retrieval Coordinators
- All experienced ICU retrieval nurses
- Majority not midwives
- All experienced in retrieval coordination of Adult, Paediatric and Neonates
  - Experience in Paeds/Neonates vastly different between Coordinators
  - Autonomy – need for a formal criteria to refer a patient?
Promote Autonomy

➢ Trust (coordinator & service)
  • Create a sound empowerment tool
    ▪ Avoid patient deterioration
    ▪ Evidence based – avoid censure
    ▪ Organisationally supported – Coordinator protection
    ▪ Needs to be easy to refer to

➢ Provide protection
  • Identify existing pre-flight early warning safety systems
  • Identify government guidelines and policies for patient safety
Current pre-flight assessment (published evidence)

- Lack of published reference tools for pre-flight nursing assessments escalation criteria:
  - Medical Emergency Response (MER)
  - Medical Emergency Team (MET)
  - New Early Warning Scores (NEWS)
  - Modified Early Warning Scores (MEWS)
  - Children’s Early Warning Tool (CEWT)

- Hospital tools for escalation of treatment
  - Designed - immediate access to Code Blue service
  - Criteria - tailored to the wards
  - Absence of tools that crossed all the age groups
Current pre-flight assessment (published evidence)

  - Subjective scoring system
  - For elective international transport
  - Retrieval criteria identified by interpretation
  - Demands clinical judgement
  - Open to clinical variance
Directives – who do we comply with?

- National Safety and Quality Health Service Standards, September 2012 document
  - Identifies 10 areas that affect patient outcomes
  - Proposes evidence-based solutions to prevent harm and improve safety standards
  - Ensures governance in quality and patient safety
- Safety and Quality improvement guide Standard 9: Recognising and Responding to Clinical Deterioration in Acute Health Care

(Australian Commission on Safety and Quality in Health 2012)
Compliance - SA Health policy statement

> “1.1 SA Health believes that effective and early recognition and response to clinical deterioration is an essential component of the delivery of safe, high quality health care.

> 1.2 SA Health believes that patients and their families and carers have the right to expect that:

• 1.2.1 signs of clinical deterioration are promptly recognised and responded to by staff with appropriate knowledge, skills, and resources

• 1.2.2 advanced care directives, and patient needs and preferences, are taken into account in responding to deterioration.

> 1.3 SA Health is committed to implementing systems that ensure effective, consistent and agreed processes and clinical team work, to support recognition and response to clinical deterioration consistently across all health services.”

(Department for Health and Ageing, Government of South Australia 2013)
Development of the pre-flight assessment tool

> Caution:

- Maintain safety within clinicians own scope of practice
  - Always give an “out option” if unsure
- Evidenced based framework
- Collaborate and support external clinicians
- Reliance on clinician judgement
  - Clinical variance – scope of practice
  - Unsupported by evidence / data
Development of the pre-flight assessment tool

> Pick your patient goals:

- High quality patient centred care
- Patient stability
- Safe timely patient transfer
Development of the pre-flight assessment tool

> Identify thresholds for patient deterioration across all patient demographics
  • Adapt it to patients in a rural hospital with an EN/RN with or without rural doctors
    ▪ Identify an escalating “Response Criteria”
    ▪ Identify an “Actions/Interventions Required” to above criteria
    ▪ Ensure referral guidance is “advised” (inter-agency)
  • Adapt it to potential for medical back up to be >2 hours away to account for inflight deterioration
# Observation Chart < 1 year

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
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### Respiratory Rate

<table>
<thead>
<tr>
<th>Score</th>
<th>Date</th>
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### Respiratory distress

<table>
<thead>
<tr>
<th>Score</th>
<th>Date</th>
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### Oxygen (l/min)

<table>
<thead>
<tr>
<th>Score if on any</th>
<th>Date</th>
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### SaO₂

<table>
<thead>
<tr>
<th>Score</th>
<th>Date</th>
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### Temperature

<table>
<thead>
<tr>
<th>Score</th>
<th>Date</th>
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</table>

### Blood Pressure

<table>
<thead>
<tr>
<th>Score Systolic BP</th>
<th>Date</th>
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### Heart Rate

<table>
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<tr>
<th>Score</th>
<th>Date</th>
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</table>

### Capillary refill time

<table>
<thead>
<tr>
<th>Score</th>
<th>Date</th>
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</table>

### Conscious level

<table>
<thead>
<tr>
<th>Score</th>
<th>Date</th>
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</table>

## Observations

- A full CEWT score should be calculated on admission.
- Thereafter, do appropriate observations at a frequency appropriate for clinical state.
- A full CEWT score should be calculated if patient is deteriorating (1 score, clinical concern).
- Notes:
  - BP – only systolic blood pressure is used for CEWT score.
  - AVPU – if patient asleep and AVPU indicated, ensure patient awake before scoring.

### Actions

<table>
<thead>
<tr>
<th>CEWT Score</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 2</td>
<td>Full CEWT score. Appropriate interventions as prescribed.</td>
</tr>
<tr>
<td>3 - 4</td>
<td>Review by Ward Doctor. CEWT score after interventions.</td>
</tr>
<tr>
<td>5 - 6</td>
<td>Review by Registrar – response within 15 minutes. Registrar to ensure Consultant notified. Ward doctor also attends.</td>
</tr>
<tr>
<td>7 +</td>
<td>MET call. Registrar to attend. Ensure Consultant notified.</td>
</tr>
</tbody>
</table>

**Other concerns**

- "Clinical concern"
- Airway threat
- Apnoea
- Seizure
- Bleeding (major)

## Modifications

If observations are as expected for patients clinical condition, please note below accepted parameters for future calls.

<table>
<thead>
<tr>
<th>Acceptable parameters</th>
<th>HR</th>
<th>RR</th>
<th>BP</th>
<th>O₂ saturation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

### Doctor (print and signature)

<table>
<thead>
<tr>
<th>Date &amp; time</th>
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<tbody>
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</tbody>
</table>

### Interventions

1.  
2.  
3.  
4.  
5.  
6.  
7.  
8.  
9.  
10. 

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Why re-invent the wheel?

- Looked at “normal” MER criteria for patient groupings Australia wide
- Adopted the New Early Warning Score box layout but removed calculating scores (KISS principle)
- Created a box for each patient grouping already adopted in multiple Australian hospitals
  - 0-3 months
  - 3 months – 1 year
  - 1 year – 4 years
  - 5 – 12 years
  - Adult
  - Maternal
Modify the wheel: MedSTAR Flight Lights

> Observations –
  • Collate groups (include maternal)
  • Ensure of sensitivity of observations
    ▪ to allow early intervention

> Colour code
  • Visual warning of level of concern
  • Traffic Light colours – well known
## AGE: 0-3 months

<table>
<thead>
<tr>
<th>Measure</th>
<th>≤19</th>
<th>20-24</th>
<th>25-29</th>
<th>30-50</th>
<th>≤2 secs</th>
<th>≥2 secs</th>
<th>≤2 L/min</th>
<th>≥2 L/min</th>
<th>≤59</th>
<th>60s-80s</th>
<th>90s-100s</th>
<th>110-150s</th>
<th>160s</th>
<th>170s</th>
<th>≥180</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consciousness AVPU</td>
<td>A, V</td>
<td>V &lt;10sec awake</td>
<td>P, U</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respiratory Respiration</td>
<td>≤19</td>
<td>20-24</td>
<td>25-29</td>
<td>30-50</td>
<td>60s</td>
<td>70s</td>
<td>≥80</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resp distress SaO2</td>
<td>≤89</td>
<td>90-94</td>
<td>≥95</td>
<td>Normal</td>
<td>Mild</td>
<td>Moderate</td>
<td>Severe</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O2 Required Heart Rate</td>
<td>≤59</td>
<td>60s-80s</td>
<td>90s-100s</td>
<td>110-150s</td>
<td>160s</td>
<td>170s</td>
<td>≥180</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cap refill Temperature</td>
<td>≤33.5</td>
<td>33.5-35</td>
<td>35.1-35.5</td>
<td>35.6-38</td>
<td>38.1-38.5</td>
<td>38.6-39</td>
<td>≥39.1</td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

**Consciousness AVPU**
- A: Alert
- V: Verbal
- V <10sec: Responds to vocalization within 10 seconds
- P: Painful
- U: Unresponsive

**Resp distress SaO2**
- Normal
- Mild
- Moderate
- Severe

**O2 Required Heart Rate**
- ≤2 L/min
- ≥2 L/min

**Cap refill Temperature**
- ≤2 secs
- ≥2 secs
Modify the wheel:

> **Response Criteria** - adapted from various SA Health Medical Emergency Response observations charts
  
  • Allowing for “variance in NRC” concern to lead to Medical referral if unsure

> **Actions Required** - adapted from various SA Health Medical Emergency Response observations charts to allow NRCs
  
  • To be able to give supported advice/guidance to rural RNs
  
  • To be organisationally supported when requesting local Doctor review or escalation to MedSTAR Consultant
**Maternal Observations (20 weeks gestation – 6 weeks PP)**

<table>
<thead>
<tr>
<th>Consciousness AVPU</th>
<th>A, V</th>
<th>V &lt;10sec awake</th>
<th>P, U</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory</td>
<td>≤7</td>
<td>8-9</td>
<td>10-12</td>
</tr>
<tr>
<td>SaO2</td>
<td>≤91</td>
<td>92-94</td>
<td>95-96</td>
</tr>
<tr>
<td>O2 Required</td>
<td>≤4L/min</td>
<td>≥4L/min</td>
<td></td>
</tr>
<tr>
<td>Heart Rate</td>
<td>≤39</td>
<td>40s</td>
<td>50s</td>
</tr>
<tr>
<td>Systolic BP</td>
<td>≤80s</td>
<td>80s</td>
<td>90s</td>
</tr>
<tr>
<td>Diastolic BP</td>
<td>≤95</td>
<td>96-99</td>
<td>100s</td>
</tr>
<tr>
<td>Temperature</td>
<td>≤33.5</td>
<td>33.5-35</td>
<td>35-1-35.5</td>
</tr>
</tbody>
</table>

**MRC / RCP / RCN - Retrieval Consult**

- **Response Criteria**
  - Respiratory or cardiac arrest
  - Threatened airway
  - Significant bleeding
  - Any observations in a red zone
  - Unexpected or uncontrolled seizure
  - You are worried about the patient

- **Actions Required ASAP**
  - NRC to advise EN/RN/MO:
    - Commence basic/advanced life support
    - Advise hospital to call emergency call
    - Notify senior doctor responsible for patient immediately
  - Conference MRC/RCP/RCN and commence retrieval consult form

**Local Dr Review AGES 0-12**

- **Response Criteria**
  - Any observation in an orange zone
  - Poor peripheral circulation
  - Greater than expected fluid loss
  - New or unexplained behavioural change
  - Urine output <1ml/kg/hr over 4 hours or patient has not voided for over 12 hours
  - You are worried about the patient

- **Actions Required**
  - NRC to advise EN/RN:
    - Ensure local MO has just reviewed or reviews patient within 30 mins
    - Increase frequency of observations
  - If local doctor has/do not attended within 10 minutes escalate to RCP/RCN:
    - If RCP/RCN reviews pt - commence retrieval consult form

  * 3 or more observations in the orange zone, escalate to RCP/RCN

**Local Dr Review ADULT & MATERNAL**

- **Response Criteria**
  - Unrelieved chest pain
  - Any observations in an orange zone
  - Urine output <30ml/hr over 4 hours from patient with IDC or patient has not voided for over 12 hours
  - You are worried about the patient

- **Actions Required**
  - NRC to advise RN to:
    - Ensure local MO has just reviewed or reviews patient within 30 mins
    - Increase frequency of observations
  - If local doctor has/do not attended or doesn’t within 30 minutes escalate to:
    - MRC and commence retrieval consult form

  * 3 or more observations in the orange zone, escalate to MRC Retrieval consult

**NRC – RFDS Triage**

- **Response Criteria**
  - Any observations in a green zone
  - New or unexplained behavioural change
  - You are worried about the patient

- **Actions Required**
  - NRC must review the patient and give Nursing advice to:
    - Ensure RN reviews the patient
    - Increase frequency of observations
    - Manage:
      - anxiety,
      - pain and
      - review O2 requirements

  * 3 or more observations in the green zone, escalate to Local Dr Review

If long standing issue [NOT ACUTE] explains the abnormality NRC may use discretion regarding MO referral
Pre launch trial

> Spent time with RFDS observing IHT triaging
  - Criteria for referral was varied
  - Unable to establish if formal document existed

> Used the MedSTAR Flight Lights tool:
  - Observed RFDS IHT triaging (without influencing decision making)
  - Applied it to patients that were referred to MedSTAR in the past (historical data)
Outcomes of trial

> Supportive of the tool
  • MedSTAR Flight Lights cleared the majority of accepted IHT’s
  • Mildly oversensitive
    ▪ MedSTAR referral to an MO would have occurred earlier in some instances
      > Temp and O2 sensitive
      > Confused patient not accounted for (AVPU)
Outcomes of trial

> Risk increasing MedSTAR Consultant workload
  • Identified potential for Consultant concern

> Risk averse
  • Rather reduce sensitivity once tool has been in place and tested on a larger sample

> Safe as a reference tool
  • alongside assessment documentation
Launch – initial audit

> First Fortnight

- IHT patient assessments
  - 250 total
  - 18 per day
- 13 x MedSTAR Adult Consultant referrals
  - 2 x Retrieval activation
- 5 x MedSTAR Paediatric Consultant referrals
- 1 x MedSTAR Neonatal Consultant referrals
  - Neonatal retrieval activation from obstetric IHT request
Launch – initial audit

> Second fortnight
  • IHT patient pre-flight assessments
    ▪ 232 total
    ▪ 16 per day
  • 9 x MedSTAR Consultant referrals
    ▪ 0 x Retrieval activation
    ▪ 1 x Patient deterioration in-flight
  > MedSTAR Flight Lights (MFL) predicted
    – Referred to MedSTAR Consultant during pre-flight assessment and patient deemed suitable for priority IHT
Follow up audit – in progress

> 6 month data:
  - 2741 x IHTs clinically assessed
  - 238 (8%) x were referred to MedSTAR Consultants
    - Adult, paed & neo – not refined in data
    - Not always due to the MFL – not defined in data.
  - 24 (0.08%) x eventuated in retrieval
  - 3 (0.0007%) x deteriorations requiring retrieval
    - 2 related to movement delays (weather & demand)
    - 1 predicted by MFL and referred to Consultant
  - 1 x MFL identified a patient falling into red category
    - But no referral made.
    - NRC clinical discretion / judgement – no adverse event
For further refining and analysis

> Referrals to Consultants initially not separated out into sub categories:
  - MFL detection and response action versus
  - Priority transfer delays i.e. <1hr doors closed for urgent cath lab

> Patients proactively treated prior to transfer due to MFL were not captured
  - Deterioration avoided – unable to calculate this yet
Conclusion

> MedSTAR Flight Lights Tool
  • Developed by using various resources and collating them into one document for easy reference

> So far the data is encouraging but:
  • MedSTAR Flight Lights tool is still in its infancy
  • An area for ongoing research – ensure MFL is a predictor patient deterioration in pre-flight nursing assessments

> We now have a baseline to work with
Questions

> Thank you to:

> Deirdre Clarke – Director of Nursing
> Duncan Bamford – Ad.NMF

> The organisers of the ASA & FNA conference
> MedSTAR for the opportunity to attend and discuss this topic.

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