



MedSTAR Flight Lights –

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

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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)

- > Proposal document for a New Scoring System in International Air Transport (2001) – (IATS)
 - 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

- Score 0
- Score 3
- Score 1
- Call MERT
- Score 2

Ward:
Date:
Name:
D.O.B.

CEWT 1-2 Inform nurse in charge
CEWT 3-4 Inform ward doctor
CEWT 5-6 Inform Registrar
CEWT 7 Place MERT call (444)
See over for additional information

DATE																				
TIME																				

Respiratory Rate	> 50																				
	41-50																				
	40-50																				
	41-49																				
	30-40																				
	31-39																				
	20-30																				
	21-29																				
	10-20																				
	11-19																				
	< 10																				

Respiratory distress	Severe																			
	Moderate																			
	Mild																			

Oxygen (l/min)	> 5																			
(Score if on any)	1 - 5																			
	< 1																			

SaO ₂	> 94																			
	90 - 93																			
	85 - 89																			
	< 85																			

Temperature	> 40																			
	39																			
	38																			
	37																			
	36																			
	35																			

Blood Pressure Score Systolic BP	> 115																			
	110																			
	105																			
	100																			
	95																			
	90																			
	85																			
	80																			
	75																			
	70																			
	65																			
	60																			
	55																			
	50																			
	< 50																			

Heart Rate	> 190																			
	185																			
	180																			
	175																			
	170																			
	165																			
	160																			
	155																			
	150																			
	145																			
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	120																			
115																				
110																				
105																				
100																				
90																				
80																				
70																				
60																				
50																				
< 50																				

Capillary refill time	> 2 s																			
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Conscious level	Alert																			
	Verbal																			
	Pain																			
	Unresp																			

Interventions																				
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Total CEWT Score																				
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Children's Early Warning Tool (CEWT)

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 (↑ 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

CEWT Score	Action
1 - 2	Full CEWT score. Appropriate interventions as prescribed
3 - 4	Review by Ward Doctor. CEWT score after interventions
5 - 6	Review by Registrar – response within 15 minutes. Registrar to ensure Consultant notified. Ward doctor also attends
7 +	MET call. Registrar to attend. Ensure Consultant notified
Other concerns	MET call if any of the following: <ul style="list-style-type: none"> • "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

Acceptable parameters	HR	RR	BP	O ₂ saturation
Doctor (print and signature)				
Date & time				

Interventions

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

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

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



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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)

Consciousness AVPU				A, V	V <10sec awake		P, U
Respiratory	≤7	8-9	10-12	13-25	26-30	31-35	≥36
SaO2	≤91	92-94	95-96	≥97			
O2 Required				≤4L/min	≥4L/min		
Heart Rate	≤39	40s	50s	60-109s	110s	120-130s	≥140s
Systolic BP	≤80s	80s	90s	100-150s	160s	170s-180s	≥190s
Diastolic BP				≤95	96-99	100s	≥110
Temperature	≤33.5	33.5-35	35.1-35.5	35.6-38	38.1-38.5	38.6-39	≥39.1

MRC / RCP / RCN - Retrieval Consult

Response Criteria	Actions Required ASAP
<ul style="list-style-type: none"> Respiratory or cardiac arrest Threatened airway Significant bleeding Any observations in a red zone Unexpected or uncontrolled seizure You are worried about the patient 	<ul style="list-style-type: none"> NRC to advise EN/RN/MO: <ul style="list-style-type: none"> 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	Actions Required
<ul style="list-style-type: none"> 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 12 hours You are worried about the patient 	<ul style="list-style-type: none"> NRC to advise EN/RN: <ul style="list-style-type: none"> ensure local MO has just reviewed or reviews patient within 30 mins Increase frequency of observations If local doctor has/does not attended within 30 minutes escalate to RCP/RCN <ul style="list-style-type: none"> 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	Actions Required
<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> NRC to advise RN to: <ul style="list-style-type: none"> ensure local MO has just reviewed or reviews patient within 30 mins Increase frequency of observations If local doctor has/does not attended or doesn't within 30 minutes escalate to: <ul style="list-style-type: none"> MRC and commence retrieval consult form

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

NRC – RFDS Triage

Response Criteria	Actions Required
<ul style="list-style-type: none"> Any observations in a green zone New or unexplained behavioural change You are worried about the patient 	<ul style="list-style-type: none"> NRC must review the patient and give Nursing advice to: <ul style="list-style-type: none"> Ensure RN reviews the patient Increase frequency of observations Manage: <ul style="list-style-type: none"> 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


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- > MedSTAR for the opportunity to attend and discuss this topic.



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