Strategic Planning and Septic Shock:

What Code blues and Cardiac arrest can't tell you about your MET

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Approaches to Planning

Contextual	Proactive, focus on values, mission, organizational culture, themes and visions
Long-range	Responsive, works within mission/directive, focus on specific goals, objectives
Strategic	Adaptive, focus on program and resource allocation, review and improvement

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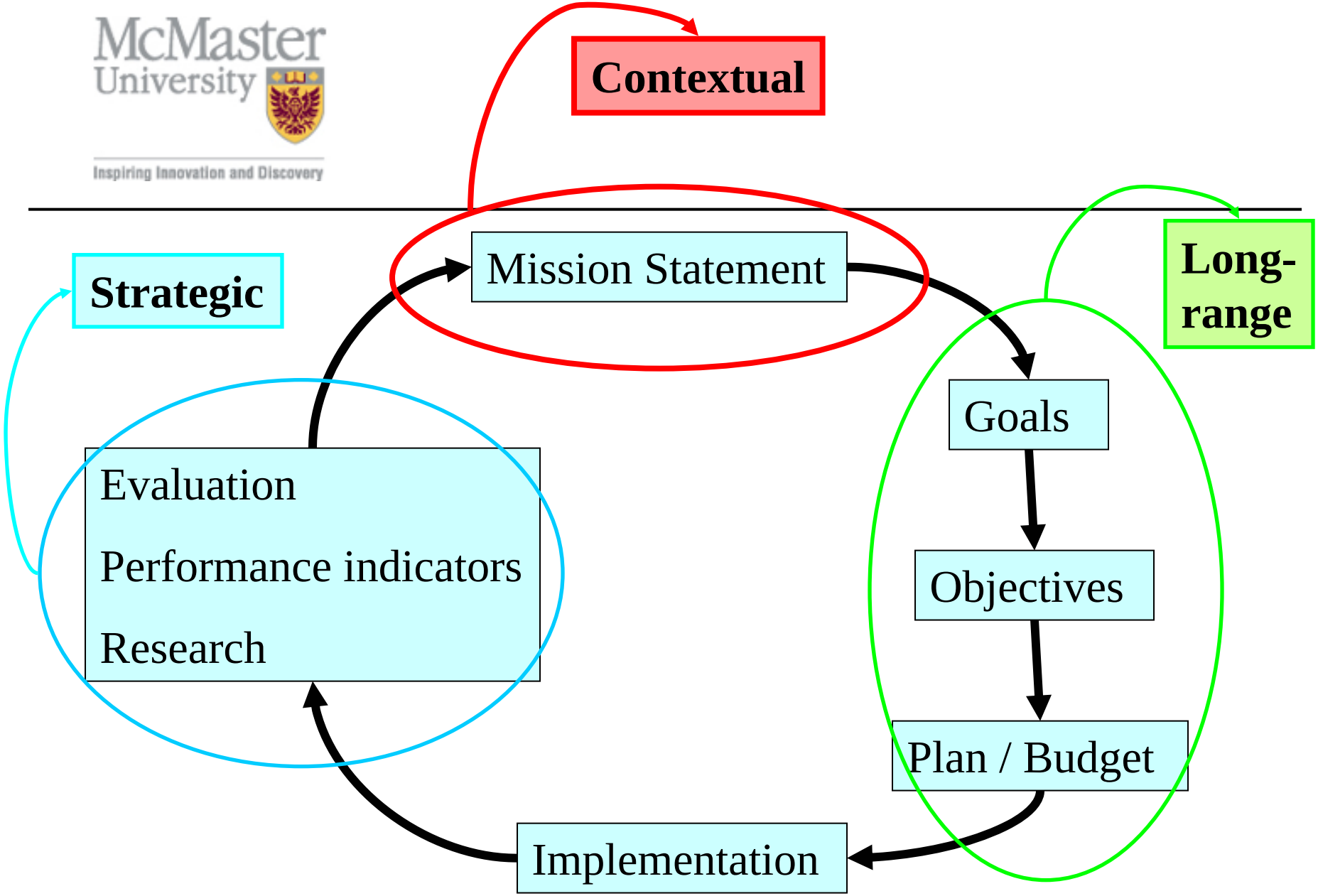
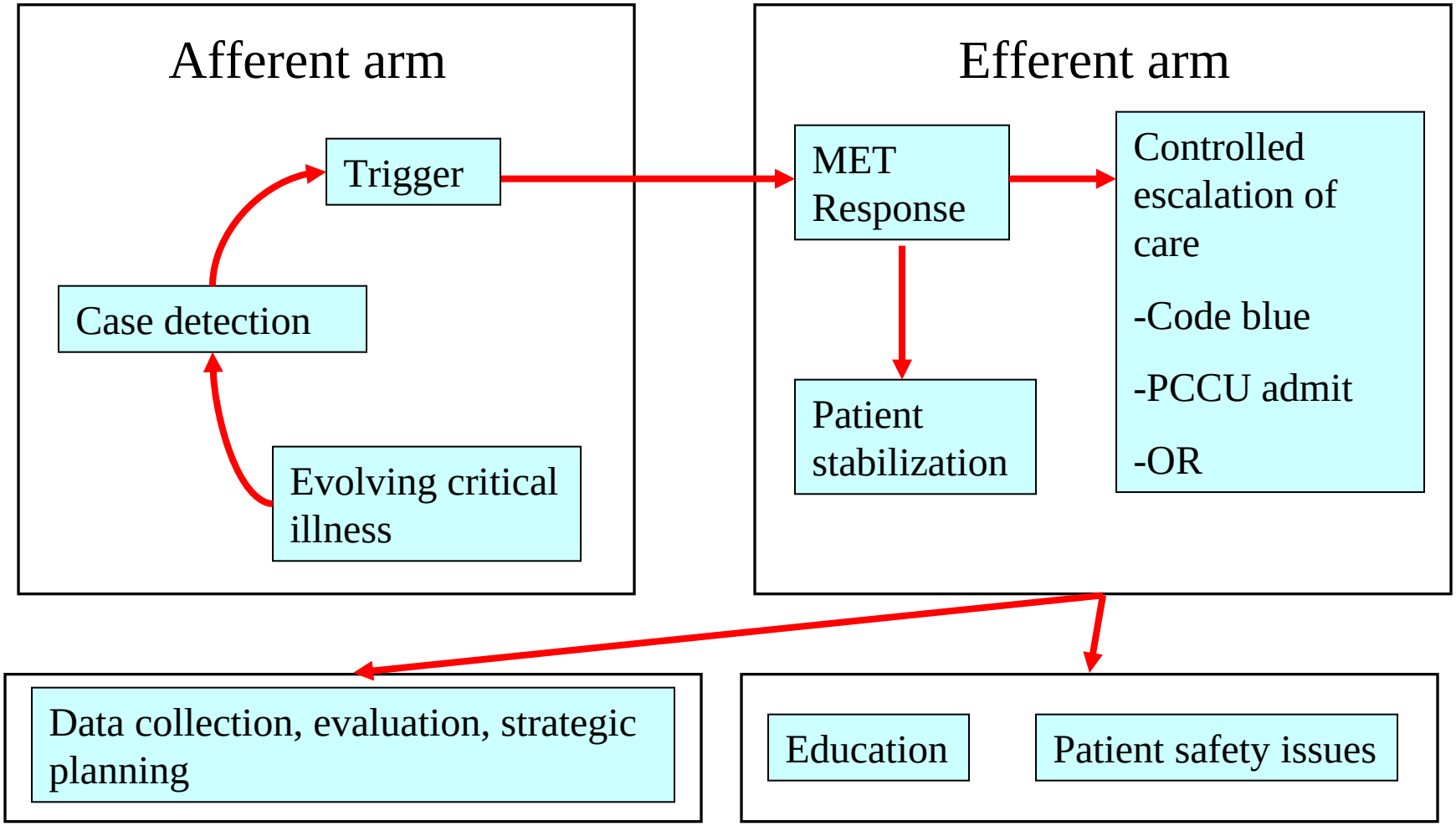


Rapid Response Structure

* Adapted from Baldisseri, 2006 MET conference proceedings



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Processes that influence strategy

1) Individual cognitive processes
   - A project lead's understanding of particular issues
2) Social and organizational processes
   - Existing policies and procedures, labour issues, staff turnover, job satisfaction
3) Political processes that may shift power to influence purpose and resources
   - Funding

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PMET: Closing the loop

- Have we met our goals and objectives?
- Are the results consistent with our mission?
- Are their new processes at work that require adaptation of our current strategy?
- Can we do better even in the face of success?
- How can future resource needs be prioritized?

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PMET Performance Indicators

- Current currency of success for a MET
  - Decreased mortality rates
  - Decreased codes
  - Decreased cardiac arrests
- Indicators of global team functioning
- Difficult to attribute benefit to a specific area of the RRS structure
- Difficult to monitor in real time

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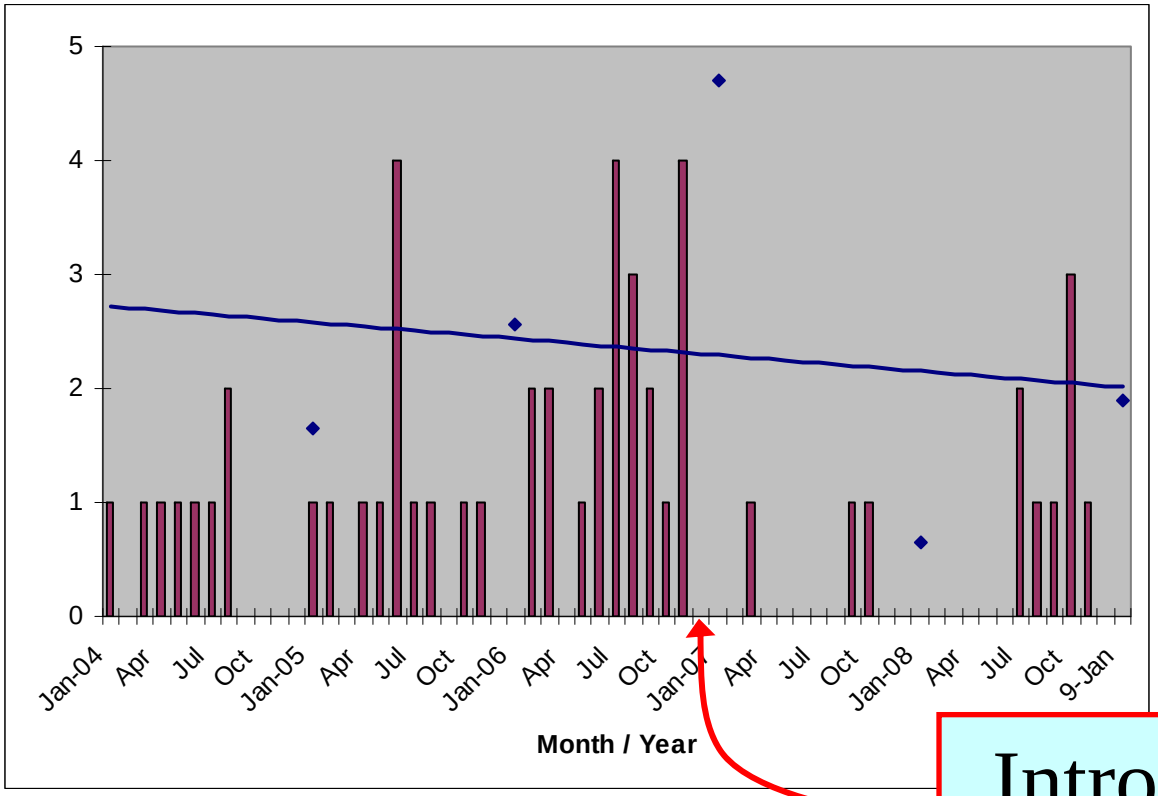
Code Blue Activations at McMaster Children's Hospital



Introduction of PMET

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PCCU Mortality

	2 Years Retrospective Data Pre-PACE Implementation Nov. 1, 2004 to Nov 5, 2006 inclusive	Full PACE coverage Jan. 29, 2007 to Jan 29, 2009 inclusive	All Patients
Raw # of Admissions to PCCU (from anywhere for any reason)	924	1094	**2018**
# Emergent Admissions to the PCCU from the PACE Zone	195	163	**358**
% = # of Emergent Admissions to the PCCU from PACE Zone / Total # of PCCU Admissions	21.1%	14.9%	**17.7%**
Average Length of Stay (of Emergent Admissions to the PCCU from the PACE Zone)	5.9	7.4	**6.6**
Average PRISM Score (of Emergent Admissions to the PCCU from the PACE Zone)	6.3	4.6	**5.5**
Average Vent Days per Patient (of Emergent Admissions to the PCCU from the PACE Zone)	3.9	3.9	**3.9**
# of Patients Readmited to PCCU within 2 days	20	20	**40**
Deaths in the PCCU (of Emergent Admissions to the PCCU from the PACE Zone)	12	7	**19**
% Death Rate (of Emergent Admissions to the PCCU from the PACE Zone)	6.2%	4.3%	**5.3%**

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Questions

- How to differentiate and evaluate afferent and efferent effects of the team?
- Can we measure if the team is improving the quality of health care delivery in an objective way?

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What to target?

	Disease Present <= 1 week	%	Disease Present > 1 week	%
Airway	162	7.8%	120	6.3%
Respiratory	403	19.3%	301	15.9%
Cardiac	102	4.9%	142	7.5%
Renal	13	0.6%	51	2.7%
Neurologic	209	10.0%	396	20.9%
Haem / Onc / BMT	57	2.7%	376	19.8%
Endocrine	32	1.5%	57	3.0%
Gastrointestinal	64	3.1%	221	11.7%
Trauma	67	3.2%	7	0.4%
Sepsis / Infection	508	24.3%	143	7.5%
Rheum / Immunol	4	0.2%	23	1.2%
Post-Surgery	466	22.3%	59	3.1%
Summary Total	2087	100.0%	1896	100.0%

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Adherence to best practice guidelines for septic shock

- Well known, international guidelines for septic shock
- High mortality if untreated
- Significantly improved survival associated with adherence to best practice guidelines
- 25 % of patients triggering PMET for sepsis /infection
- Can assess response times as well as therapeutic endpoints

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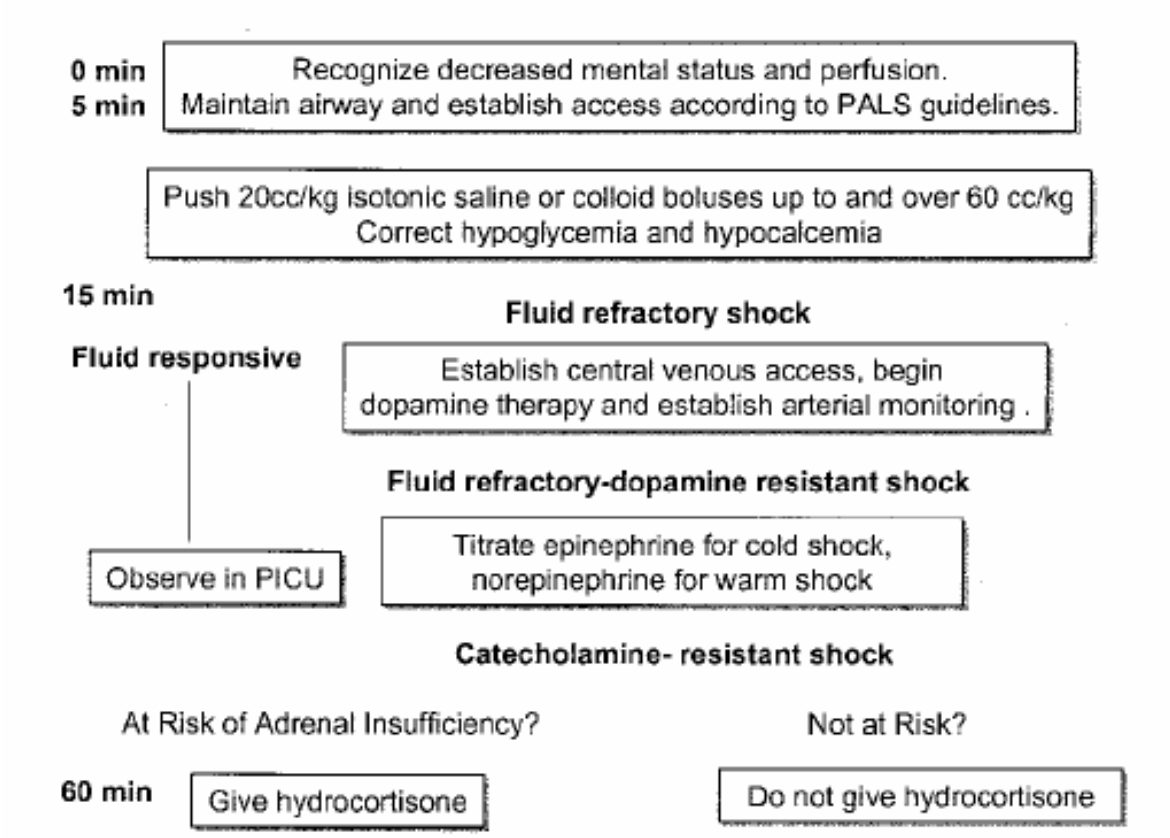
Clinical practice parameters for hemodynamic support of pediatric and neonatal patients in septic shock*

Joseph A. Carcillo, MD; Alan I. Fields, MD; Task Force Committee Members

Crit Care Med 2002 Vol. 30, No. 6



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International pediatric sepsis consensus conference: Definitions for sepsis and organ dysfunction in pediatrics*

Brahm Goldstein, MD; Brett Giroir, MD; Adrienne Randolph, MD; and the Members of the International Consensus Conference on Pediatric Sepsis

Pediatr Crit Care Med 2005 Vol. 6, No. 1

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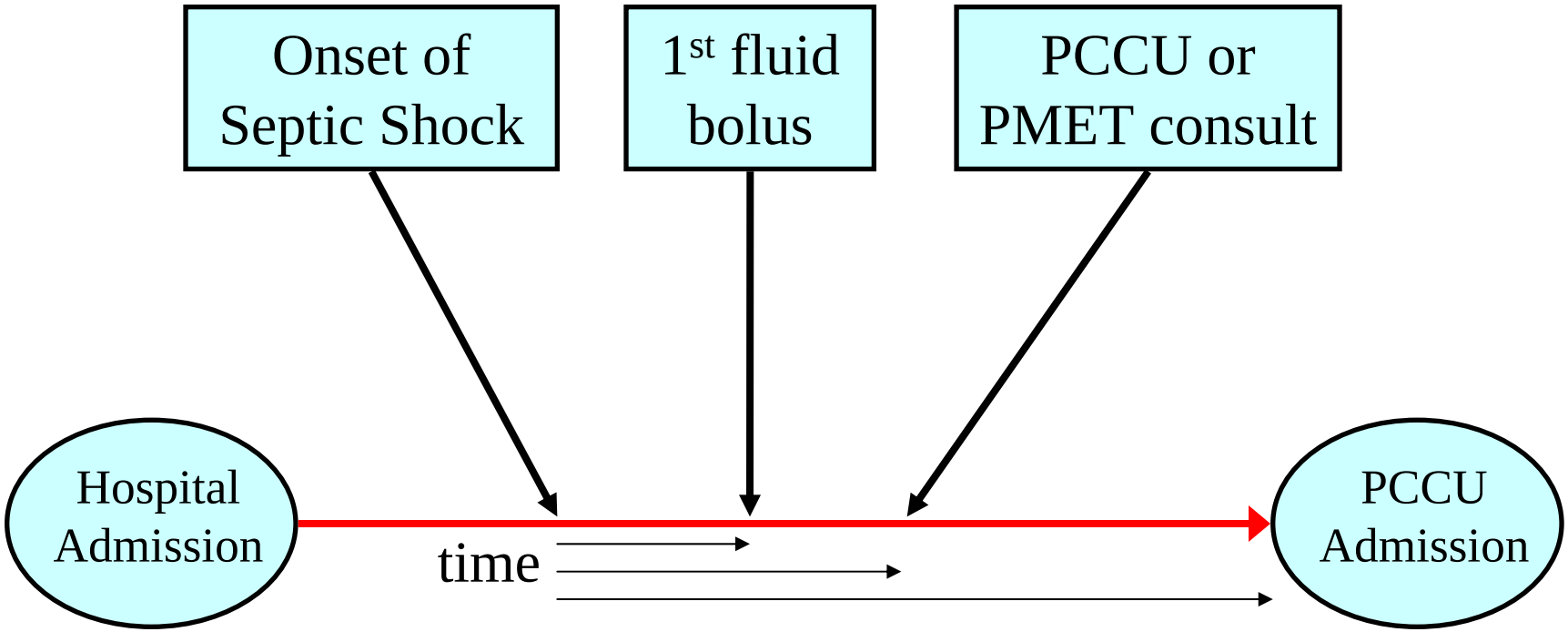

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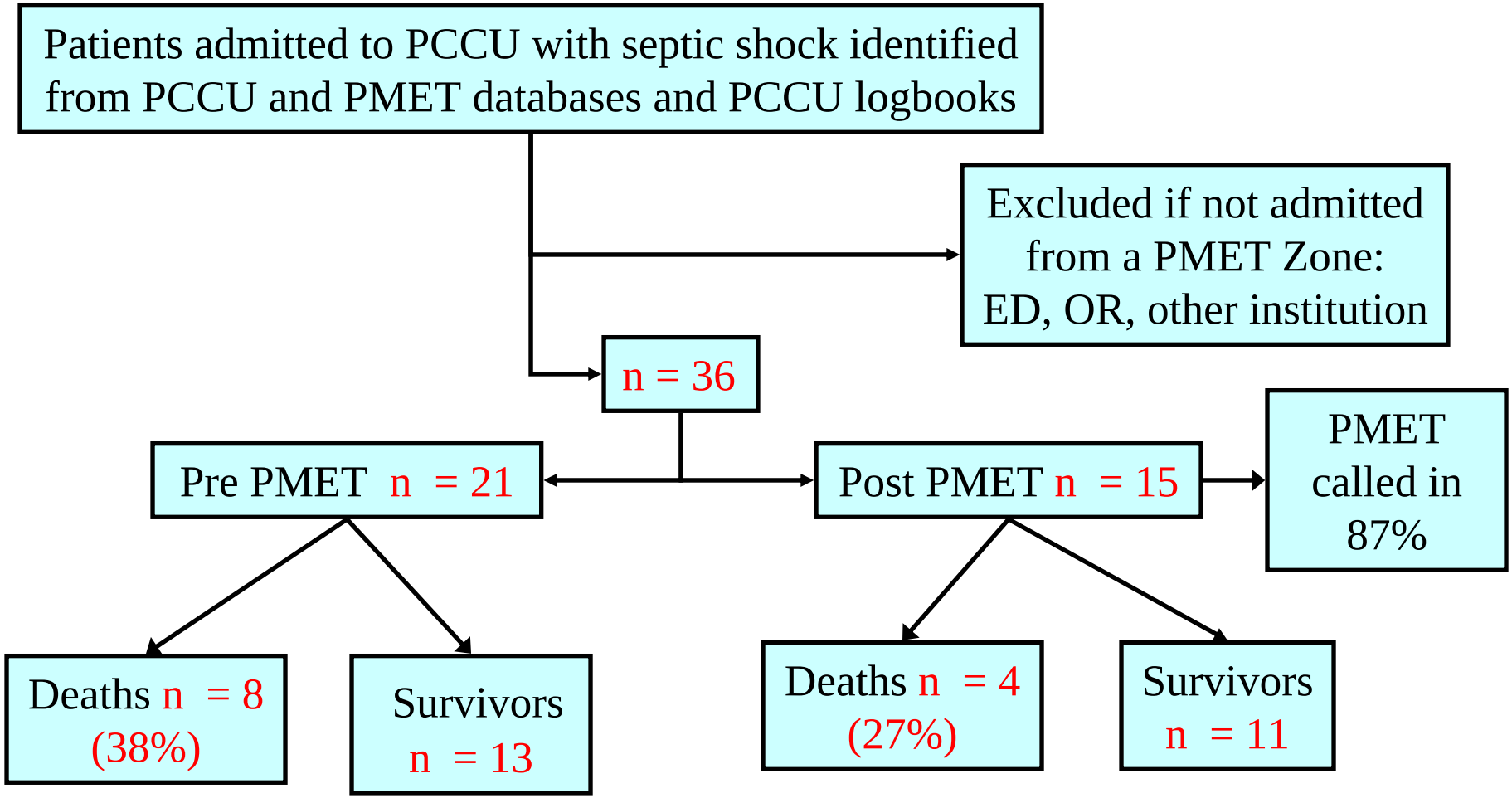
Results



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Onset of shock to PMET / PCCU consult

	Pre- PMET	Post-PMET
Total		
• Mean (SD)	11.0 (-7.1 – 29.1)	9.7 (-10.4 – 29.8)
• Median (IQR)	3.6 (2.0 – 8.0)	1.6 (0.0 – 9.6)
Survivors		
• Median (IQR)	2.4 (1.7 – 4.3)	3.6 (0.4 – 9.9)
Deaths		
• Median (IQR)	23.6 (4.9 – 30.7)	-0.1 (-0.2 – 2.6)
	*p = 0.009	NS

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Onset of shock to first fluid bolus

	Pre- PMET	Post-PMET
Total • Mean (SD) • Median (IQR)	8.5 (-7.5 – 24.5) 2.5 (0.6 – 5.1)	5.5 (-11.1 – 22.1) 0.0 (-0.7 – 2.8)
Survivors • Median (IQR)	1.9 (0.3 – 2.9)	0.0 (-1.0 – 0.5)
Deaths • Median (IQR)	13.6 (1.8 – 28.7)	4.1 (0.0 – 9.2)
	*p = 0.026	NS

Volume of fluid within 1 hour of shock diagnosis

	Pre- PMET	Post-PMET
Total • Mean (SD) • Median (IQR)	18.7 (8.8 – 28.6) 19.3 (11.1 – 21.9)	26.9 (5.9 – 47.9) 21.0 (20.0 – 35.8)
Survivors • Median (IQR)	19.7 (15.4 – 21.1)	21.0 (20.0- 40.0)
Deaths • Median (IQR)	14.0 (11.1 – 21.9)	22.5 (17.5 – 26.6)
	NS	NS

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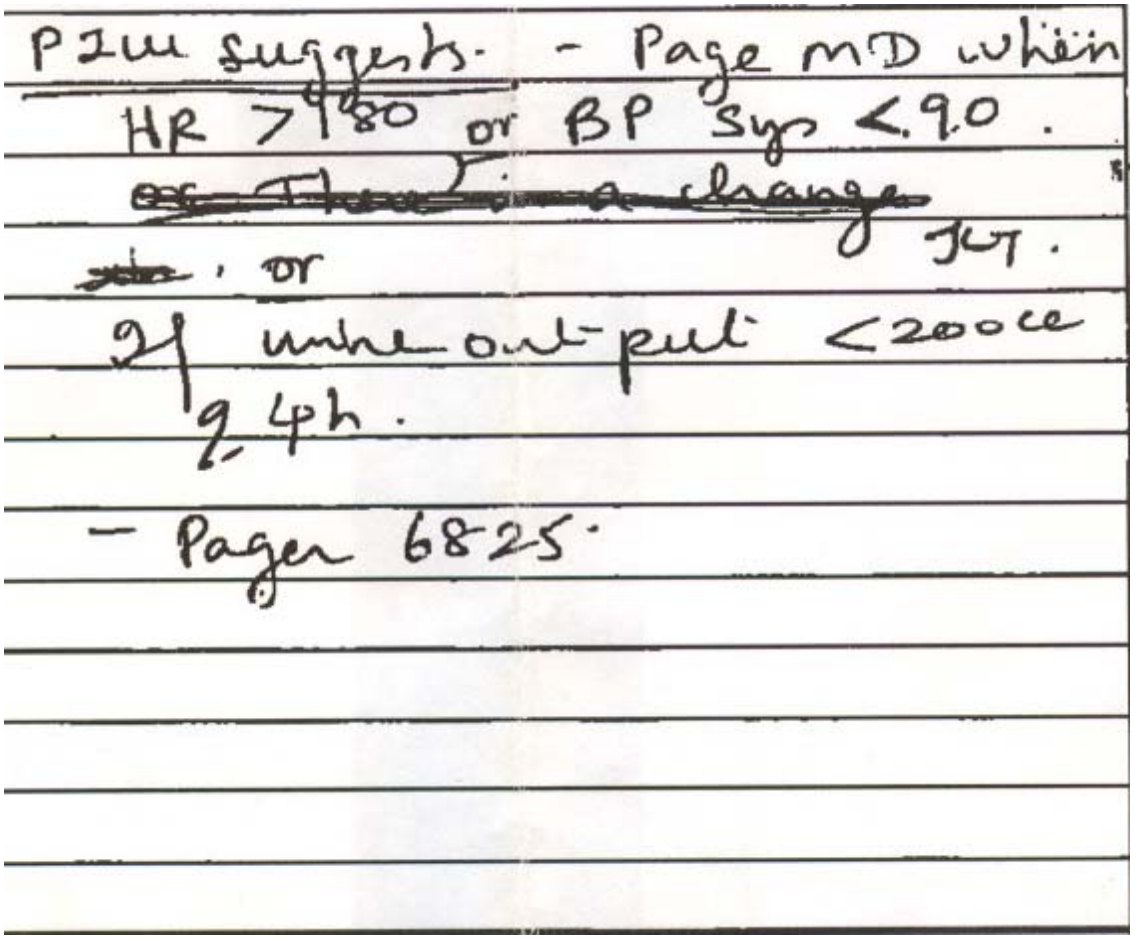
Conclusions

- Improved response times between survivors and non-survivors of septic shock suggests institutional culture change and acceptance of PMET

- Patients admitted to PCCU for septic shock still under-resuscitated: why?

Consider these activation criteria: 11 year-old


PIM suggests. - Page MD when
HR > 180 or BP Sys < 90.
~~or There is a change~~ JET.
~~also~~, or
2/ urine output < 200cc
q 4h.
- Pager 6825.

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PMET Activation Criteria

*Adapted from Tibballs, et al. Arch Dis. Child. 2005:90; 1148-1152

If you are worried about the patient's clinical state or if any of the following criteria are present

Airway

Threatened or obstructive symptoms: stridor, excessive secretions

Breathing

Severe respiratory distress, apnea, tachypnea or cyanosis

Age	Respiratory rate/min	Hypoxemia
Term – 3 months	> 60	SaO2 < 90% in >40% FiO2
4-12 months	> 50	
1-4 years	> 40	SaO2 < 60% in > 40% FiO2 (cyanotic heart disease)
5-12 years	> 30	
12 years +	> 30	

Circulation

Age	Bradycardia (beats/min)	Tachycardia (beats/min)	BP (systolic mmHg)
Term – 3 months	< 100	> 180	< 50
4-12 months	< 100	> 180	< 60
1-4 years	< 90	> 160	< 70
5-12 years	< 80	> 140	< 80
12 years +	< 60	> 130	< 90

Neurologic State

Acute change in neurologic status or convulsion

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PMET trigger Vs.Goldstein, et al: 11 year old

PMET Criteria (Tibballs, et al)	
HR	> 140
SBP	< 80
Goldstein	
HR	> 130
SBP	< 105

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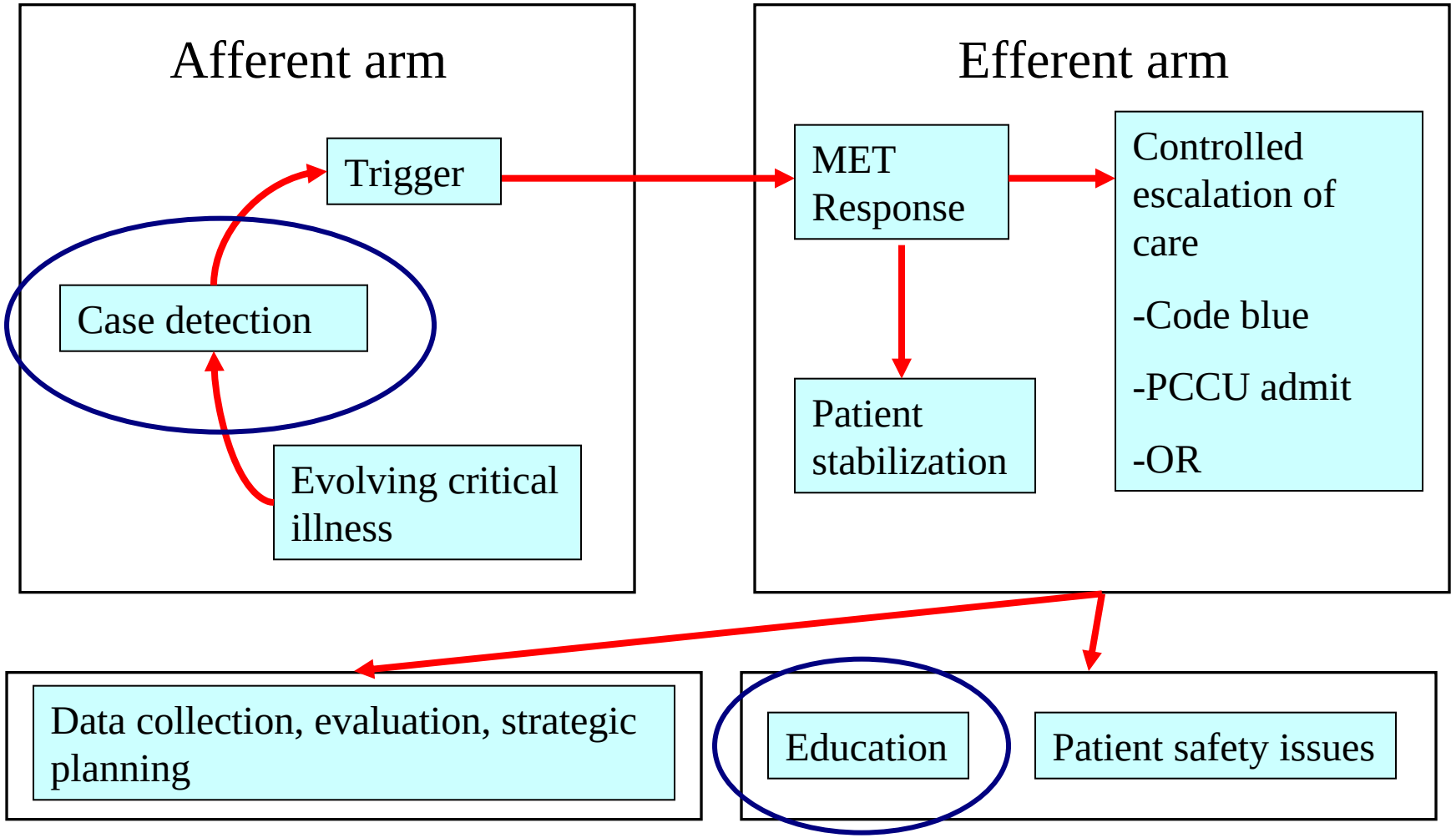
Back to the mission

- PMET designed to prevent code blue and cardiac arrest not for *early* detection of evolving illness
- Patients may have very abnormal vital signs without meeting activation criteria thresholds

Where to invest future resources?



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Discussion

- High thresholds for PMET activation require frontline staff to recognize septic shock and need for early aggressive fluid resuscitation and initiation of antibiotics
- Increase focus on afferent case detection, knowledge translation of best practice guidelines and importance of early and aggressive therapy for septic shock

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Intervention

- Multidisciplinary PMET rounds
  - Brown-bag noon-hour sessions for frontline staff
- Development of an intranet website to post presentations and guidelines for access by educators and staff working off hours
- Review of afferent triggers: PEWS?

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Thank you

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