Prospective Audit of Sepsis Management in patients admitted to Waikato Hospital ICU/HDU with Sepsis

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ANZICS

Sepsis

Life-threatening organ dysfunction

caused by a dysregulated host response to infection.

Why think about sepsis??

659 admissions to Waikato hospital with sepsis in period ranging July 2017 to June 2018.

Each year 15,000 patients in Australia and New Zealand are admitted to intensive care with sepsis (1).

There is no gold standard diagnostic test for sepsis and at present it is best recognised by a **constellation of clinical signs and symptoms** in a patient with suspected infection

Early recognition, Early intervention, Improved outcomes!

"If you don't think about it, you'll miss it!"

He paatai, he sepsis teenei?

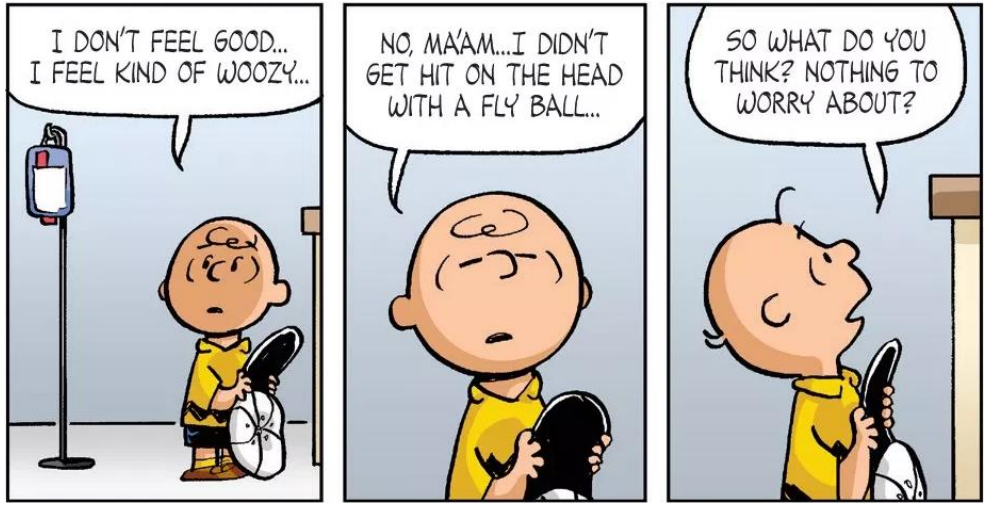
People with suspected sepsis are assessed using a structured set of observations to stratify risk of severe illness or death.

Sepsis Trust NZ

RED FLAG SEPSIS

AMBER FLAG SEPSIS

LOW RISK SEPSIS



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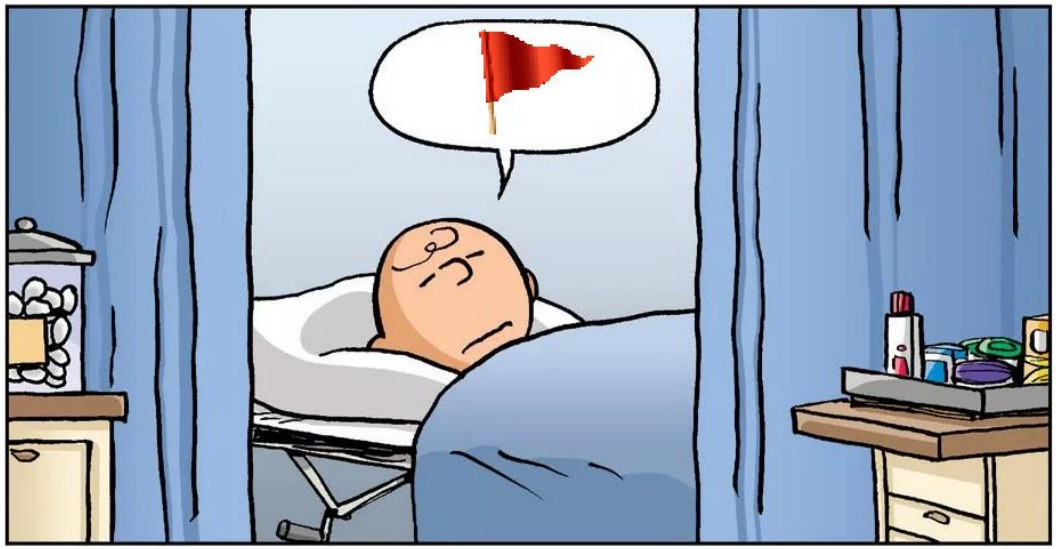

Red Flag criteria;

- Responds only to voice or pain/ unresponsive
- Systolic B.P ≤ 90 mmHg (or drop >40 from normal)
- Heart rate > 130 per minute
- Respiratory rate ≥ 25 per minute
- Needs oxygen to keep SpO^2 ≥92%
- Non-blanching rash, mottled/ ashen/ cyanotic
- Not passed urine in last 18 hours
- Urine output less than 0.5 ml/kg/hr
- Lactate ≥2 mmol/l
- Recent chemotherapy

Amber Flag criteria;

- Relatives concerned about mental status
- Acute deterioration in functional ability
- Immunosuppressed
- Trauma/surgery/procedure in last 6 weeks
- Respiratory Rate 21-24 or breathing hard
- Heart Rate 91-130 or new arrhythmia
- Systolic BP 91-100mmHg
- Not passed urine in last 12-18 hours
- Temperature <36°C
- Clinical signs of wound, device or skin infection

Sepsis Trust NZ

Adult Sepsis Screening and Action Tool

To be applied to all non-pregnant adults and children over 15 years with fever (or recent fever) symptoms, or who are clearly unwell with any abnormal observations

Patient Label or patient details

Name:

NHI: DOB: dd/mm/yy

Address:

Staff member completing form:

Date (DD/MM/YY): Name (print):

Designation: Signature:

Important:

Is a Last Day of Life Care Plan in place? Yes ☐ Is escalation clinically inappropriate? No ☐ Initials ☐ Discontinue pathway

1. EWS 3 or above?

AND/OR does patient look sick?

NO → Low risk of sepsis. Use standard protocols, review if deteriorates.

YES ↓

2. Could this be an infection?

	Tick
Yes, but source unclear at present	☐
Pneumonia	☐
Urinary Tract Infection	☐
Abdominal pain or distension	☐
Cellulitis/ septic arthritis/ infected wound	☐
Device-related infection	☐
Meningitis	☐
Other (specify):	

NO → **4. Any Amber Flag criteria?**

	Tick
Relatives concerned about mental status	☐
Acute deterioration in functional ability	☐
Immunosuppressed	☐
Trauma/surgery/procedure in last 6 weeks	☐
Respiratory Rate 21-24 or breathing hard	☐
Heart Rate 91-130 or new arrhythmia	☐
Systolic BP 91-100mmHg	☐
Not passed urine in last 12-18 hours	☐
Temperature <36°C	☐
Clinical signs of wound, device or skin infection	☐

YES ↓

3. Is ONE Red Flag present?

	Tick
Responds only to voice or pain/ unresponsive	☐
Systolic B.P ≤ 90 mmHg (or drop >40 from normal)	☐
Heart rate > 130 per minute	☐
Respiratory rate ≥ 25 per minute	☐
Needs oxygen to keep SpO^2 ≥92%	☐
Non-blanching rash, mottled/ ashen/ cyanotic	☐
Not passed urine in last 18 hours	☐
Urine output less than 0.5 ml/kg/hr	☐
Lactate ≥2 mmol/l	☐
Recent chemotherapy	☐

NO → **Discuss with senior clinician, decide either:**

	Time complete	Initials
Start Sepsis Six pathway (see page 2)		
Take bloods and review within 1 hour (FBC, U&E, CRP, LFT, coag, VBG lactate)		
Hold off bloods and review within 1hr		

Clinical deterioration or AKI or lactate >2

YES ☐ NO ☐

	Time complete	Initials
Clinician to make antimicrobial prescribing decision within 3h		

YES ↓

Red Flag Sepsis!! Start Sepsis Six pathway NOW (see page 2)

This is time critical, immediate action is required.

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Patient Label or patient details

Name:

NHI: DOB: dd/mm/yy

Address:

Make a treatment escalation plan and decide on CPR status
Inform consultant *(use SBARR)* patient has Red Flag Sepsis

Time zero	Consultant informed? (Tick)	Initials
	☐	

Action (complete ALL within 1 hour) — Reason not done/variance

1. Administer oxygen

Aim to keep saturations >94%

(88-92% if at risk of CO_2 retention e.g. COPD)

Time complete: Initials:

2. Take blood cultures

At least a peripheral set. Consider e.g. CSF, urine, sputum

Think source control! Call surgeon/radiologist if needed

Time complete: Initials:

3. Give IV antibiotics

Refer to hospital guideline

Consider allergies prior to administration

Time complete: Initials:

4. Give IV fluids

If hypotensive/lactate >2mmol/l, 500ml stat

Repeat if clinically indicated – do not exceed 30ml/kg

Time complete: Initials:

5. Check serial lactates

Repeat VBG lactate after fluid bolus completed. Send ABG lactate only if arterial line in situ

If lactate >4mmol/l, call Critical Care and recheck VBG after each 10ml/kg IV fluid challenge

Time complete: Initials:

Not applicable – initial lactate ☐

6. Measure urine output

May require urinary catheter

Ensure fluid balance chart commenced and completed hourly

Time complete: Initials:

After delivering the Sepsis Six, does patient still have any of the following?

- systolic B.P <90 mmHg
- reduced level of consciousness despite resuscitation
- respiratory rate over 25 breaths per minute
- lactate not reducing or >2mmol/l

If escalation remains clinically appropriate.
Consider vasopressor support and call **ICU IMMEDIATELY**

Study Objectives

1. To assess whether patients received key recommended interventions for detection/treatment of sepsis.
2. To assess whether these interventions occurred in the directed timeframe from “Time-Zero.”
3. To evaluate if there is a measurable improvement in sepsis bundle compliance over time with continued feedback to caregivers.

Methods

A convenience sample of non-pregnant adult patients (≥ 15 years) admitted to the ICU or HDU in Waikato hospital with a primary diagnosis of sepsis were included in the study.

Sepsis was screened for based on the presence of red flag or amber flag criteria and diagnosed based on clinical assessment and investigation.

Eligibility Criteria

Inclusion Criteria	Exclusion Criteria
Age ≥ 15 years	Age < 15 years
Primary diagnosis of sepsis on admission to ICU or HDU	Alternative dx more likely than sepsis in the first 24 hours after T0
	Pregnant
	Multi-factorial presentation where the cause of the patient's condition is unclear/ sepsis is not the most likely underlying cause
	Patient not admitted to ICU or HDU

Methods

The pre ICU/HDU care received by patients was audited against recommended local guidelines.

We assessed whether patients had received key recommended interventions (**Sepsis 5***) and whether these interventions had been administered in the directed timeframe from time zero (T0).

T0 = Time at which patient recorded a single red flag criteria or ≥2 Amber flag criteria.

Each case then had an individualised report formulated which was fed back to caregivers involved (Nursing staff, RMOs, SMOs) in that patients care.

Data was logged and recorded on a google document spreadsheet.

Variables Assessed

- Mode of presentation
- Source of sepsis
- Time to blood cultures
- Time to lactate sampling
- Time to IV antibiotic administration
- Oxygen administration
- Adequate fluid resuscitation
- Time to first medical review
- Time to first SMO review
- Appropriate ICU referral.

Sepsis Clinical Findings (Red Flag)	Systolic BP </=90 or >40mmHg drop from normal, Respiratory rate >/= 25, Lactate >/=2 mmol/L, Recent chemotherapy
Sepsis Clinical Findings (Amber Flag)	
Primary Team at Time Zero	Emergency Medicine
Date	
Location	ED Waikato
EWS recorded and escalated per protocol?	Yes
Seen by doctor within 30 mins T0?	No
Time to 1st medical review (mins)	50
Time to 1st SMO review (hrs)	50
Blood cultures taken <1hr?	Yes
Antibiotics given <1hr?	Yes
Antibiotics given per MicroGuide?	Yes
Oxygen (if needed) <1hr?	Yes
Fluid bolus (if needed) <1hr?	Yes
Lactate <1hr?	Yes
Escalation to ICU (if needed) <6hr?	Yes
Discharge desination (if in ED or general ward at time of T0)	HDU

Results

Over the 3 months of the initial audit process:

70 cases of suspected sepsis requiring admission to ICU or HDU in Waikato Hospital have been audited.

4 cases were subsequently excluded due to more likely alternative diagnosis/duplication.

Feedback therefore provided for 66 cases to date.

Excluded Cases

1. Non-sepsis diagnosis. Excluded as alternative diagnosis more likely than sepsis. Multi-factorial mortality, suspected mesenteric ischaemia
2. Non-sepsis diagnosis. Initially managed as sepsis. Subsequent diagnosis of DRESS syndrome secondary to TB meds.
3. Non-sepsis diagnosis. Subsequently diagnosed as paclitaxel induced pneumonitis
4. Duplicate

Results

Mean patient age was 60.5 years (Median 62.5).

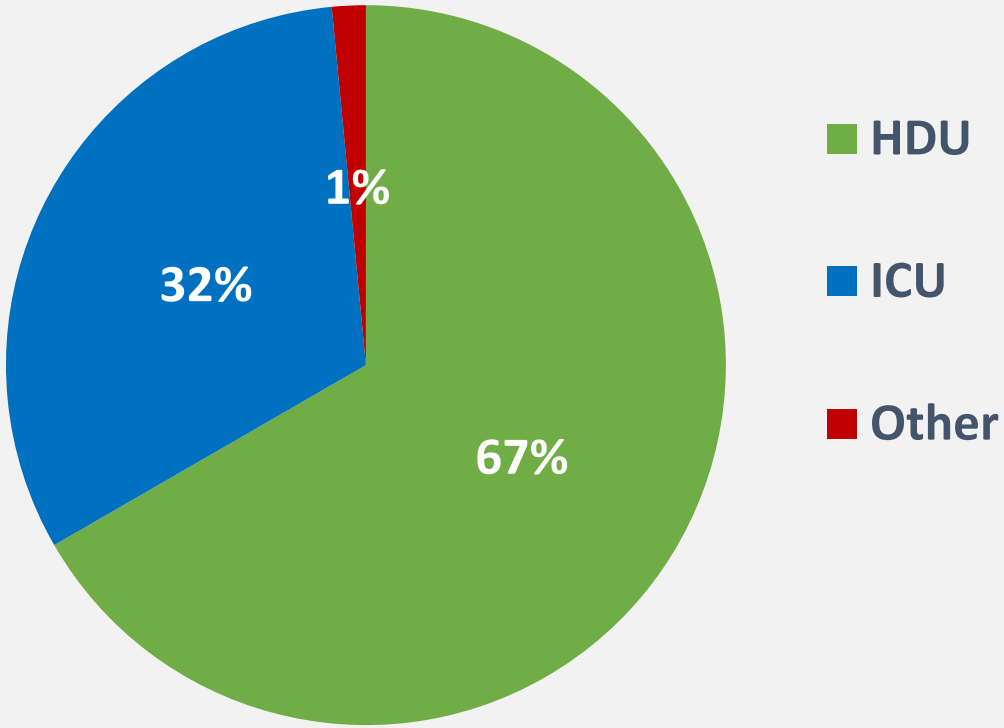
Source of sepsis:

1. **Respiratory tract (50%)**
2. **Soft tissue (15.2%)**
3. **Urinary tract (13.6%)**
4. **Abdominal (10.6%)**
5. **Other source (10.6%)**

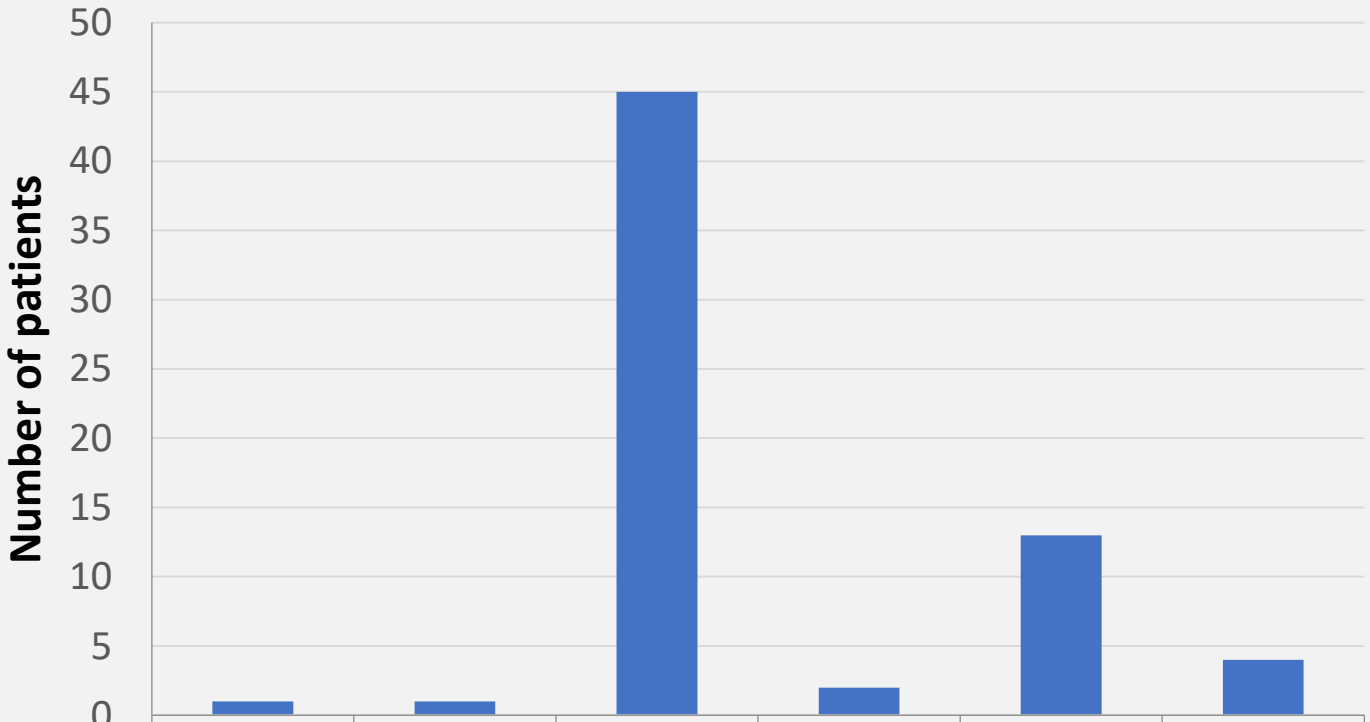
Mode of Presentation

- **57.6% patients BIBA**
- **27.3% self presented**
- **9.1% GP referral**
- **6% Transfer from other hospital**

Patient location at time of data collection



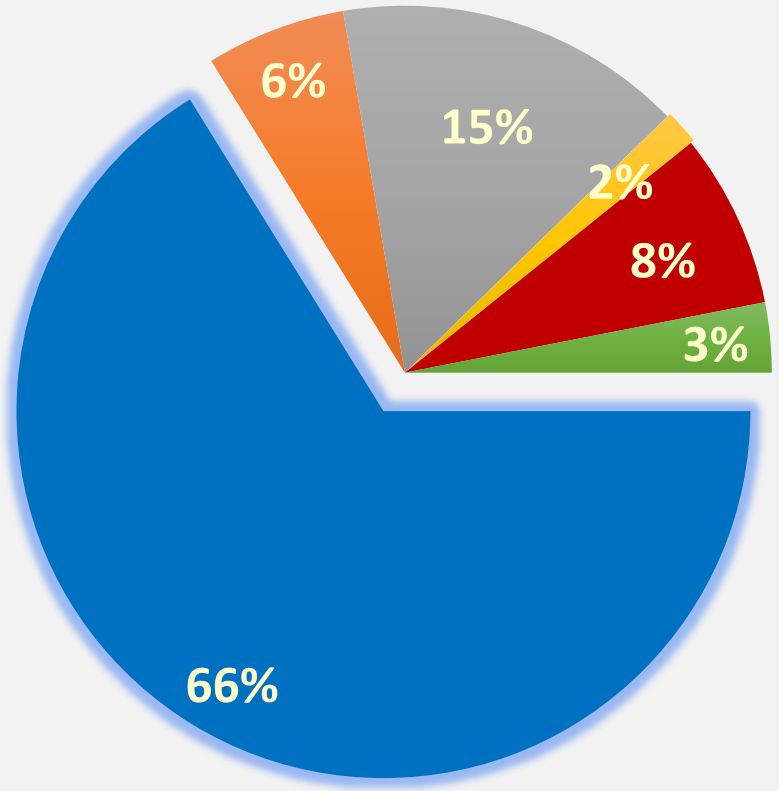
Location of patients at T0



	ED Taumaranui	ED Thames	ED Waikato	Other	Ward	With ambulance
Total	1	1	45	2	13	4

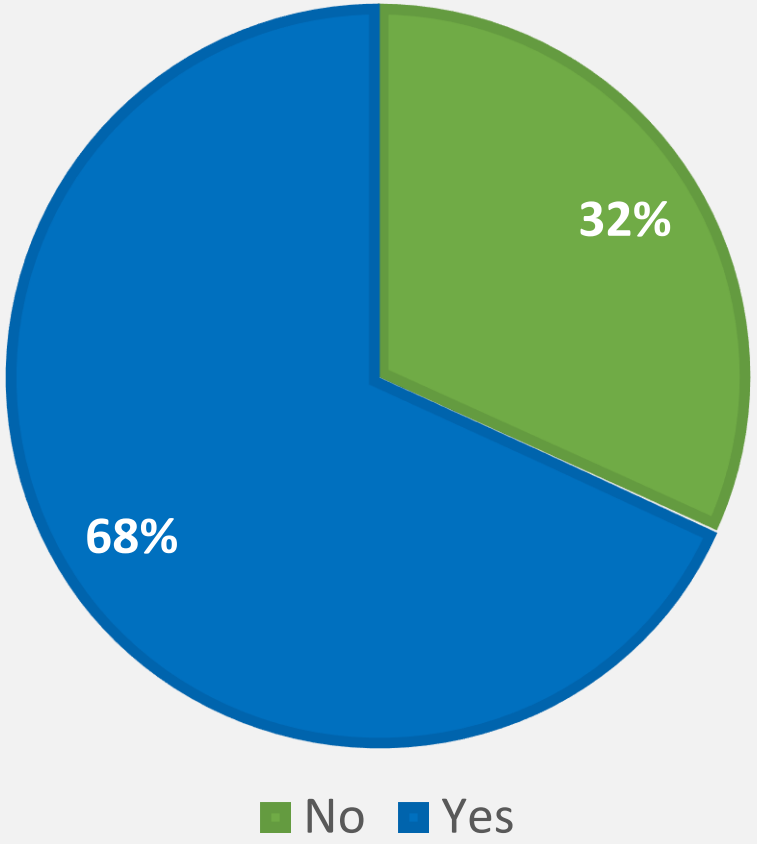
Clinical Team at T0

n = 66

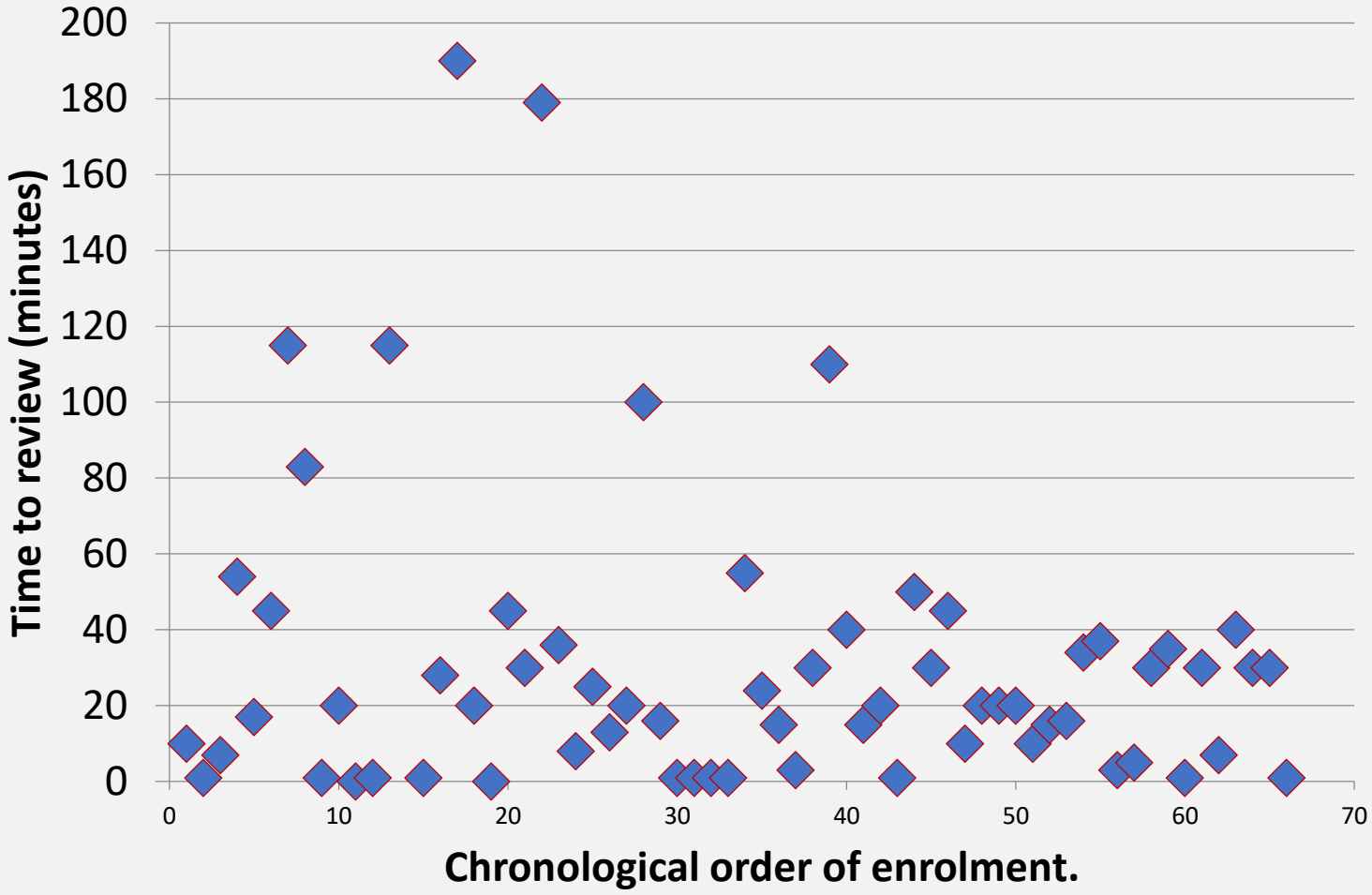


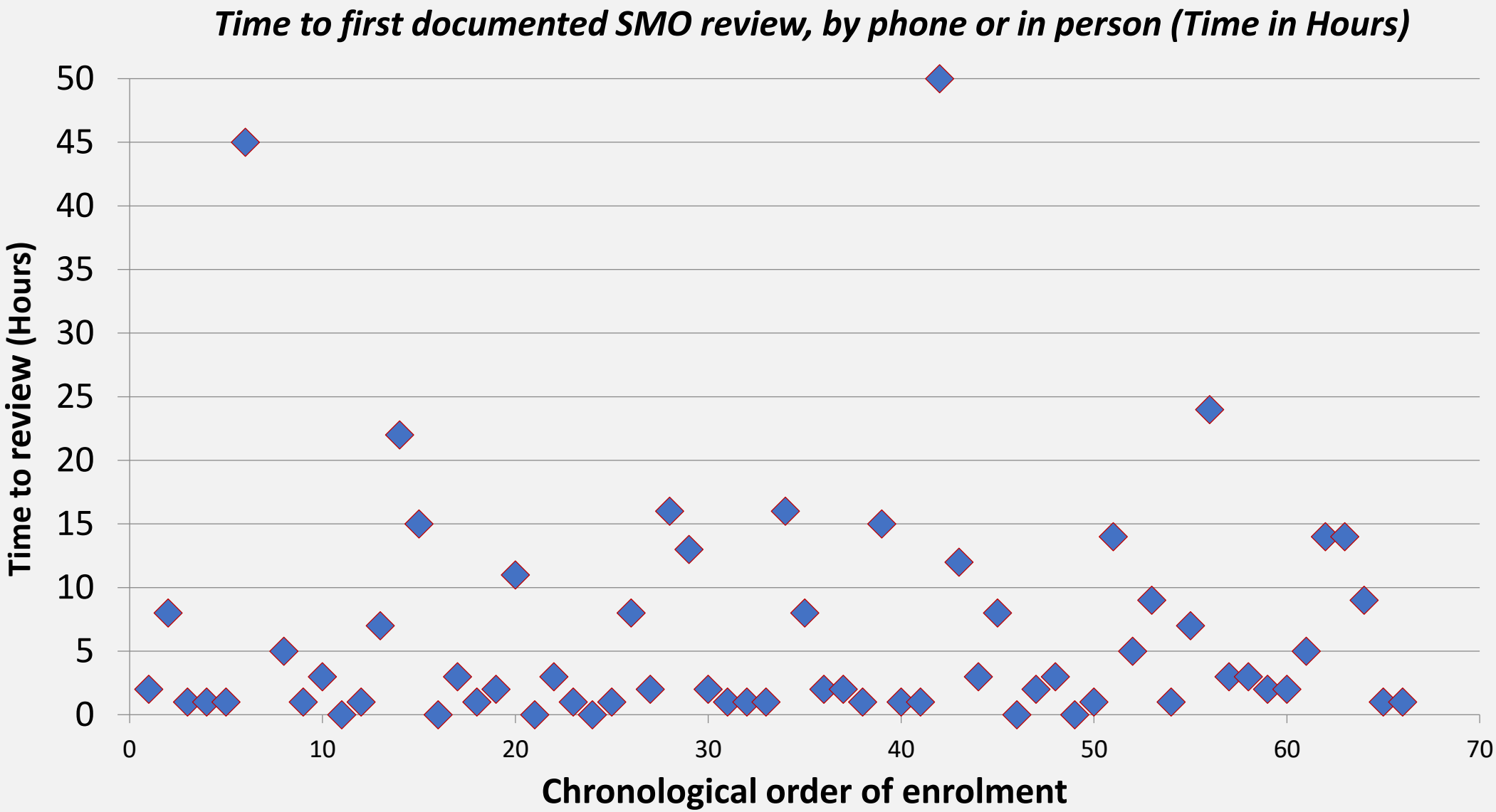
- Emergency Medicine
- General surgery
- Medicine (general)
- Medicine (respiratory)
- Other medical specialty
- Other surgical specialty

Reviewed by a doctor within 30mins of T0



Time to first review (minutes)

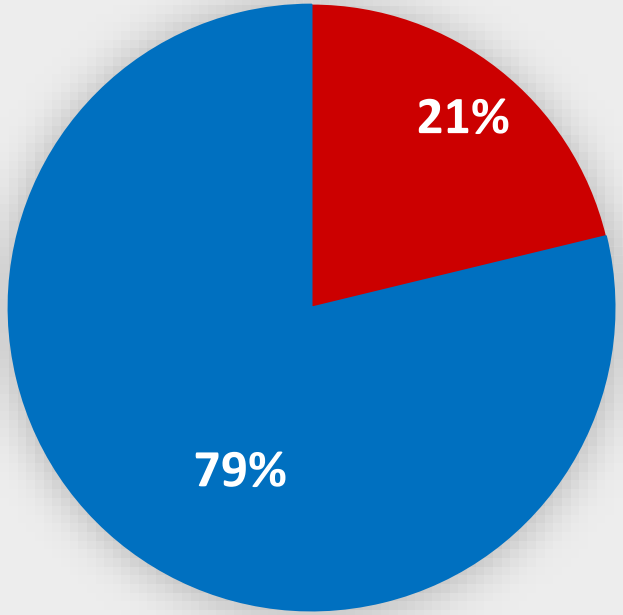



Time to first documented SMO review, by phone or in person (Time in Hours)
Time to review (Hours)
50
45
40
35
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
Chronological order of enrolment

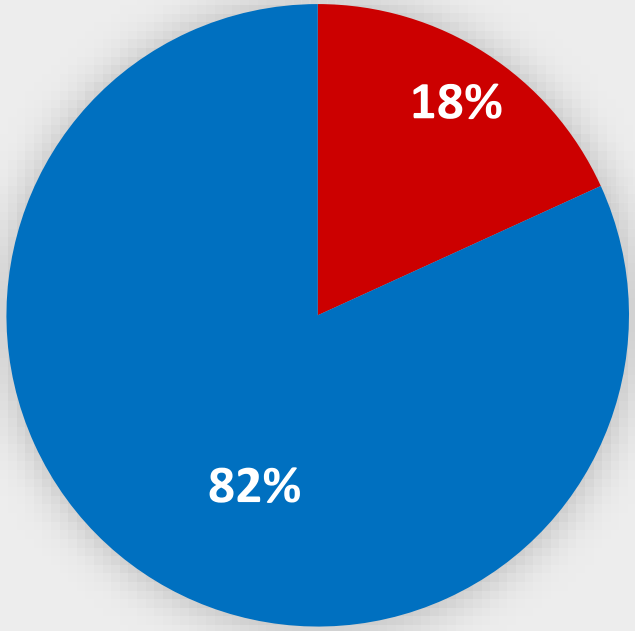
Sepsis 6 targets

n = 66

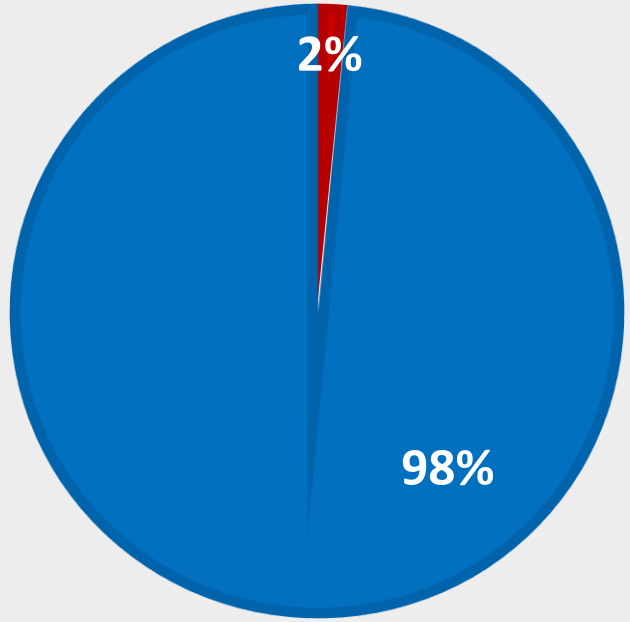
Blood culture sampling <1hr



Lactate sampling <1hr



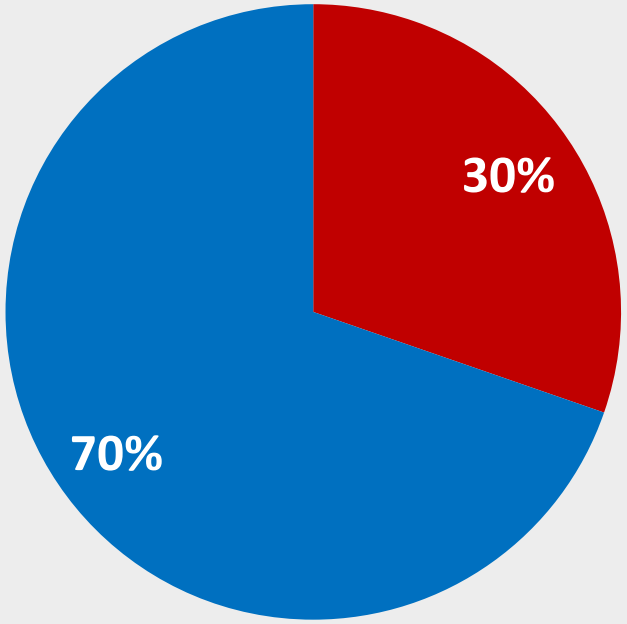
Oxygen given if required



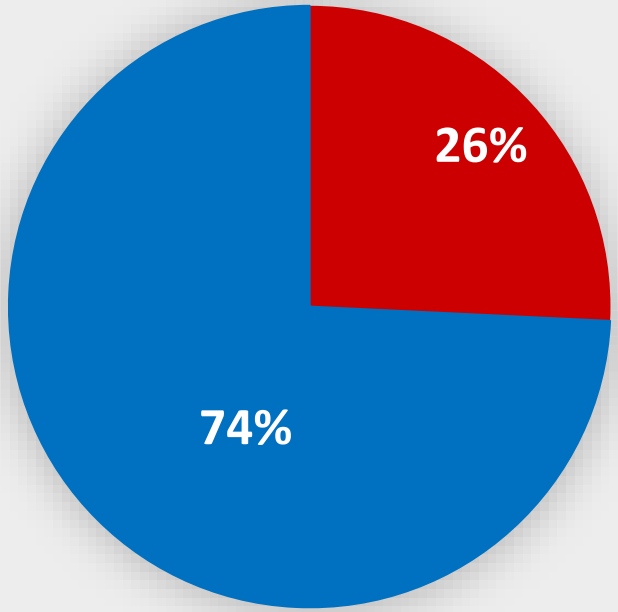
Sepsis 6 targets

n = 66

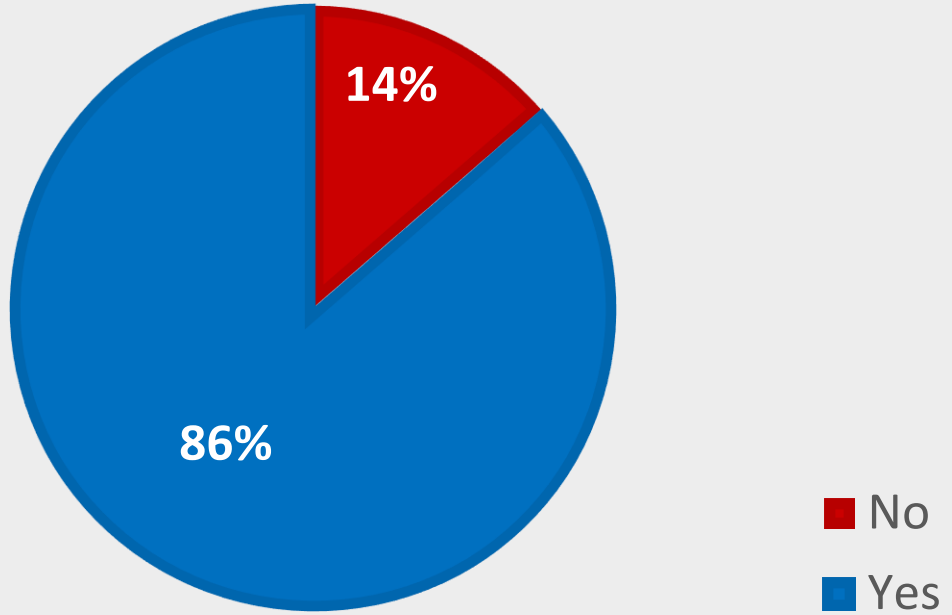
IV antibiotics <1hr



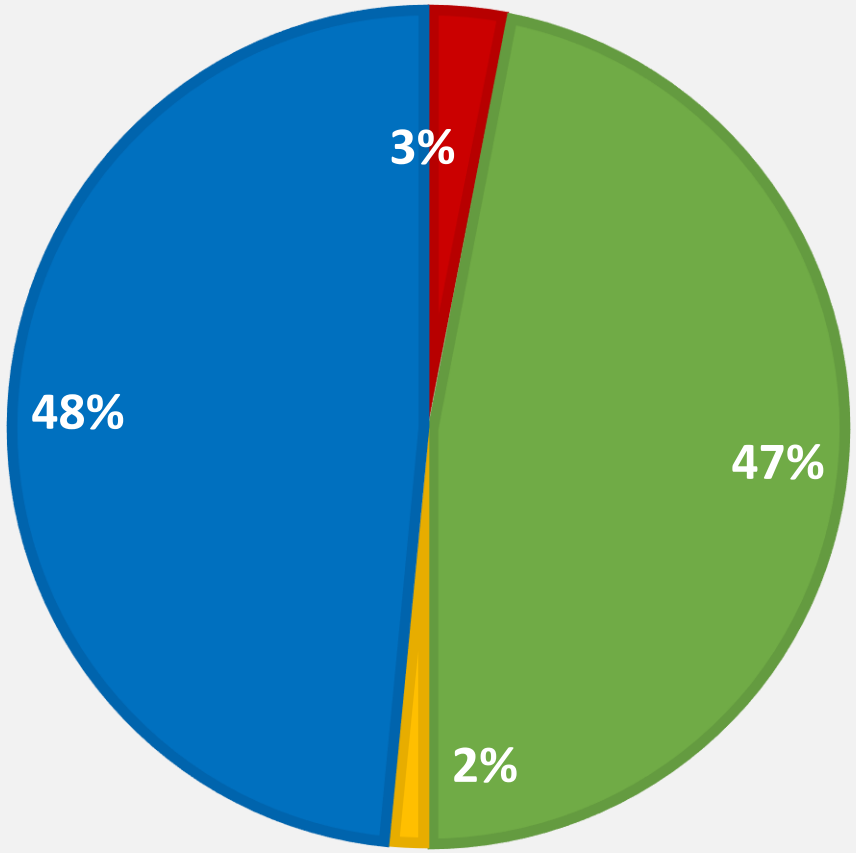
Antibiotics as per guidelines



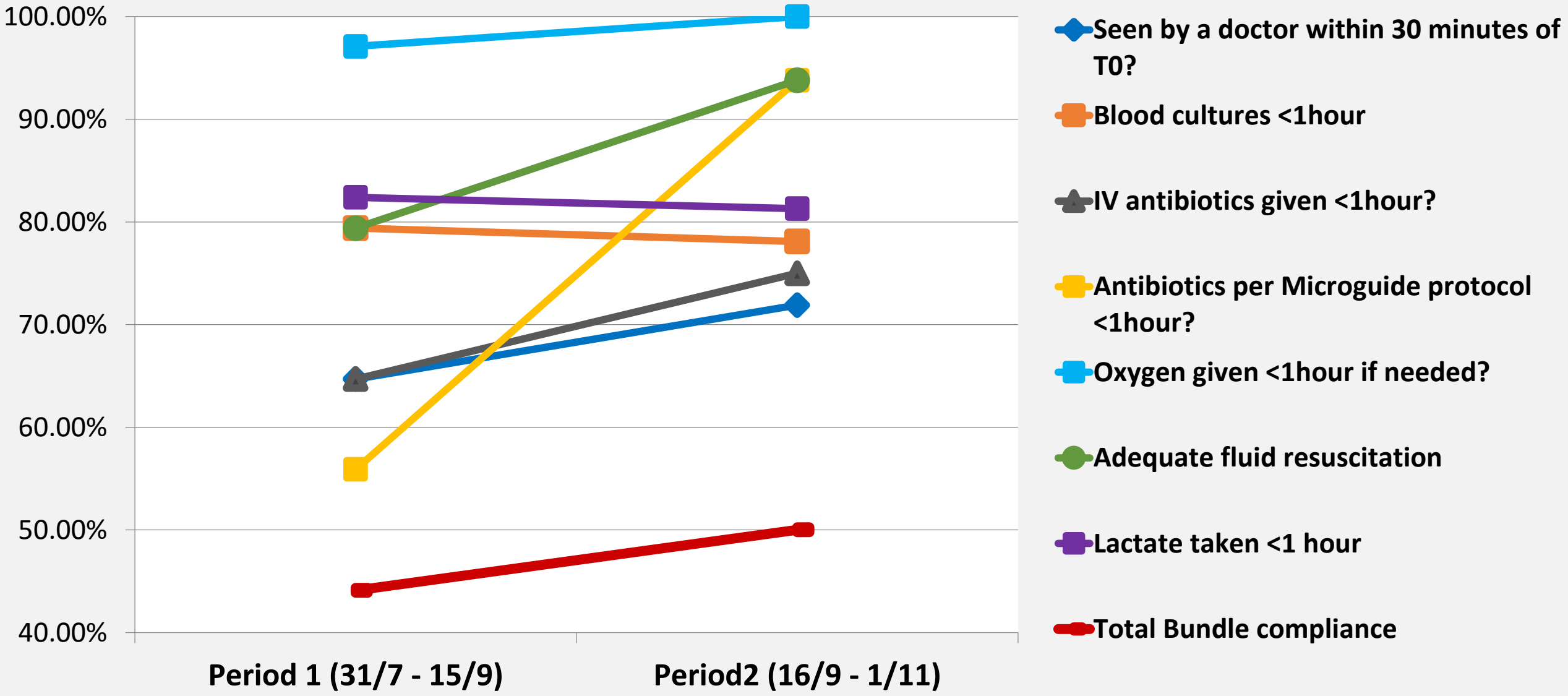
Adequate fluid given



ICU REFERRAL



Bundle compliance over time



Discussion

Highlighted strengths:

- Sepsis5 targets >70%
- Nurse led interventions.

Highlighted areas for improvement:

- Time to review – avg 1st review (35minutes), avg SMO review (7hr).
- Empirical antimicrobial prescribing.
- Antimicrobial prescribing as per local guidelines.

Going Forward

Ongoing audit:

- Aim to incorporate sepsis6 (Urine output).
- Aim to see measurable improvement in sepsis bundle compliance over time with continued feedback.
- Scope for inclusion/separate audit process of paediatric & obstetric patients.

- ? Application of feedback audit model to other areas as an intervention

Thank you.

Tēnā koutou.

References

1. The Third International Consensus Definitions. Mervyn Singer, MD, FRCP, et al., et al. 2016 Feb 23, JAMA, pp. 315(8):801-10. doi: 10.1001/jama.2016.0287.
2. Evidence of High Mortality and Increasing Burden of Sepsis in a Regional Sample of the New Zealand Population. Paul J Huggan, corresponding author1,2 Anita Bell,1 James Waetford,3 Zuzanna Obertova,2 and Ross Lawrenson. s.l. : Open Forum Infect Dis, 2017, Vol. 2017 Summer.