The Leeds Teaching Hospitals NHS
NHS Trust

S.A.F.E
Situation Awareness for Everyone

Situation awareness and the deteriorating patient at Leeds Children's Hospital

Leeds Children's Hospital

RCPCH
Royal College of Paediatrics and Child Health
Leading the way in Children's Health

S.A.F.E Project

The SAFE (Situation Awareness For Everyone) project is a national paediatric patient safety project led by The Royal College of Paediatrics and Child Health. The project has been running at Leeds Children's Hospital for over two years.

Situation awareness can be defined as 'the perception of elements in the environment within a volume of time and space, the comprehension of their meaning, and the projection of their status in the near future'(1). Improving situational awareness through the use of more structured, formalised communication threads cultivates a more proactive safety culture and improves team cohesion by empowering staff to have input into decisions made around patient care.

Increased situation awareness of potential risks in real time on inpatient wards may help reduce identifiable safety risks. One study found that improving situation awareness resulted in 50% fewer unplanned transfers to higher levels of care (2).

The main intervention of the SAFE project is the 'Safety Huddle'.

SAFETY HUDDLE

The 'Safety Huddle' is a meeting between the multi-disciplinary team of each ward to re-establish situational awareness, reinforce plans already in place, and assess the need to adjust the plan.'(1). The primary aim of the Huddle is to identify risks to patients, develop a multi-disciplinary team understanding of patients at risk of deterioration and the creation of plans to mitigate such risks. Huddles should aim to be concise, optimise staff engagement and focus on essential information only (3).

The Neo-natal unit, Paediatric Intensive Care Unit (PICU), the oncology wards (31,32,33), and Ward 50 were the early adopters of the 'Safety Huddle' in 2015/16. In 2017 the 'Safety Huddles' were launched on other inpatient wards and are now happening on a daily basis on all inpatient wards bar one (Ward 48); **Figure 1** shows a snap shot of 'Safety Huddle' compliance in November 2017. The graph shows that the early adopters are 100% compliant. Although the other wards are not quite at 100% just yet I would expect these wards to reach 100% over the next year or so once the cultural shift has fully embedded.

High Dependency Unit Ward 48 (HDU) has yet to establish a formal 'Safety Huddle'. This is due to the difficulty of getting doctors from different specialities all on HDU at one time. A nurse led 'Safety Huddle' could be a way forward.

Anecdotally the 'Safety Huddle' works well when the senior nurses on each ward and the Consultants of each speciality have a good understanding of the value of the 'Safety Huddle' and display effective local leadership.

Some areas have started to run weekend and evening 'Safety Huddles' and moving forward this would be a good aspiration for all wards.

THE WATCHER LIST

The watcher list is held by PICU and is populated with patients that are at risk of needing a critical care bed. A Standard Operating Procedure (SOP) has been written explaining how to communicate the information to PICU and the number to call is written on all the medical handover sheets. The aim of the 'Watcher List' is to provide PICU with a greater sensitivity to 'at-risk' patients in the hospital and to manage flow within the intensive care unit.

The registrars/nurses and anaesthetic colleagues on PICU have given good feedback about the 'Watcher List' given that it allows the PICU team to hold some background information about at-risk patients. This information is helpful if a patient later needs a formal review/admission and could lead to more timely interventions.

The 'Watcher List' is hand written at the moment, but PPM will soon have the facility to populate individual lists electronically which will improve accessibility.

FEEDBACK AND MEASURABLE OUTCOMES

Included below is a summary of the qualitative feedback received from staff about the interventions (Appendix 1)

A bigger challange for this project is to find effective quantitative feedback. A reduction in UNSAFE (Unexpected Situation Awareness Failure Events) PICU transfers is a key indicator as it is thought that these events represent a potential precursor event to serious harm (3). An UNSAFE transfer is any patient that requires a PICU admission and is intubated, requires significant fluid bolus or inotropes on the ward before admission or up to one-hour post admission.

The data collected so far is not conclusive, but a downward trend may be revealed over the coming years if the 'Safety Huddle' and 'Watcher List' enable our teams to intervene in a more timely manner with 'at-risk' patients. The goal of zero UNSAFE transfers can be achieved but a paediatric outreach team may need to be considered to achieve this target. These types of teams have reduced hospital wide mortality in several studies (2).

DETERIORATING PATIENT DATA

The rest of the report provides data that was collected from the notes of patients requiring an unplanned admission to PICU from our inpatient wards. Some of the data was from January-June and other data charts are from the full year, as outlined below.

It is hoped that the data will help to create more proactivity in relation to identifying early signs of deterioration and help gain a greater awareness/understanding of the deteriorating patient in the Children's Hospital. Some of the data could help to define a patient's 'watcher' status.

Based on the data to-date amendments to the Paediatric Advance Warning Score (PAWS) chart could be considered (Appendix 2). Persistent or unexplained tachycardia has been a pre-cursor to unrecognised deterioration in some of our patients, so a box has been added to the chart to acknowledge this. A prompt to complete the sepsis screening tool when a patient scores 10 has also been added. A high percentage (75%) of the PAWS charts for patients who had unplanned admissions to PICU in the first six months of 2017 were incorrectly filled in; most of these errors related to the recording of escalation. Given this, it may be useful to add the SBAR (Situation Background Assessment Recommendation) tool onto the chart as a further prompt in the escalation process.

Due to the imminent arrival of electronic observations, it may be worth considering factoring in these amendments to the algorithms.

The Data

Figure 1. Safety Huddle Compliance

A snapshot of 'Safety Huddle' compliance in November 2017 showing >60% compliance on all inpatient wards other than Ward 48.

Figure 2. The Watcher List

The poster illustrates the kind of parameters that could constitute a 'watcher'. Since the launch of the 'Watcher List' in September 2017 up until January 2018 approximately 15% of 'watchers' were admitted to PICU.

Figure 3. UNSAFE Transfers from ward to PICU 2017

An UNSAFE transfer is any patient that requires a PICU admission and is intubated, requires significant fluid bolus or inotropes on the ward before admission or up to one-hour post admission.

The graph also shows when the 'Safety Huddles' and 'Watcher List' interventions occurred so the impact can be assessed.

As stated above, trends may not be apparent for a few years. No clear pattern has emerged.

Figure 4. Unplanned admissions to PICU

In 2016 there was 102 unplanned admissions to PICU from inpatient wards compared to 94 in 2017.

Figure 5. Unplanned admissions by ward

Ward 51 High Dependency was a 'hot spot' for unplanned PICU admissions in 2017 (21 in total). Ward 9 had 13 admissions, all other wards had 10 or less admissions each.

Figure 6. Age groups of unplanned admissions

A majority (56%) of patients that were unplanned admissions to PICU from inpatient wards in 2017 were aged between 1 month and 2 years.

Figure 7. Times of admissions

Between 12pm and 2pm was when the highest number (15) of unplanned admissions to PICU from inpatient wards were admitted in 2017.

Figure 8 Unplanned admissions length of stay

20 of the patients that were unplanned admissions to PICU from inpatient wards in 2017 stayed more than 10 days.

Figure 9. Time of last PICU review till admission.

13 of the patients that were unplanned admissions to PICU from inpatient wards in the first six months of 2017 were admitted within an hour of their last critical care review.

What this data doesn't show is how many critical care reviews occurred before admission. It would be useful to collect this data to assess whether any PICU admission delays are occurring.

Figure 10. Patients requiring Vapotherm on ward before admission to PICU

This shows that a high percentage of patients in the first six months of 2017 required Vapotherm assistance up to 12 hours before admission to PICU.

Figure 11. PAWS scores before admission to PICU

A high proportion of the PAWS charts (40%) were bell shaped (scores rose significantly but had begun to come down before admission to PICU). 24% of PAWS scores were rising before admission, 20% were coming down and 16% were static. The scores relate to the 12 hours leading up to admission.

This seems to reiterate the understanding that the PAWS chart is not a stand-alone tool but part of a system of assessment and should be used as a warning and not as a tool to reassure healthcare providers that 'things are ok'.

Figure 12 Lactate readings of unplanned admissions

The red and blue colours on the blood gas data charts is there to make the charts easier to visually interpret.

31% of unplanned admissions to PICU from inpatient wards in 2017 had a lactate of over 3 on admission.

Figure 13 PH readings leading up to admission

64% of unplanned admissions to PICU in the first six months of 2017 had a PH level of 7.3 or below in the 12 hours leading up to admission.

Figure 14. PCo2 leading up to admission

45% of unplanned admissions to PICU in the first six months of 2017 had a PCo2 reading of 6 or higher, 92% had a reading of 4 or higher in the 12 hours leading up to admission.

Figure 15. Po2 reading leading up to admission.

48% of unplanned admissions to PICU in the first six months of 2017 had a Po2 reading of 8 or higher, 70% had a reading of 6 or higher in the 12 hours leading up to admission.

It's worth noting that the blood gas data was only taken from data that was recorded with Point of Care. If staff chose to override the patient details on the blood gas machine the data wasn't recorded.

Figure 16. Crash/Medical Emergency calls that preceded unplanned PICU admission

12 out of 39 (30%) unplanned admissions to PICU in the first six months of 2017 required crash/medical emergency call assistance on the wards prior to admission.

Figure 17. Intubations on ward

8 out of 39 (20%) unplanned admissions to PICU in the first six months of 2017 were intubated on the ward before admission.

Figure 18. Reasons for admission

A high percentage (54%) of unplanned admissions to PICU in the first six months of 2017 were due to respiratory issues.

Figure 19. Winter/Spring comparison

A higher percentage (69%) of unplanned admissions to PICU in the first six months of 2017 were admitted in the winter months (Jan, Feb, March).

Figure 20. Operations cancelled due to no PICU beds

22 paediatric operations were cancelled in the first six months of 2017 due to no bed availability on PICU.

SUMMARY

The interventions/methodology of the SAFE project should not be seen as a temporary intervention. The concept of situation awareness is an essential component for ensuring systems and processes are highly reliable and safety culture evolves to a generative status whereby managing patient safety is an integral part of everything we do. This can only be achieved if there is buy-in from the whole Children's Hospital.

In 2017, 94 patients were unexpectedly admitted to PICU from inpatient wards. This is a significant demand on the resources of the Children's Hospital. Structured communication models such as the 'Safety Huddle' the 'Watcher List' and SBAR help to mitigate against the risk of unrecognised deterioration and to assure timely interventions but these alone cannot guarantee the Trust goal of being the best for patient safety and quality. A dedicated paediatric outreach team could improve the quality and safety of care delivered to at-risk/deteriorating patients by sitting in the centre of the early recognition system in the Children's Hospital.

References

(1) Situation awareness global assessment technique (SAGAT). The National Aerospace and Electronics Conference (NAECON). New York: IEE, 1988.

(2) Brady PW, Muething S, Kotagal U, et al. Improving situation awareness to reduce unrecognized clinical deterioration and serious safety events. Pediatrics 2013;131:e298–e308.

(3) Goldenhar LM, Brady PW, Sutcliffe KM, et al. Huddling for high reliability and situation awareness. BMJ Qual Saf 2013;22:899–906.

ACKNOWLEDGMENTS

Many thanks to all the dedicated teams on the wards at Leeds Children's Hospital.

Special thanks to Jo Lumsden, Hannah Shore, Elizabeth Holmes and Natasha Brown.

Fig. 1

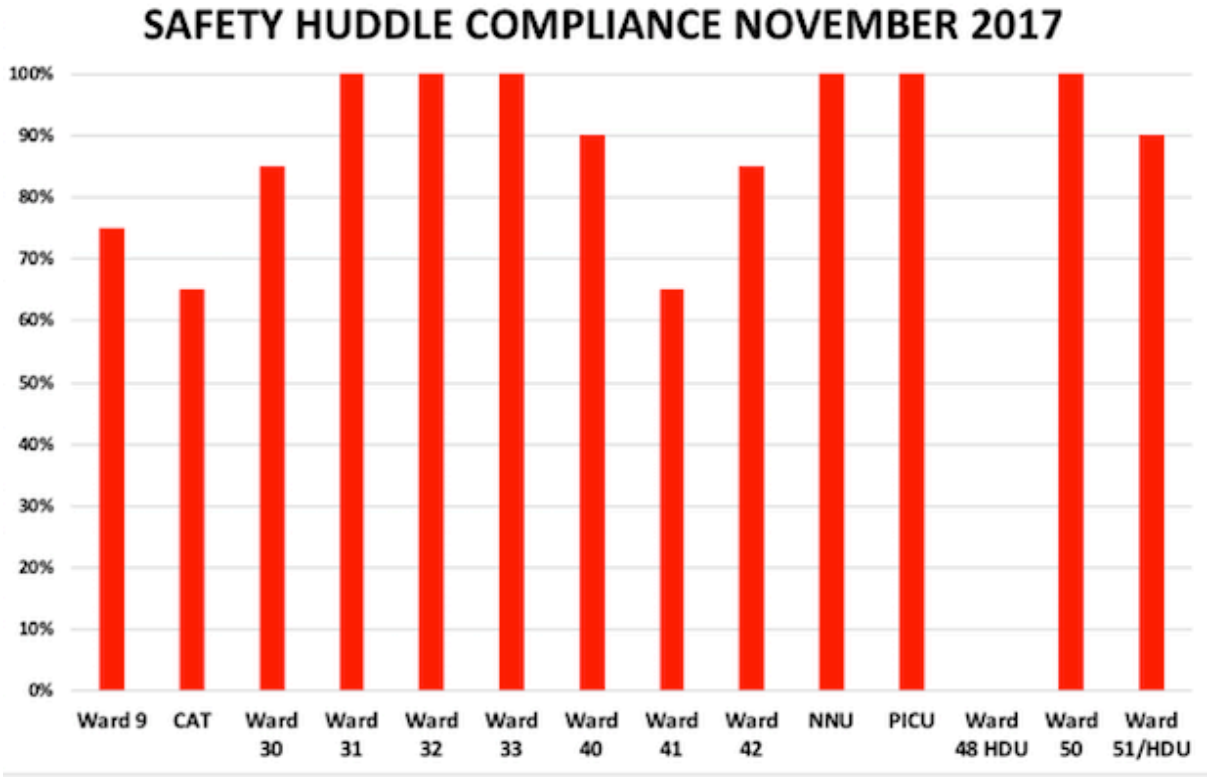


Fig. 2

WATCHER LIST

Launched 7/9/17

83 Patients on list up until 31/12/17

13 of 'watchers' admitted to PICU

Fig. 3

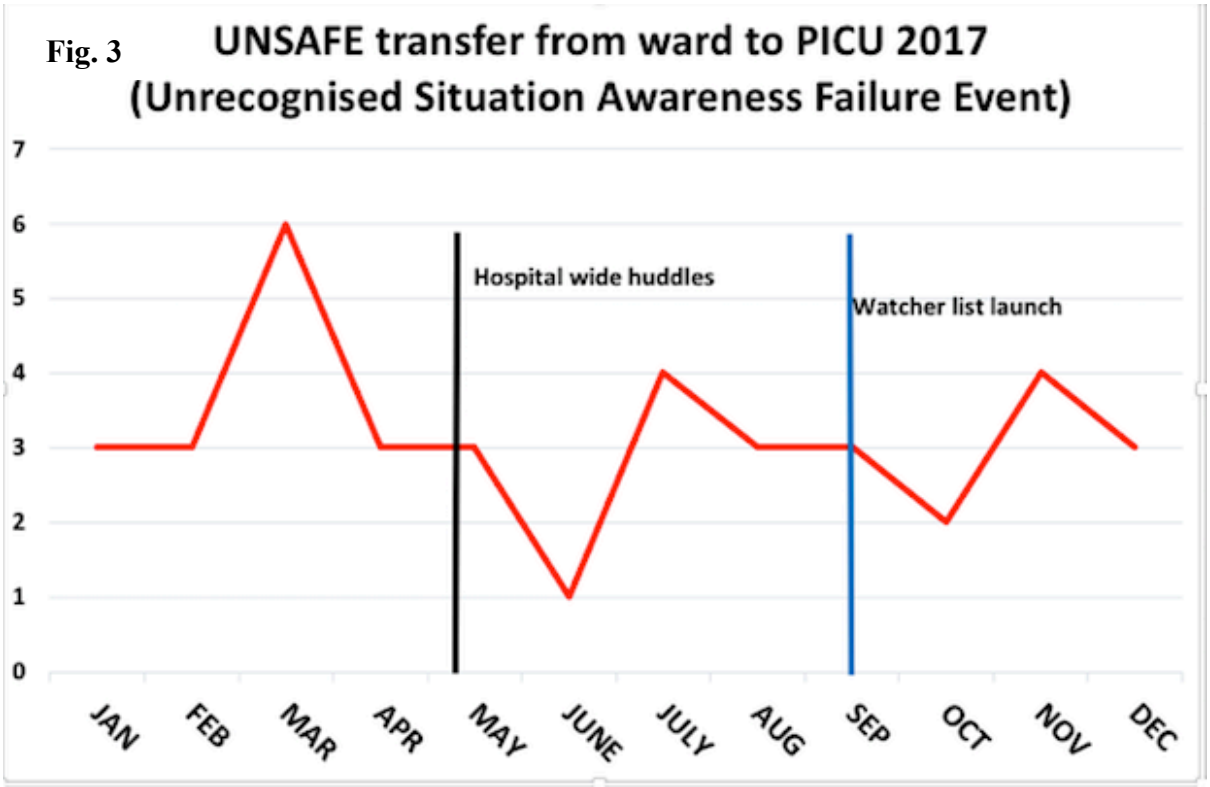

UNSAFE transfer from ward to PICU 2017
(Unrecognised Situation Awareness Failure Event)
7
6
5
4
3
2
1
0
Hospital wide huddles
Watcher list launch
JAN
FEB
MAR
APR
MAY
JUNE
JULY
AUG
SEP
OCT
NOV
DEC

Fig. 4

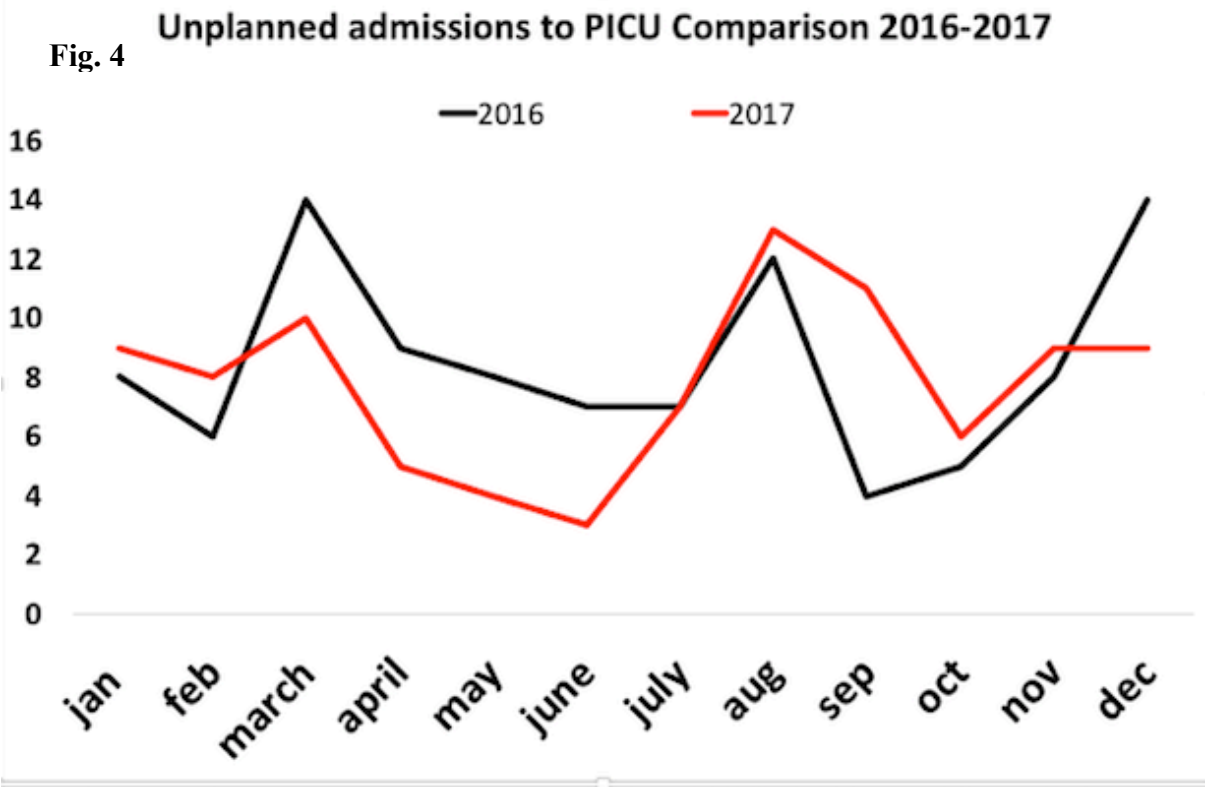

Unplanned admissions to PICU Comparison 2016-2017
2016
2017
16
14
12
10
8
6
4
2
0
jan
feb
march
april
may
june
july
aug
sep
oct
nov
dec

Fig. 5

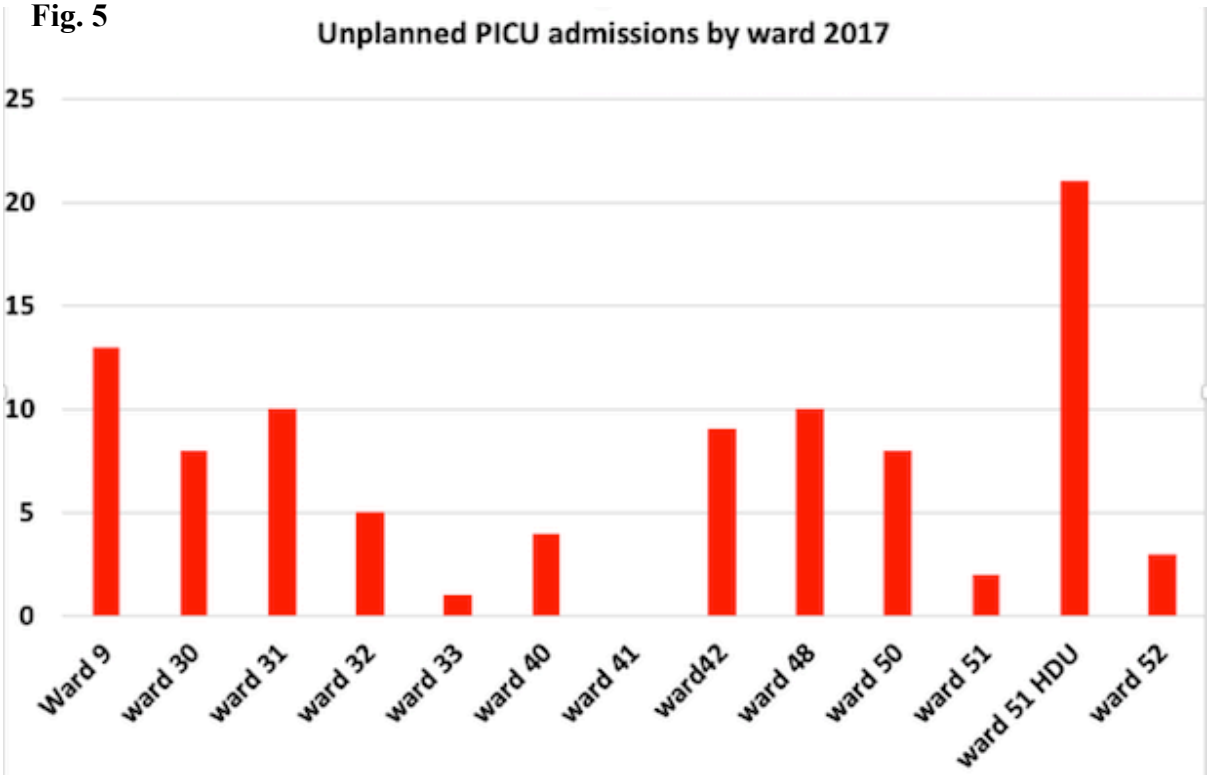

Unplanned PICU admissions by ward 2017
25
20
15
10
5
0
Ward 9
ward 30
ward 31
ward 32
ward 33
ward 40
ward 41
ward42
ward 48
ward 50
ward 51
ward 51 HDU
ward 52

Fig. 6

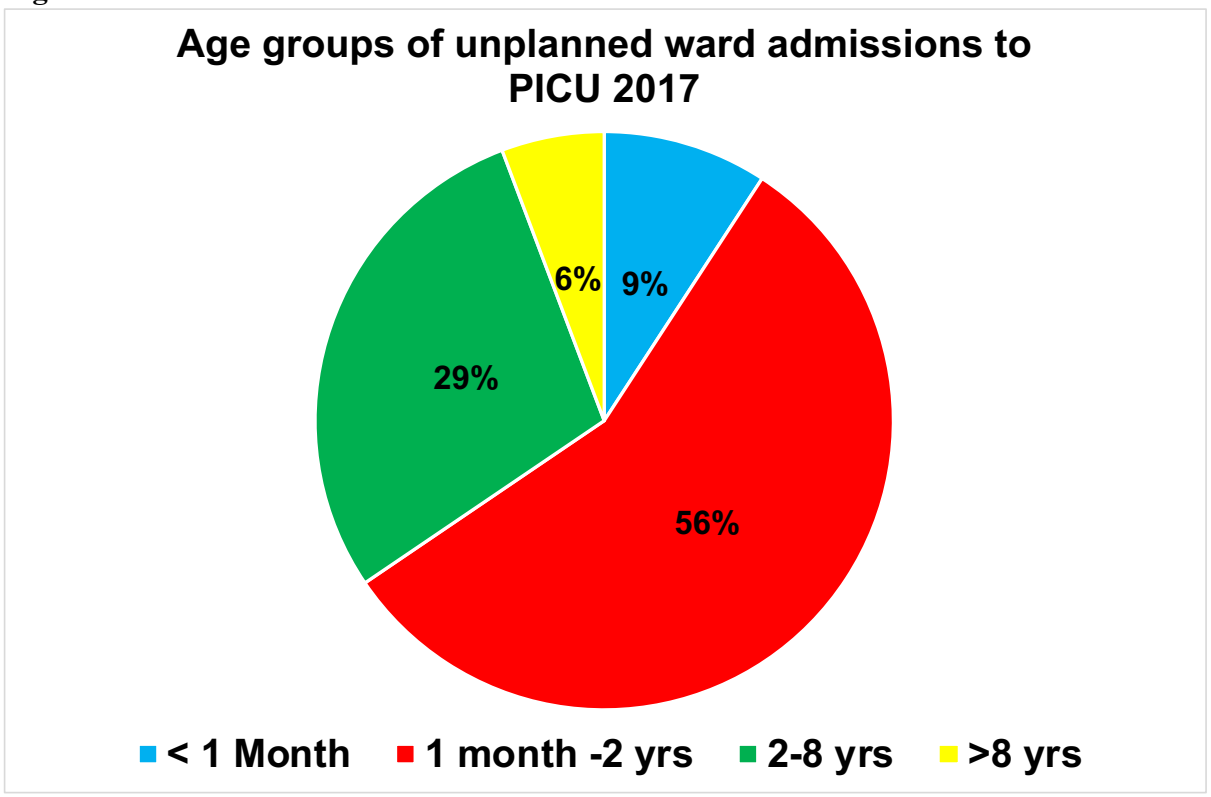

Age groups of unplanned ward admissions to PICU 2017
6%
9%
29%
56%
< 1 Month
1 month -2 yrs
2-8 yrs
>8 yrs

Fig. 7

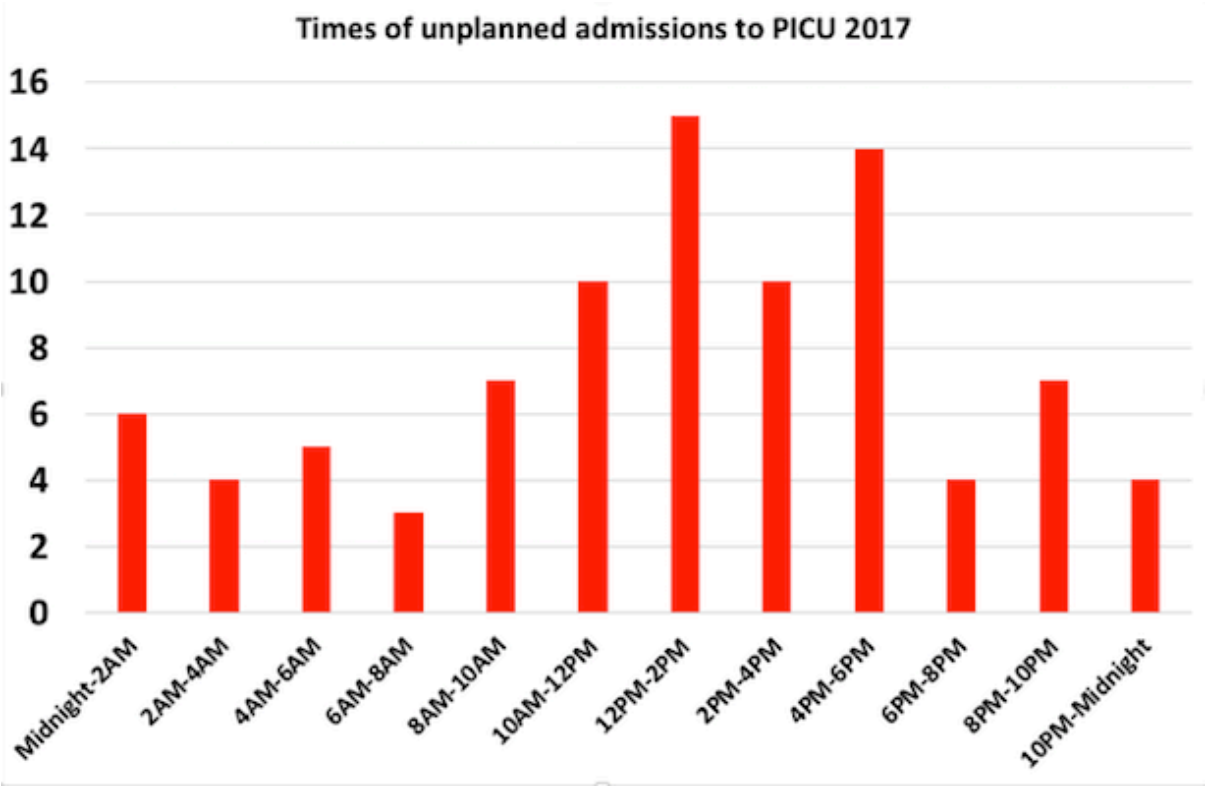

Times of unplanned admissions to PICU 2017
16
14
12
10
8
6
4
2
0
Midnight-2AM
2AM-4AM
4AM-6AM
6AM-8AM
8AM-10AM
10AM-12PM
12PM-2PM
2PM-4PM
4PM-6PM
6PM-8PM
8PM-10PM
10PM-Midnight

Fig. 8

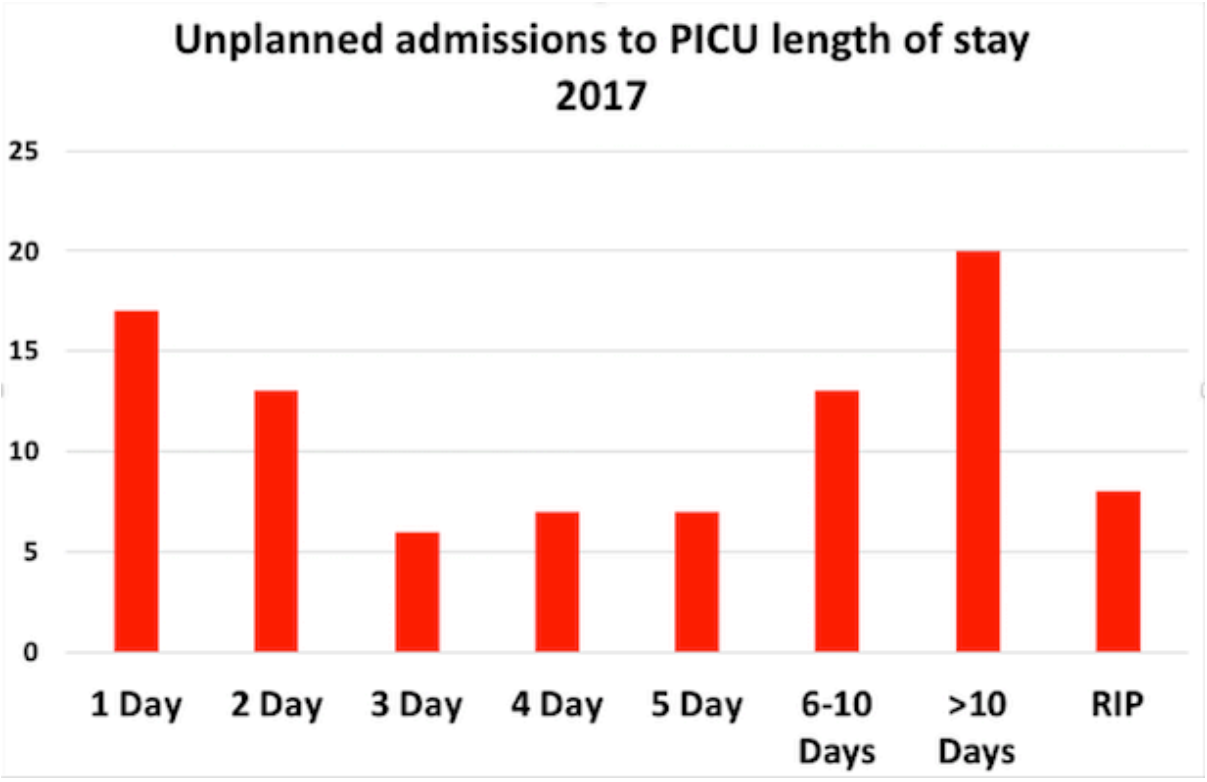

Unplanned admissions to PICU length of stay 2017
25
20
15
10
5
0
1 Day
2 Day
3 Day
4 Day
5 Day
6-10 Days
>10 Days
RIP

Fig. 9

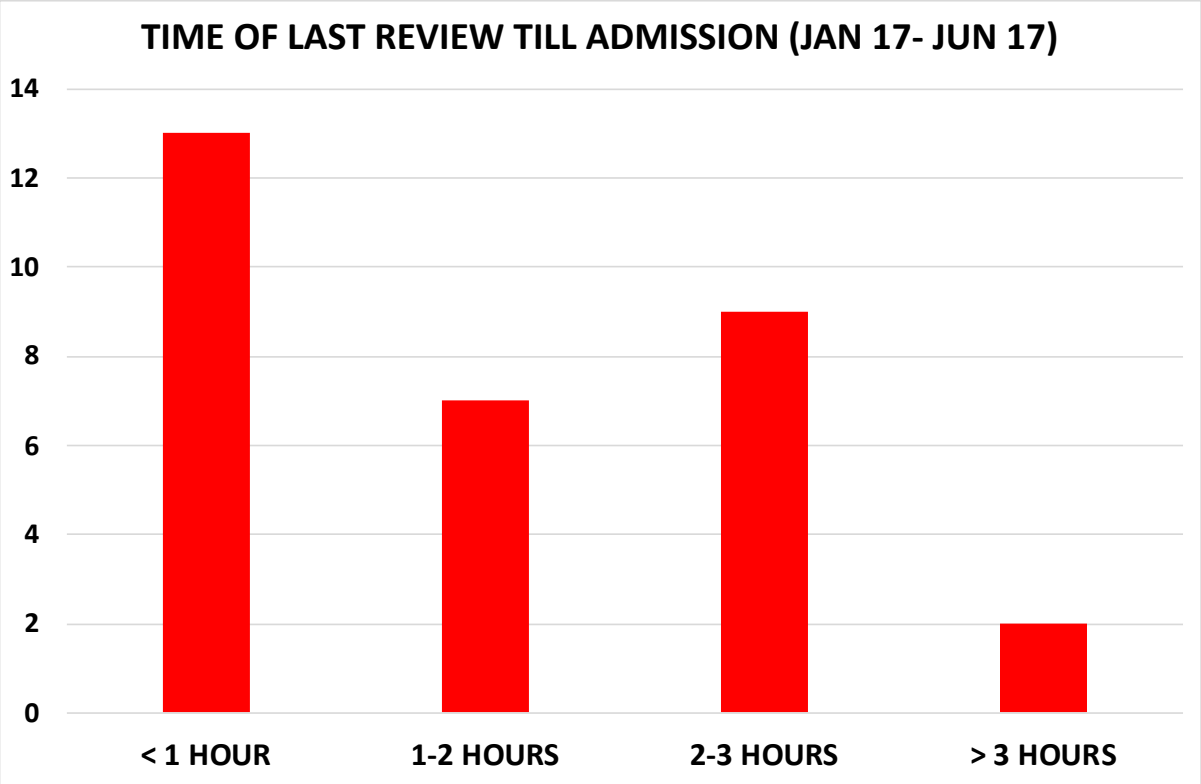

TIME OF LAST REVIEW TILL ADMISSION (JAN 17- JUN 17)
14
12
10
8
6
4
2
0
< 1 HOUR
1-2 HOURS
2-3 HOURS
> 3 HOURS

Fig. 10

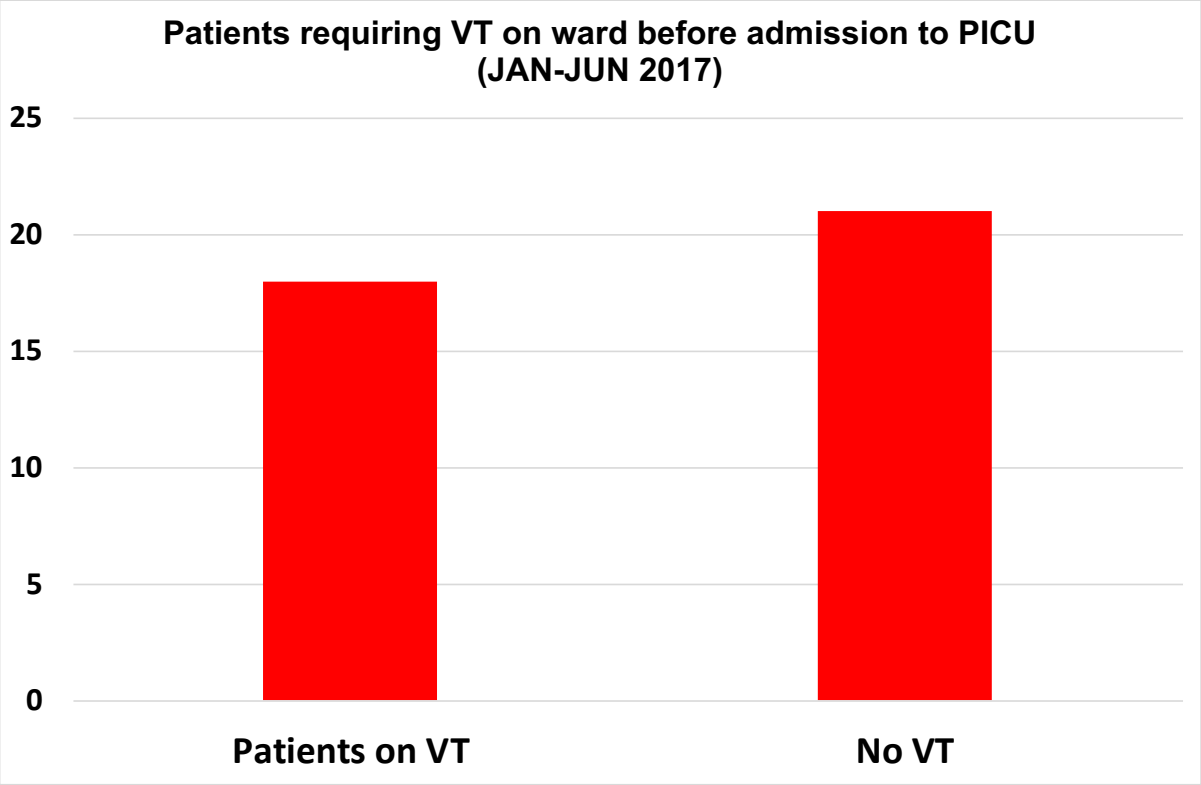

Patients requiring VT on ward before admission to PICU
(JAN-JUN 2017)
25
20
15
10
5
0
Patients on VT
No VT

Fig. 11

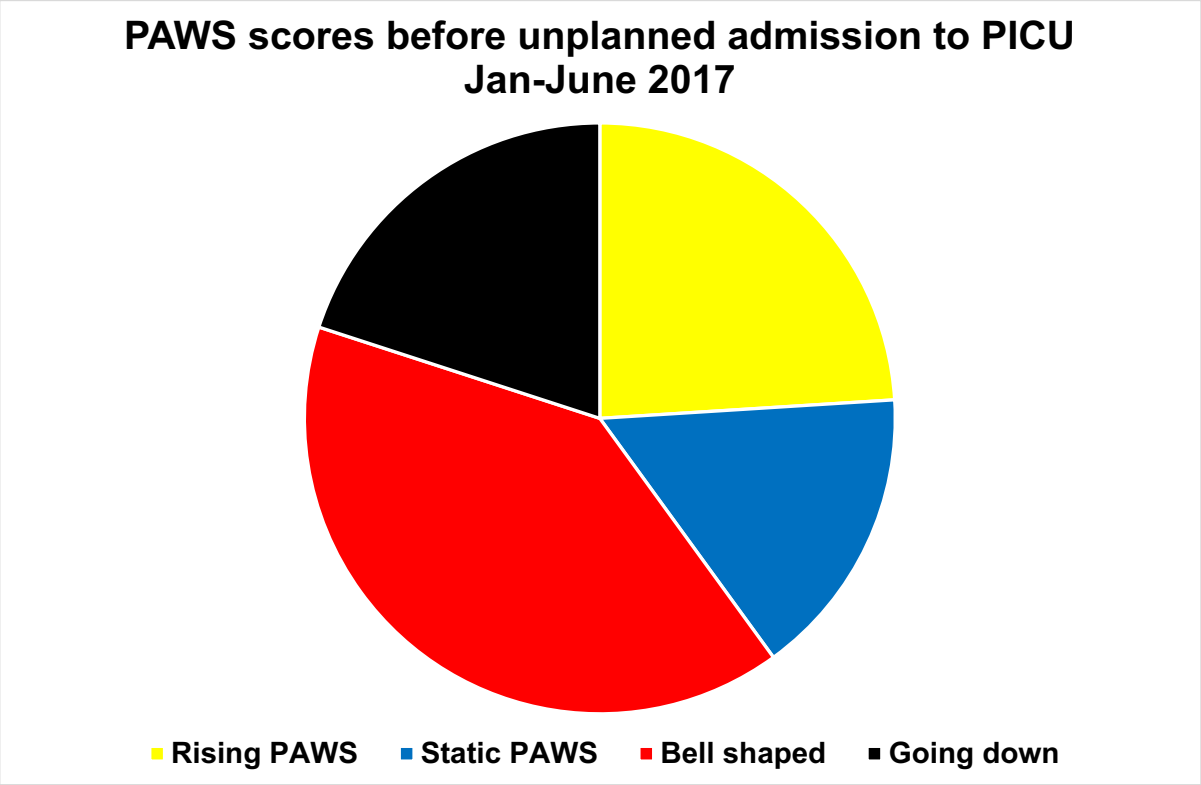

PAWS scores before unplanned admission to PICU
Jan-June 2017
Rising PAWS
Static PAWS
Bell shaped
Going down

Fig. 12

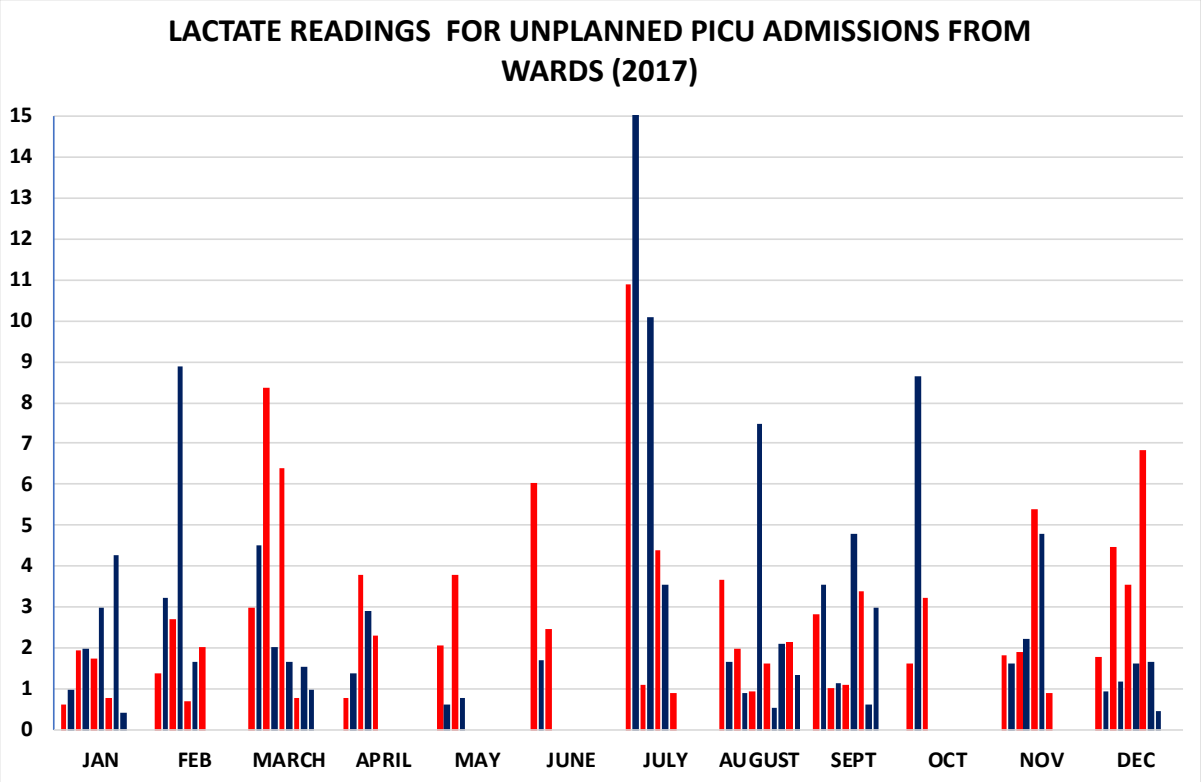

LACTATE READINGS FOR UNPLANNED PICU ADMISSIONS FROM WARDS (2017)
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
JAN
FEB
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPT
OCT
NOV
DEC

Fig. 13

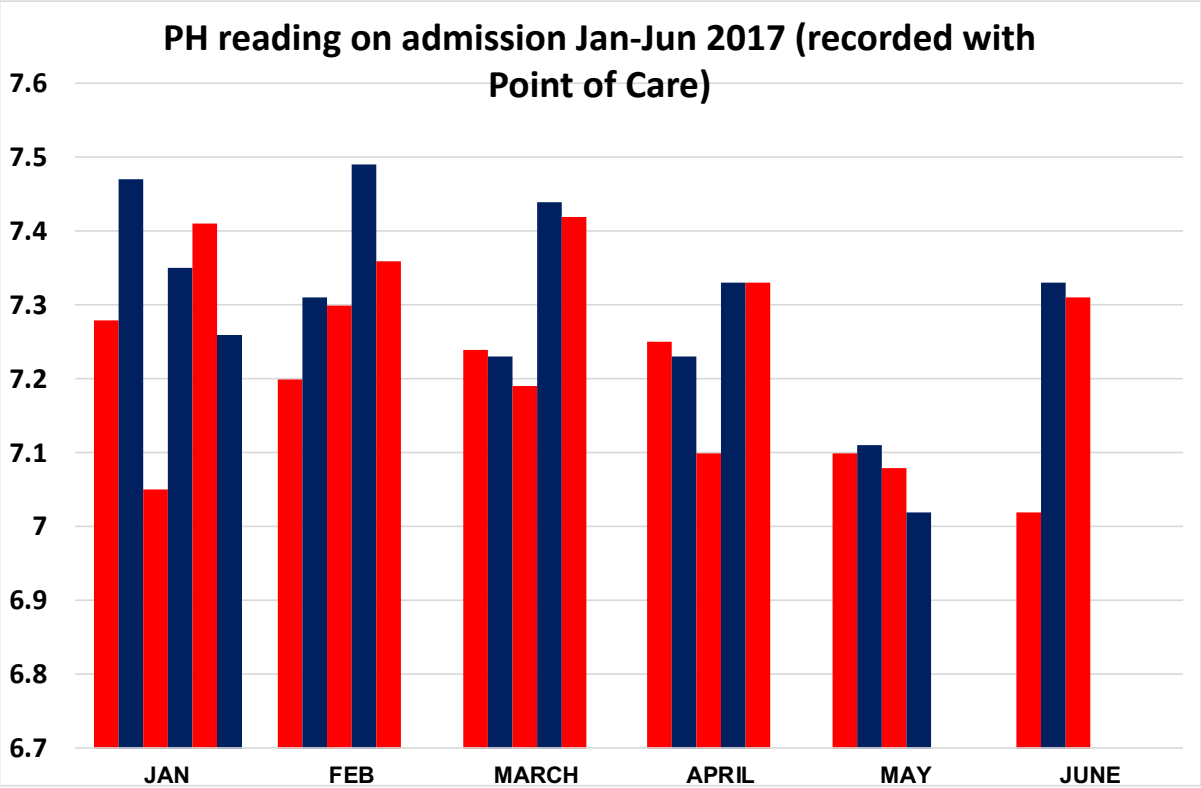

PH reading on admission Jan-Jun 2017 (recorded with Point of Care)
7.6
7.5
7.4
7.3
7.2
7.1
7
6.9
6.8
6.7
JAN
FEB
MARCH
APRIL
MAY
JUNE

Fig. 14

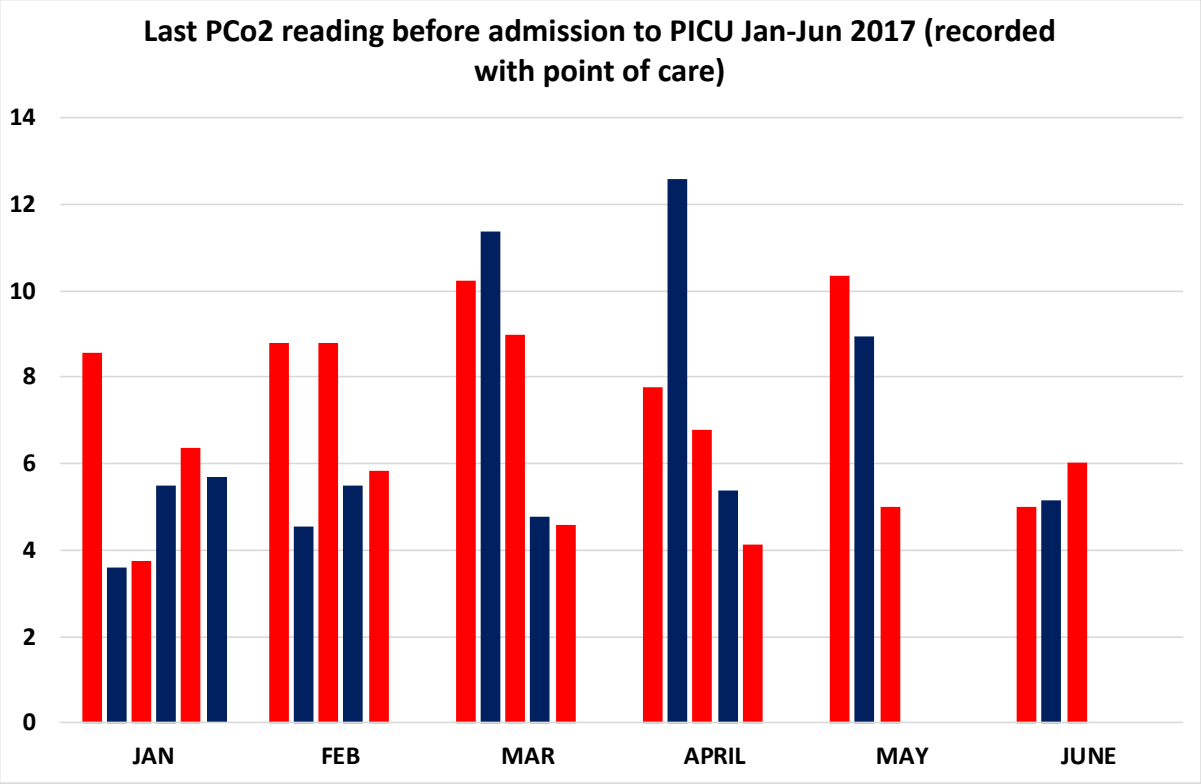

Last PCo2 reading before admission to PICU Jan-Jun 2017 (recorded with point of care)
14
12
10
8
6
4
2
0
JAN
FEB
MAR
APRIL
MAY
JUNE

Fig. 15

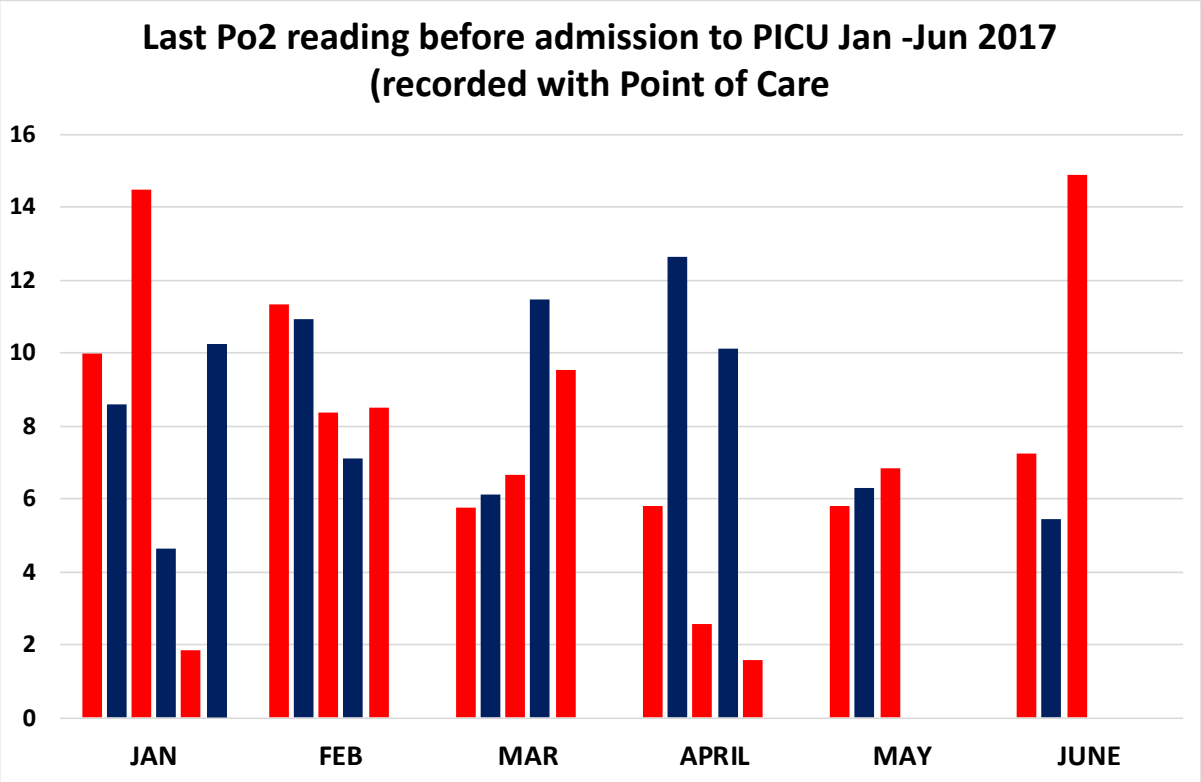

Last Po2 reading before admission to PICU Jan -Jun 2017
(recorded with Point of Care
16
14
12
10
8
6
4
2
0
JAN
FEB
MAR
APRIL
MAY
JUNE

Fig. 16

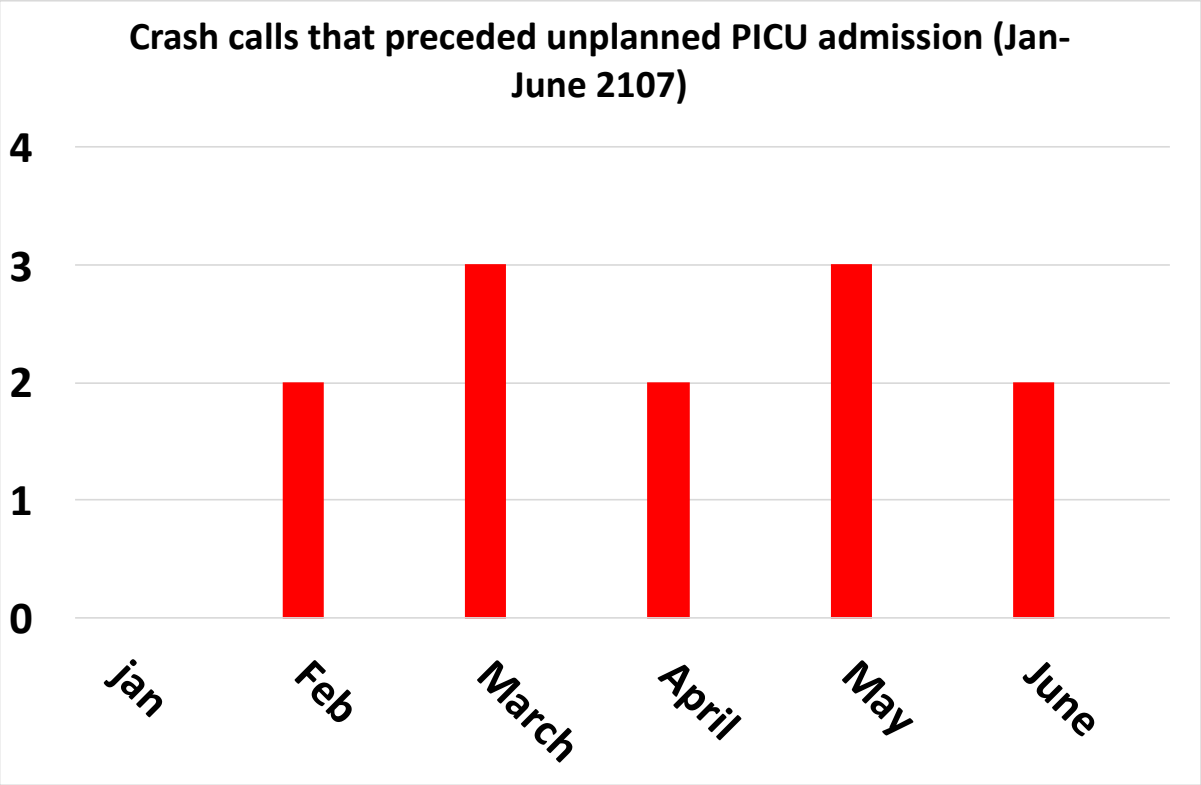

Crash calls that preceded unplanned PICU admission (Jan-June 2107)
4
3
2
1
0
jan
Feb
March
April
May
June

Fig. 17

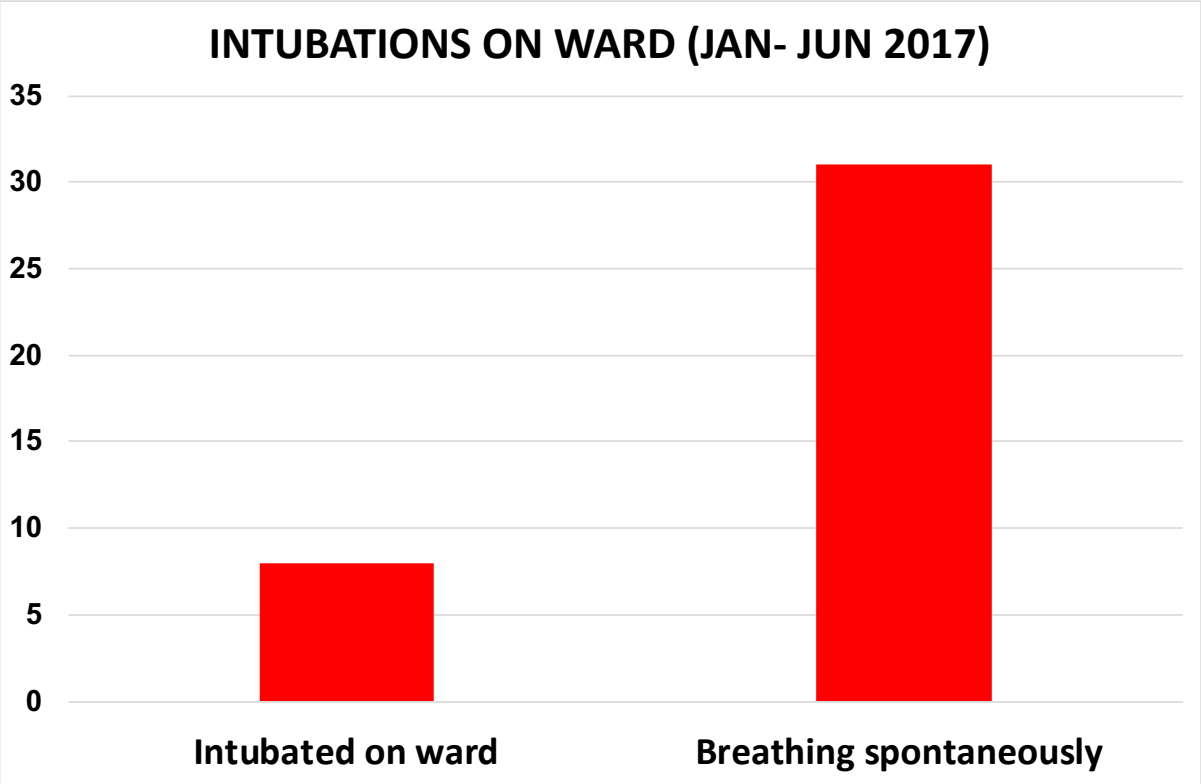

INTUBATIONS ON WARD (JAN- JUN 2017)
35
30
25
20
15
10
5
0
Intubated on ward
Breathing spontaneously

Fig. 18

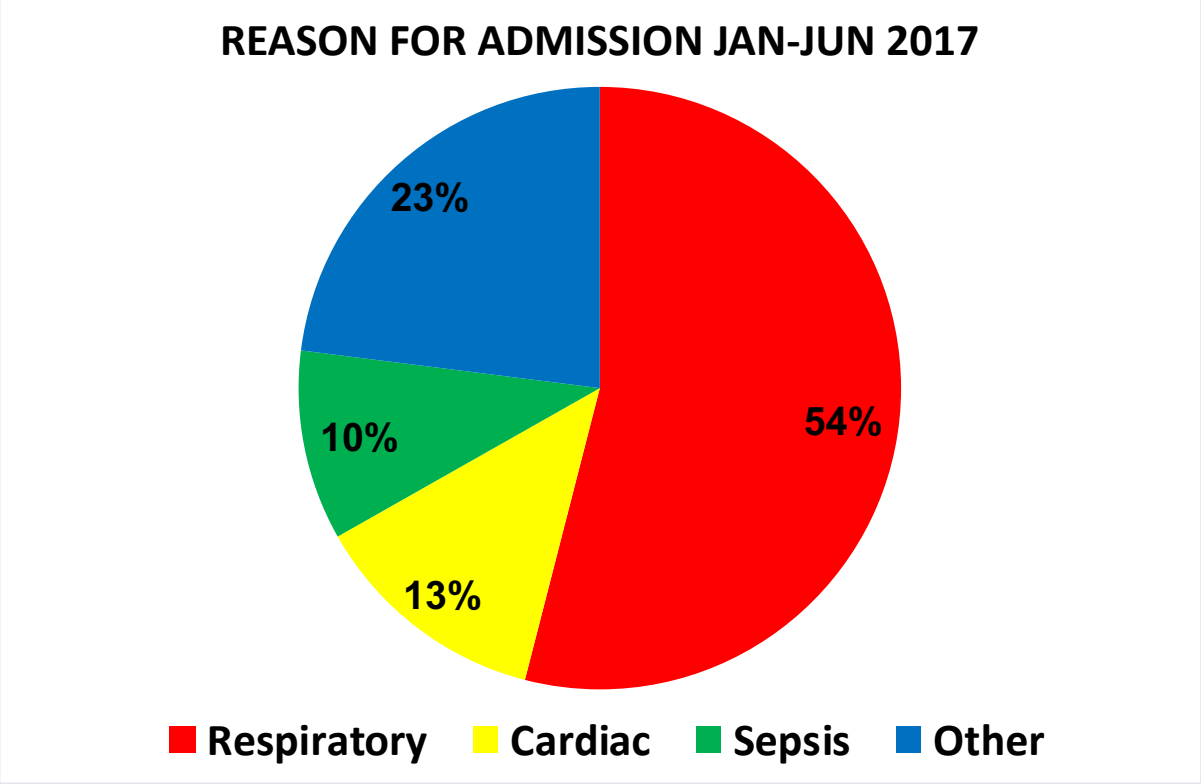

REASON FOR ADMISSION JAN-JUN 2017
23%
10%
54%
13%
Respiratory
Cardiac
Sepsis
Other

Fig. 19

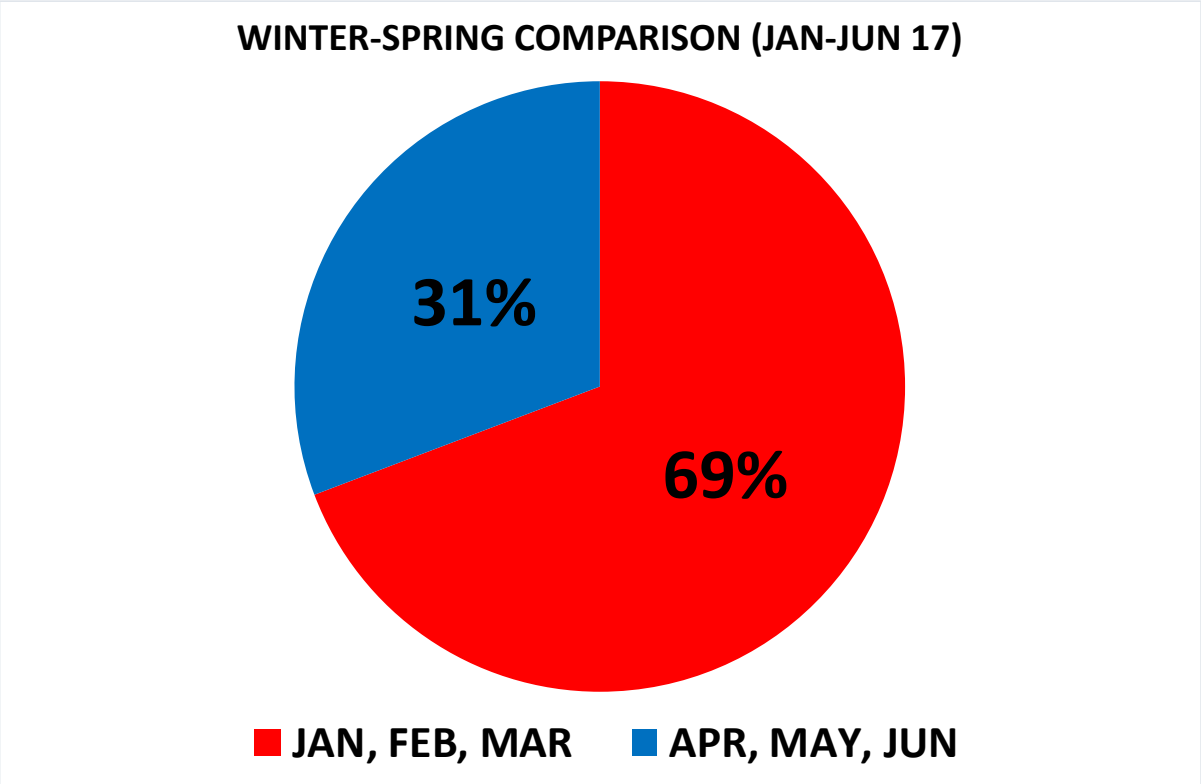
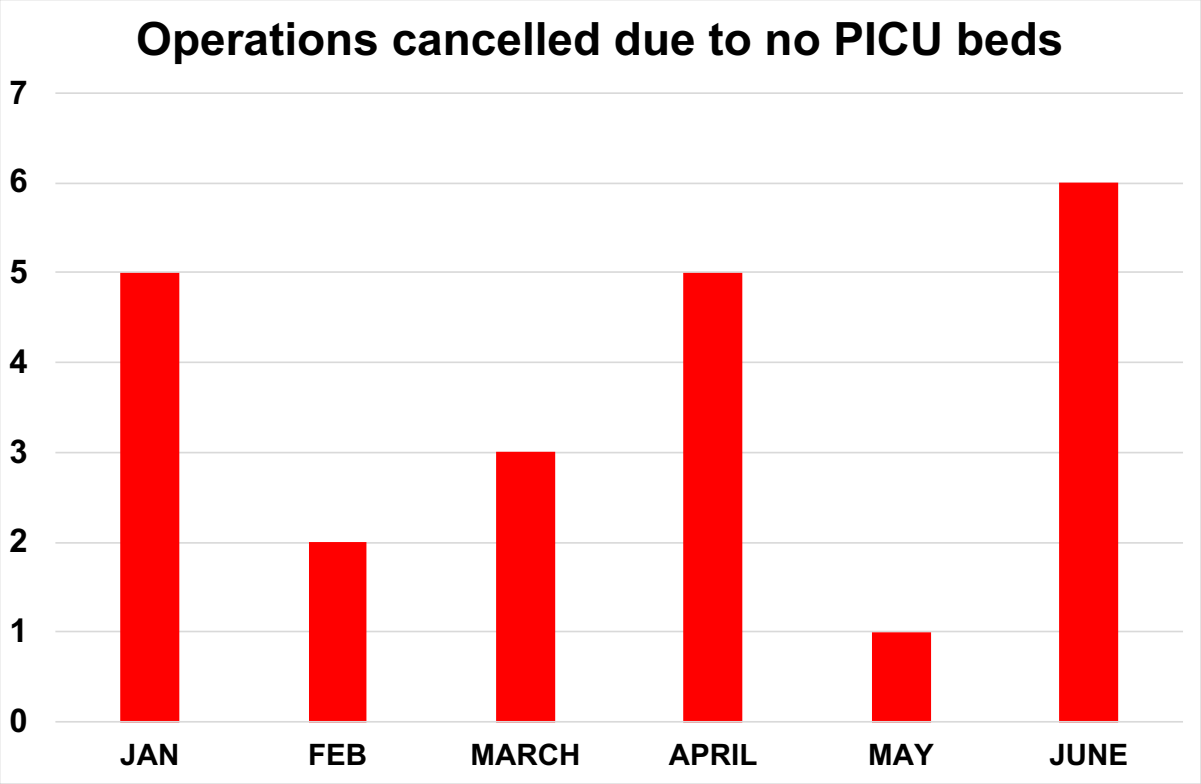

WINTER-SPRING COMPARISON (JAN-JUN 17)
31%
69%
JAN, FEB, MAR
APR, MAY, JUN

Fig. 20


Operations cancelled due to no PICU beds
7
6
5
4
3
2
1
0
JAN
FEB
MARCH
APRIL
MAY
JUNE

Appendix 1.

SAFETY HUDDLE FEEDBACK FROM STAFF

“Helps problem solving to be more efficient and a lot less time consuming”

“Helpful to get team together at beginning of shift, that way the sickest patients can be seen first”

“Huddles work well on our ward, especially on busy days. It is particularly useful for bed management and acuity”

WATCHER LIST FEEDBACK FROM STAFF ON PICU

'YES' I think having a watchers list improves situational awareness around the deteriorating patient...

'YES' I think it's valuable to have an overview of the Watchers across the children's hospital.

“Forewarned is forearmed!”

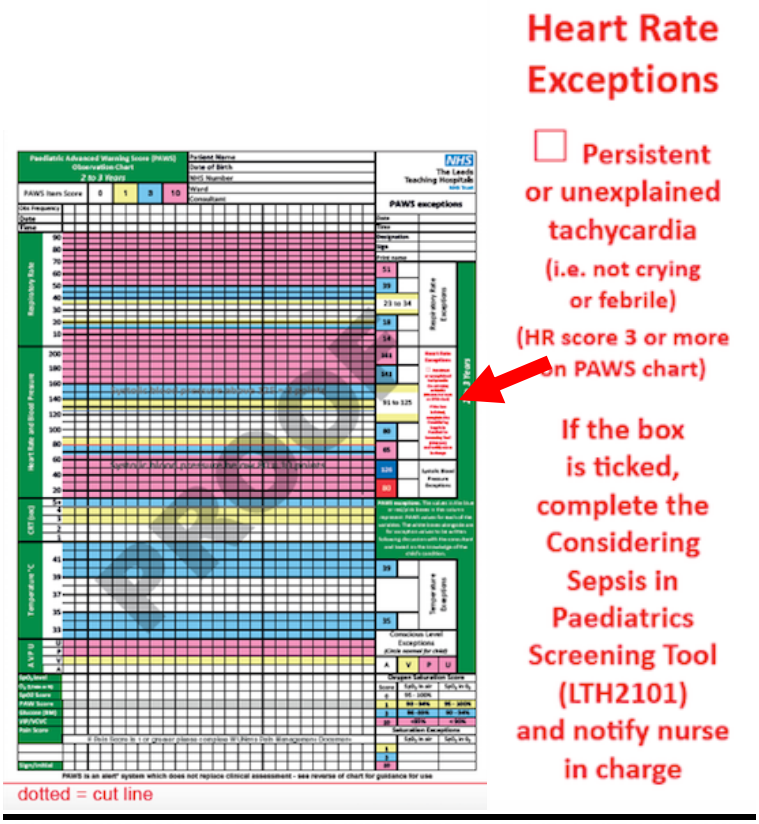
“Very helpful system particularly when on nights as increased awareness of patients in the hospital who were likely to require input/review”

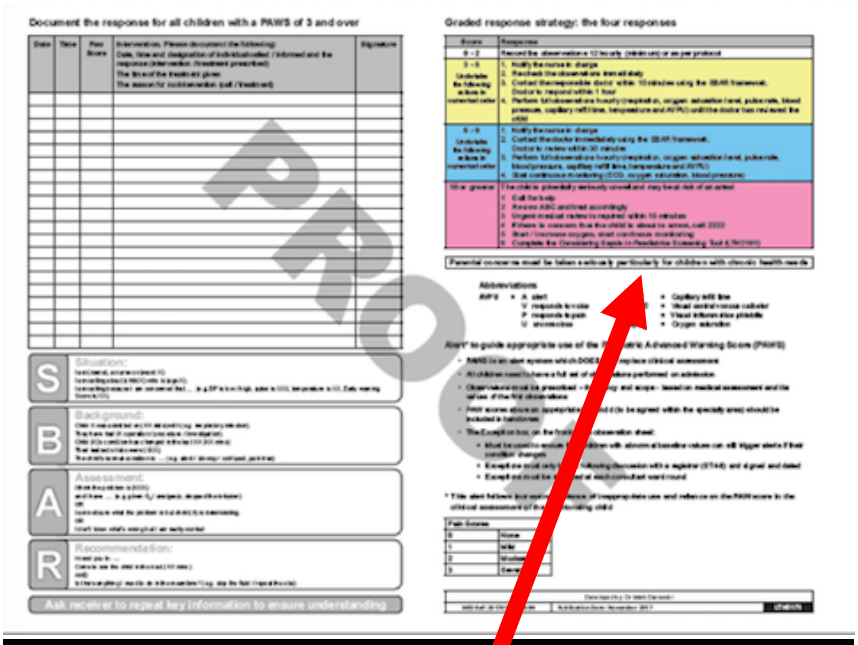
“….at other times patients required escalation of care but were well known to the PICU team from being on the watcher list”

“Speaking from a nursing point of view, particularly in view of being in charge of the unit, we benefit from being aware of any patients around the hospital who may end up needing critical care as we can almost prepare for that eventuality in regard to staffing and skill mix”

Appendix 2:

PROPOSED PAWS CHART AMENDMENT





Complete the Considering Sepsis in Paediatrics Screening Tool (LTH2101)