Quality improvement in paediatrics

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Learning objectives

- Define quality
- Explore the principles of quality improvement
- Model for improvement and SPC charts
- Getting started
- Tips for success

What is quality?

The dimensions of quality	
Safe Avoiding harm to patients from care that is intended to help them.	**Timely** Reducing waits and sometimes harmful delays.
Effective Providing services based on evidence and which produce a clear benefit.	**Efficient** Avoiding waste.
Person-centred Establishing a partnership between practitioners and patients to ensure care respects patients' needs and preferences.	**Equitable** Providing care that does not vary in quality because of a person's characteristics.

the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge

Institute of medicine

The Health Foundation 2013 Quality improvement made simple: What everyone should know about health quality improvement

What is quality improvement (QI)?

A systematic, formal approach to the analysis of practice performance and efforts to improve performance

www.aafp.org

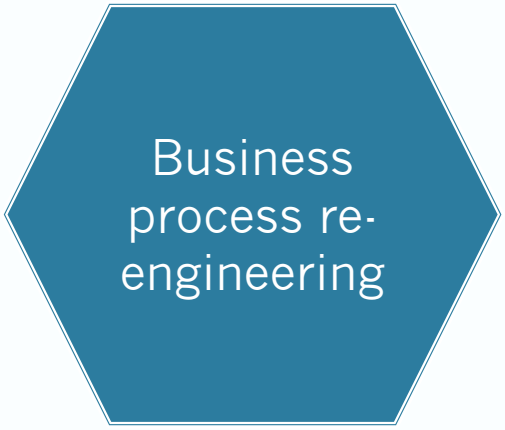
Principles of QI

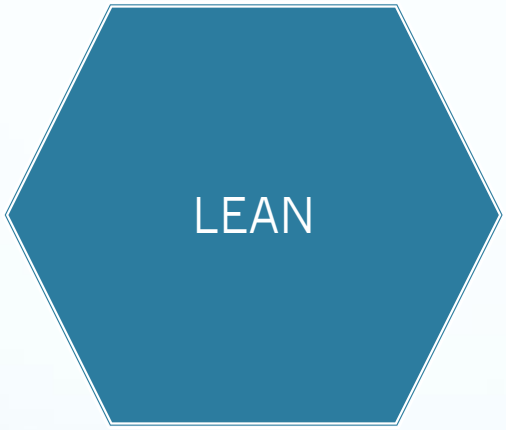
- Understand the problem
- Data and measuring for improvement
- Understand the process
- Improve reliability
- Analyse demand, capacity and flow
- Choose tools to bring about change
- Enthuse, involve and engage staff
- Involve patients and co-design

The Health Foundation (2013) Quality improvement made simple: What everyone should know about health quality improvement

QI tools

Statistical process control


Business process re-engineering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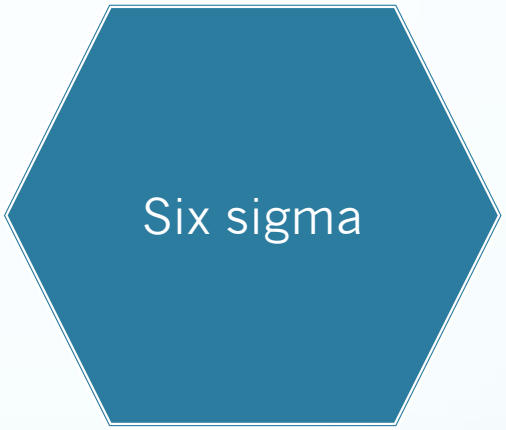
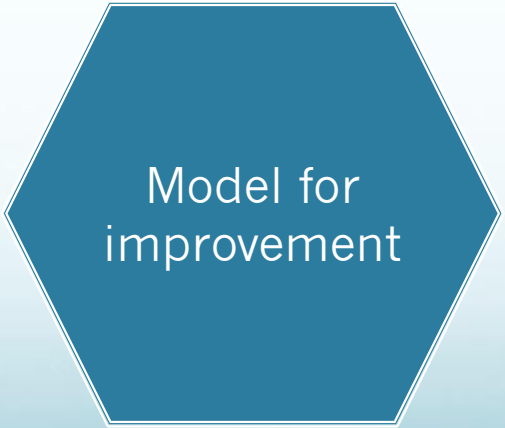
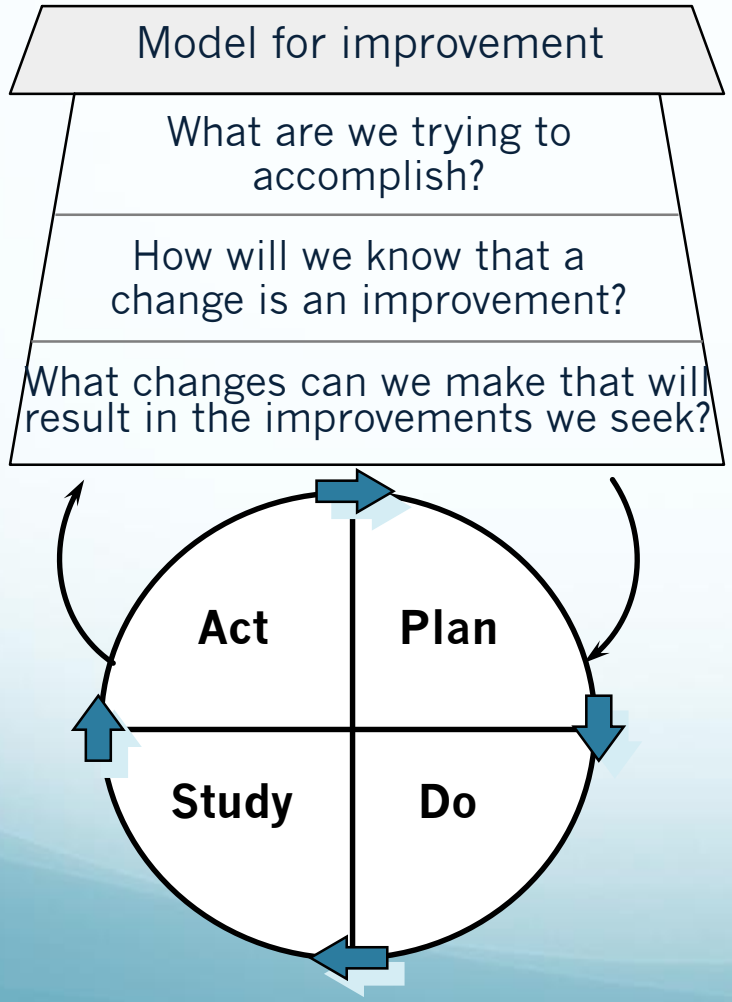

Six sigma

Experience-based co-design


Model for improvement

Total Quality Management

Model For Improvement



Aim – how much, by when?

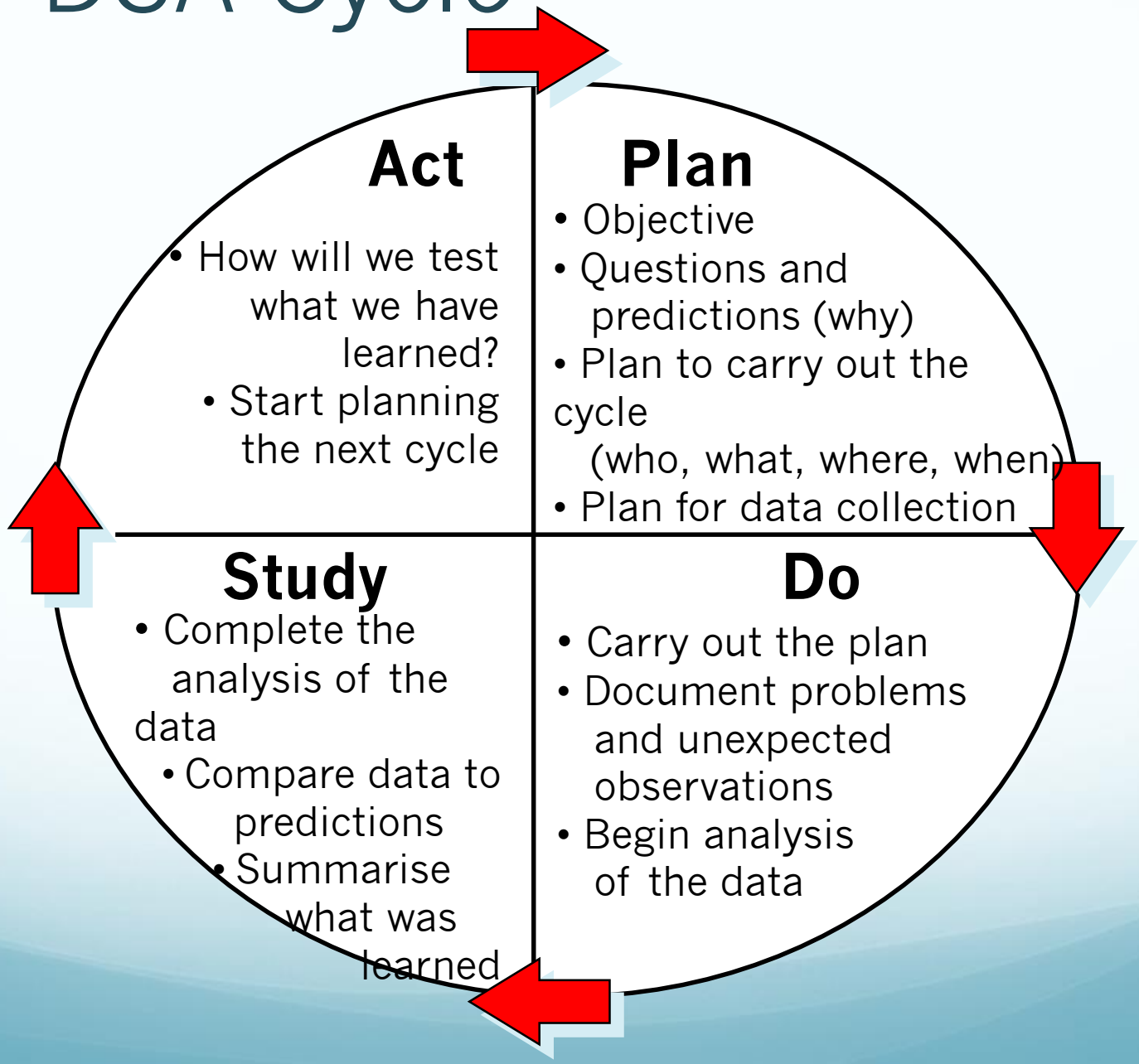
Measurement

Frontline staff suggest innovative ideas to overcome problems

Test ideas before implementing.
PDSA Cycles are mini-audits

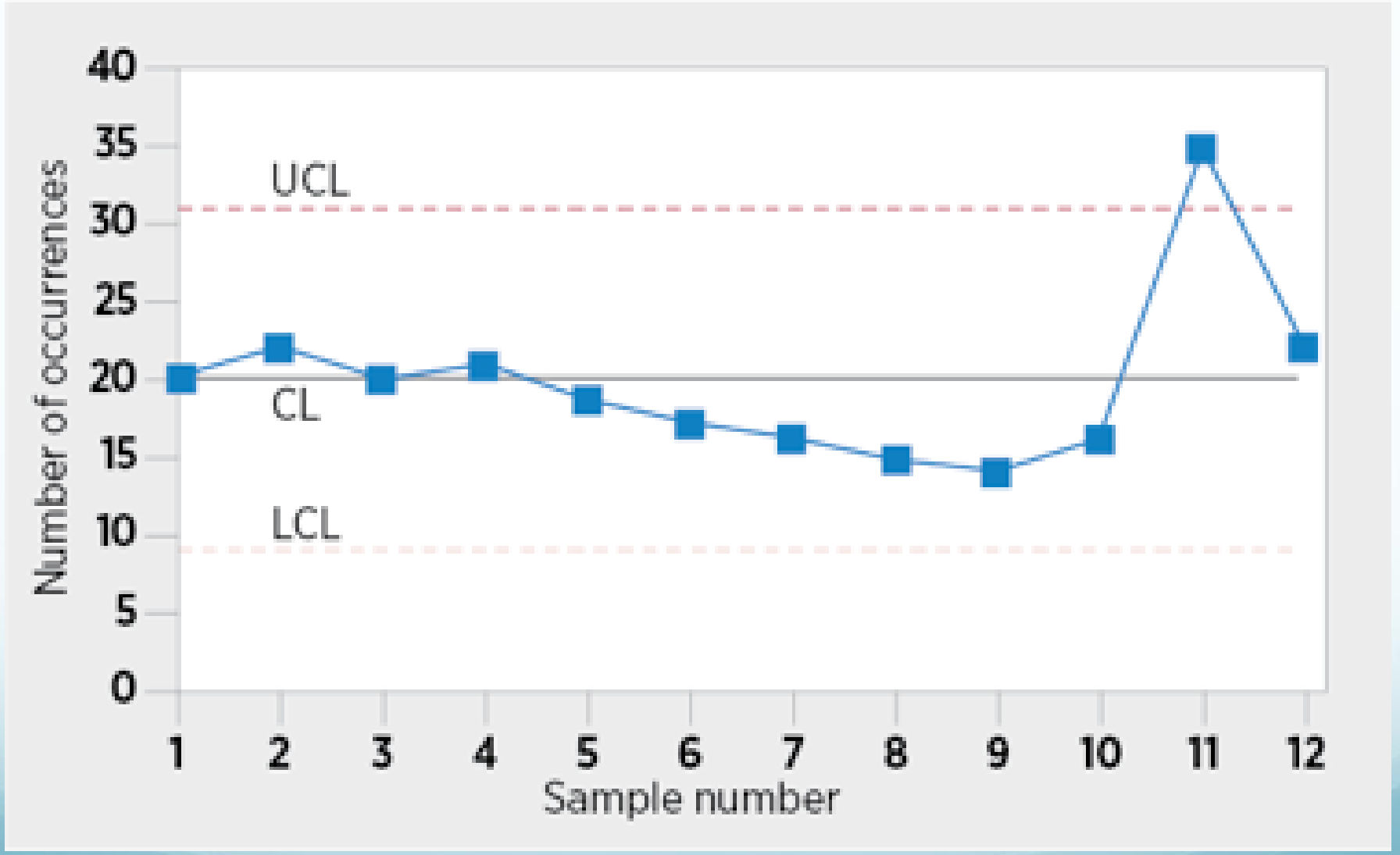
The Improvement Guide: A practical approach to enhancing organizational performance (2nd Edition 2009)
Gerard J. Langley, Kevin M. Nolan, Thomas W. Nolan, Clifford L. Norman, Lloyd P. Provost

The PDSA Cycle



Statistical Process Control (SPC) charts

- Excellent way of **measuring for improvement**
- Use the pattern of events in the past to predict with some degree of certainty where future events should fall
- Distinguish between the natural/common cause variation and special cause variation
- Enable you to look for problems when they are there, not when they are not
- Can motivate staff to improve practice thereby reducing adverse events and minimising variation


Number of occurrences
40
35
30
25
20
15
10
5
0
UCL
CL
LCL
1
2
3
4
5
6
7
8
9
10
11
12
Sample number

SPC charts

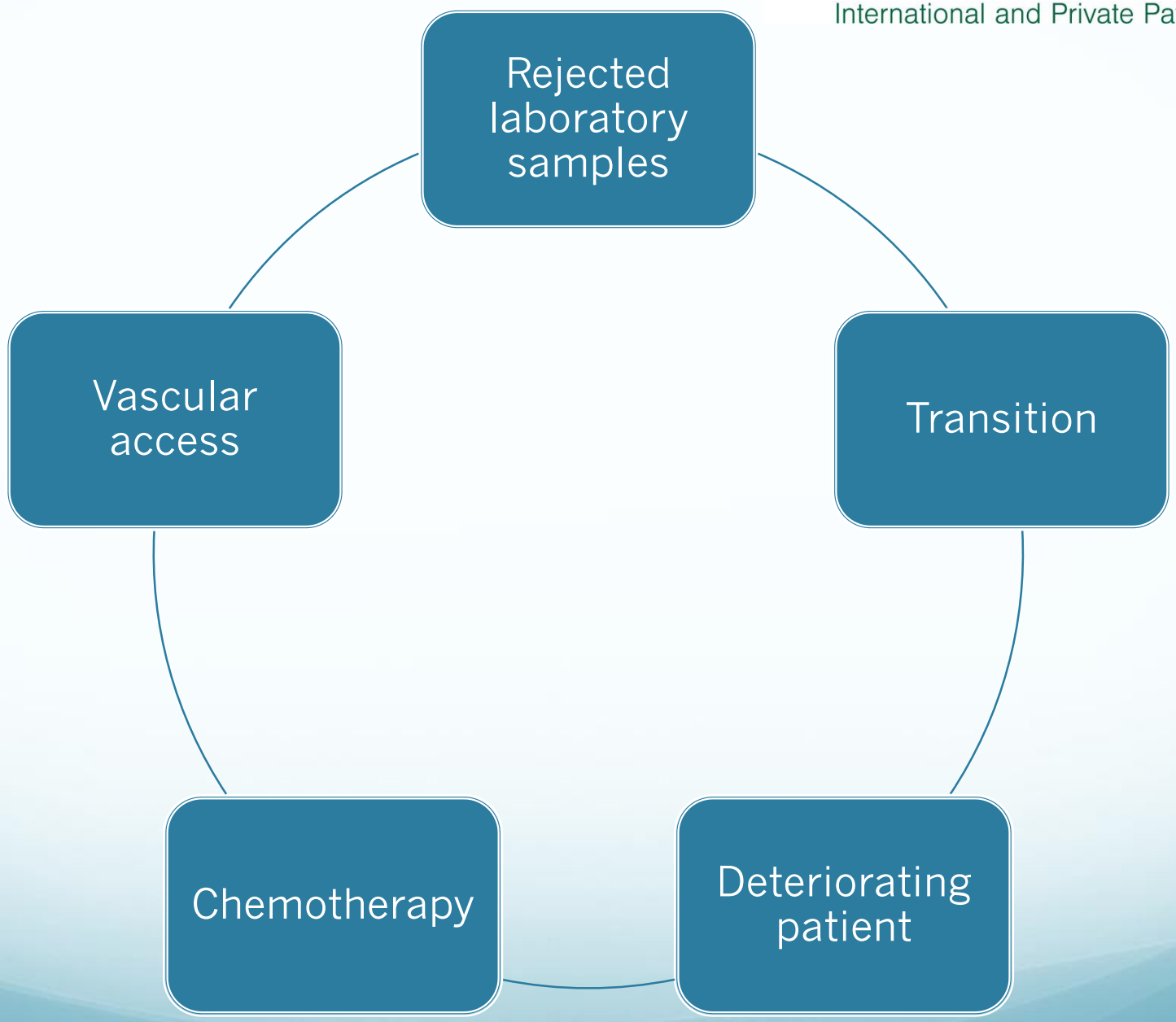
Natural cause versus special cause variation

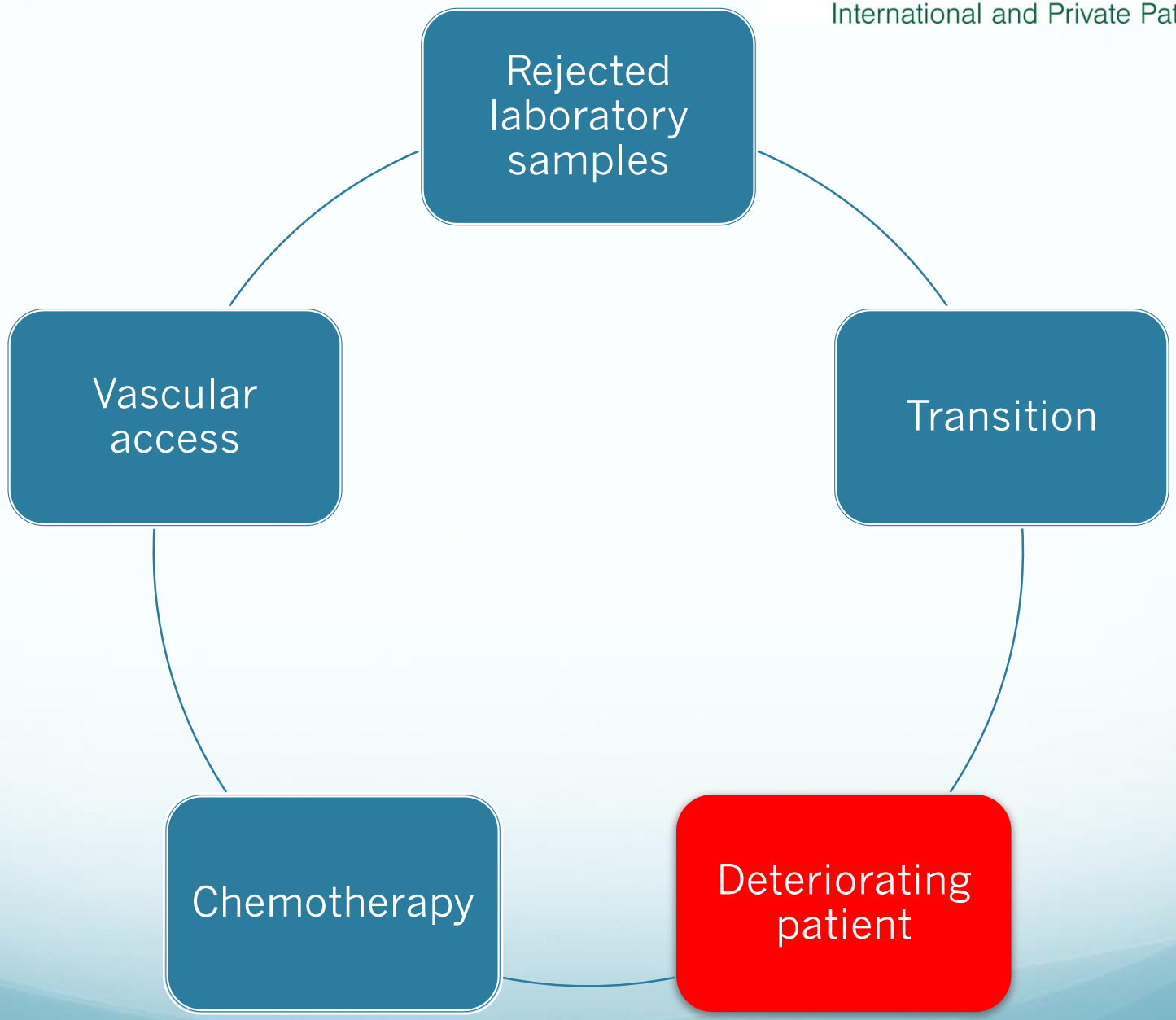
- All special causes should be investigated to see whether they are an indication of process change and / or improvement.

- **Runs** - seven consecutive points above or below the mean/median
- **Trends -** seven consecutive points all increasing or decreasing
- **Outliers -** a data point which is outside of the control limits

GREAT ORMOND STREET
HOSPITAL FOR CHILDREN

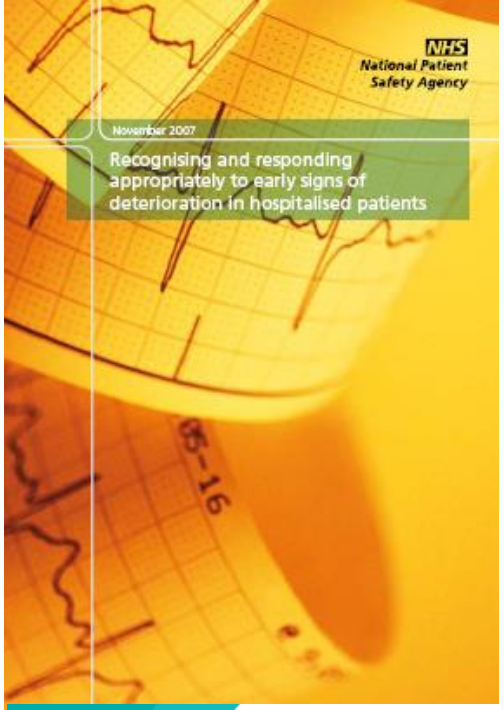
Camden
GT. ORMOND
STREET
WC1

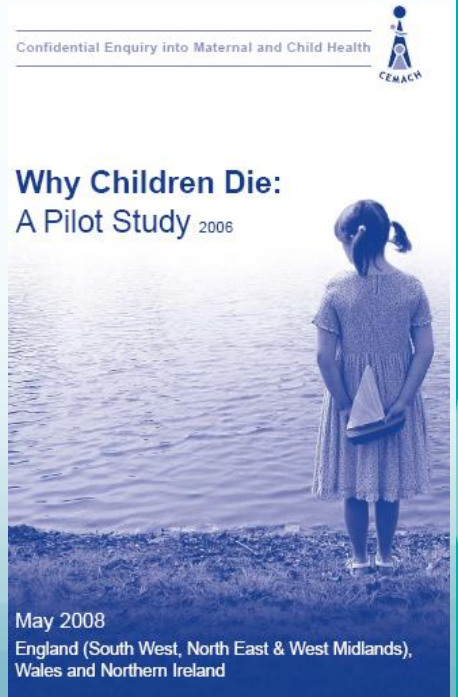

Rejected laboratory samples
Transition
Deteriorating patient
Chemotherapy
Vascular access

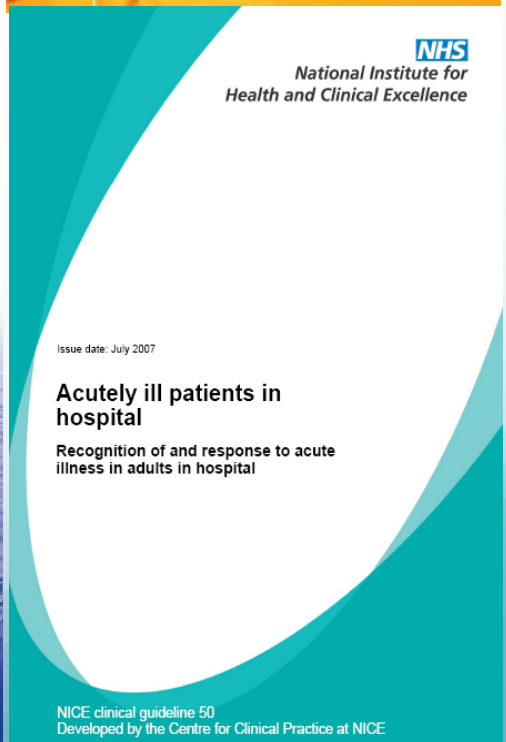

Rejected laboratory samples
Transition
Deteriorating patient
Chemotherapy
Vascular access

Key issues around deteriorating hospitalised patients

- Failure to monitor
- Failure to recognise
- Failure to communicate
- Failure to respond



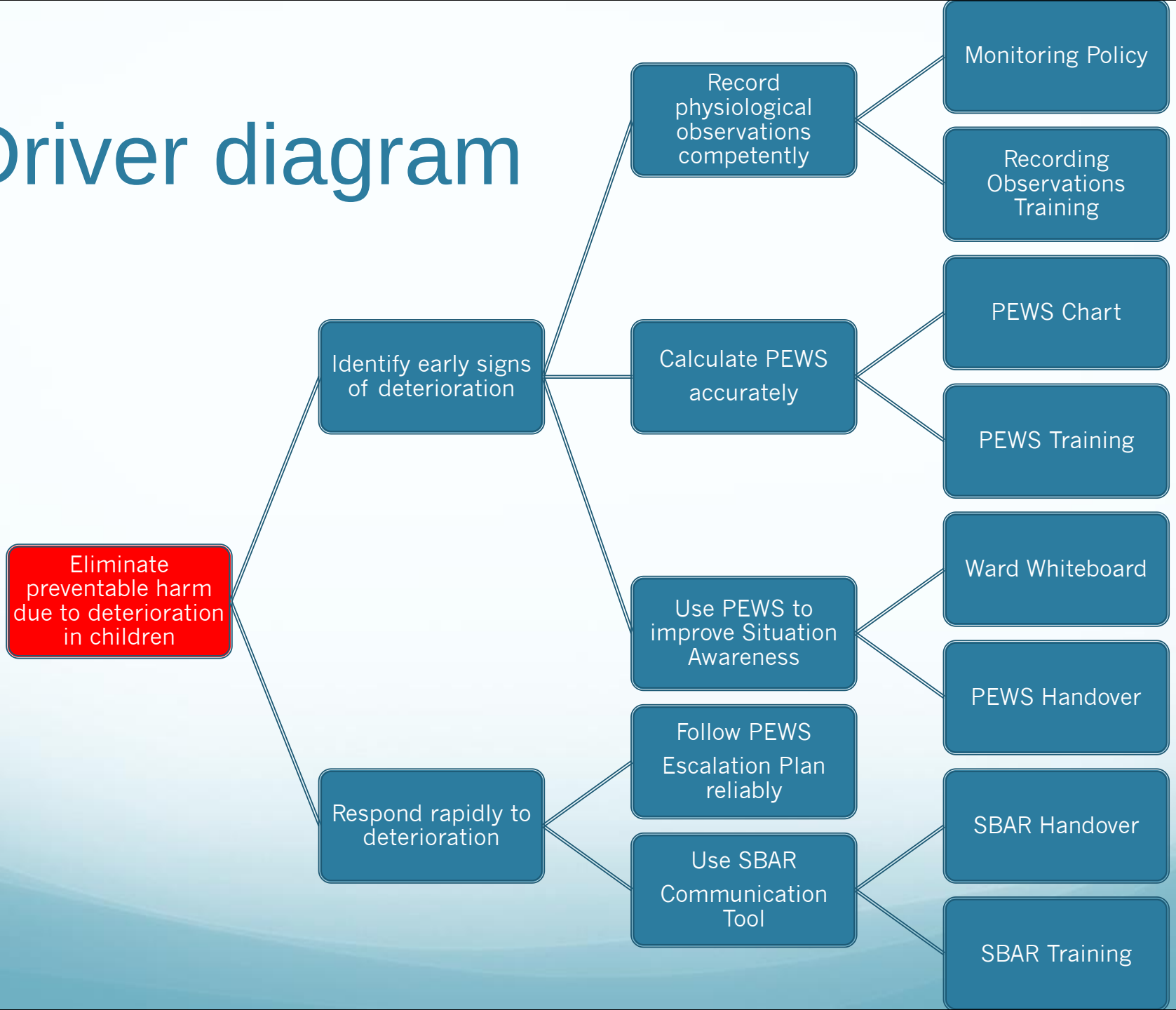




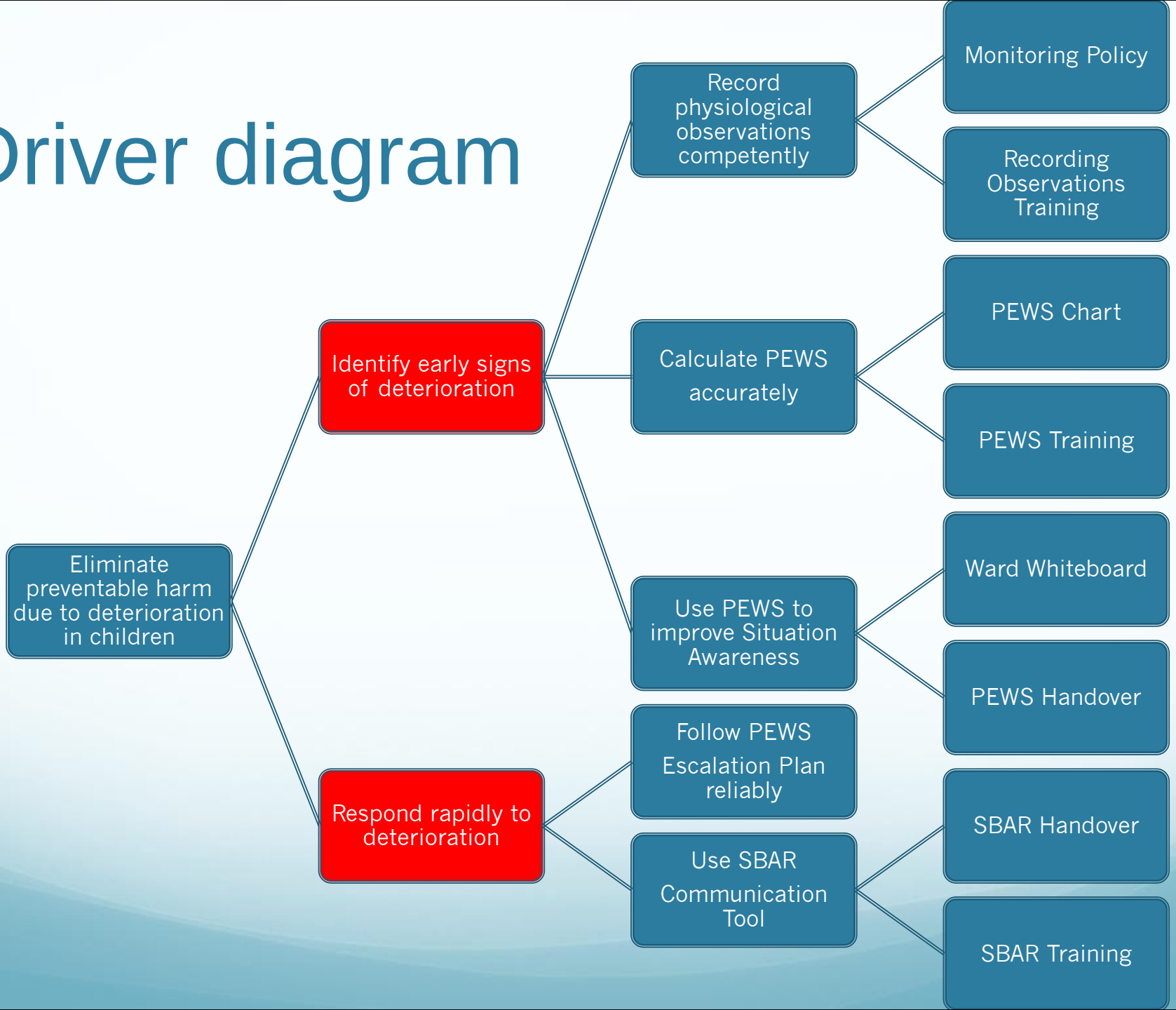
Build The Team

- Lead Nurse / Matron
- Lead Paediatrician
- Improvement Advisor
- Clinical Champions – frontline staff
- Administrator
- Executive Sponsor
- NHS Institute for innovation and improvement

Driver diagram



Driver diagram



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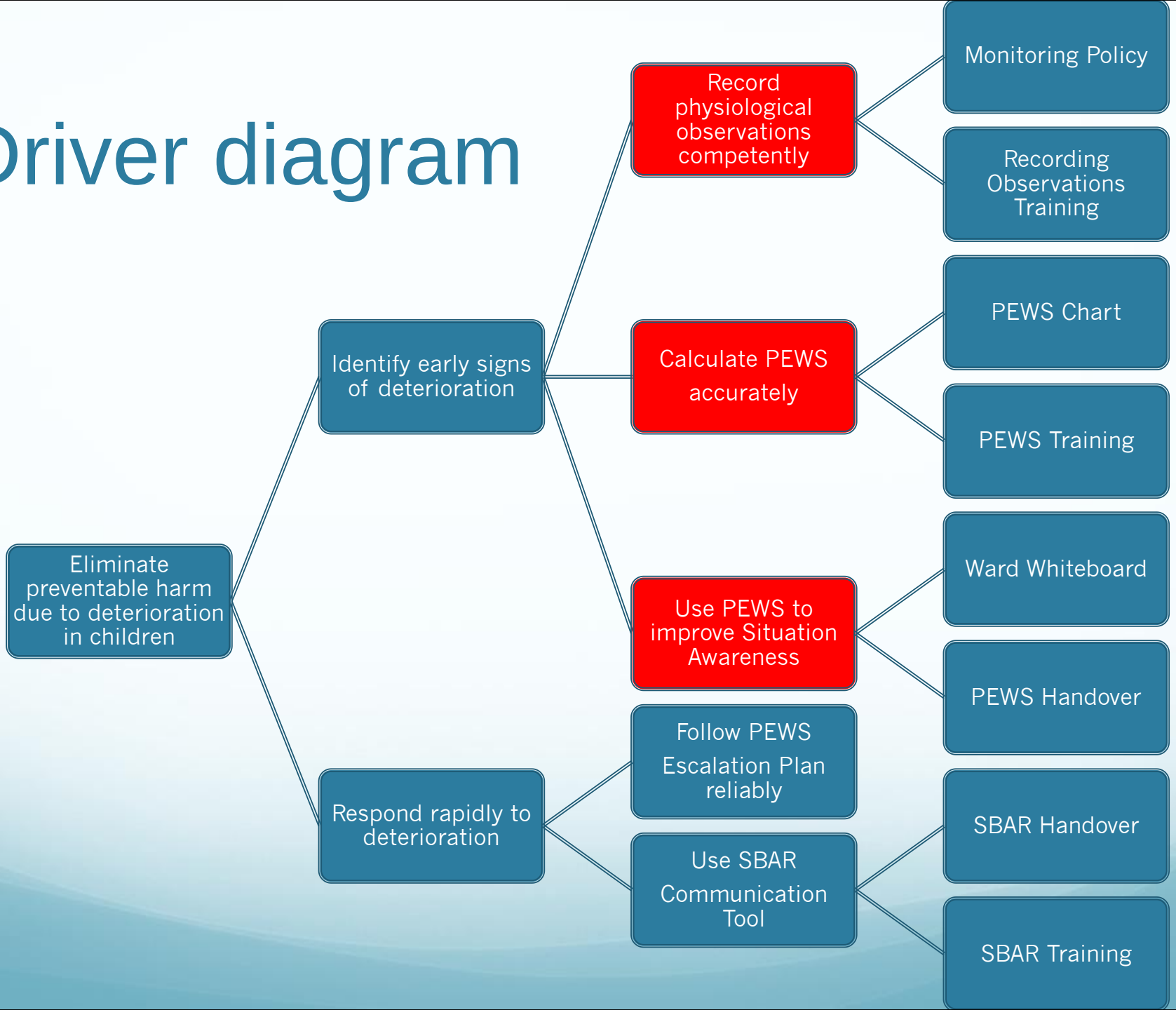

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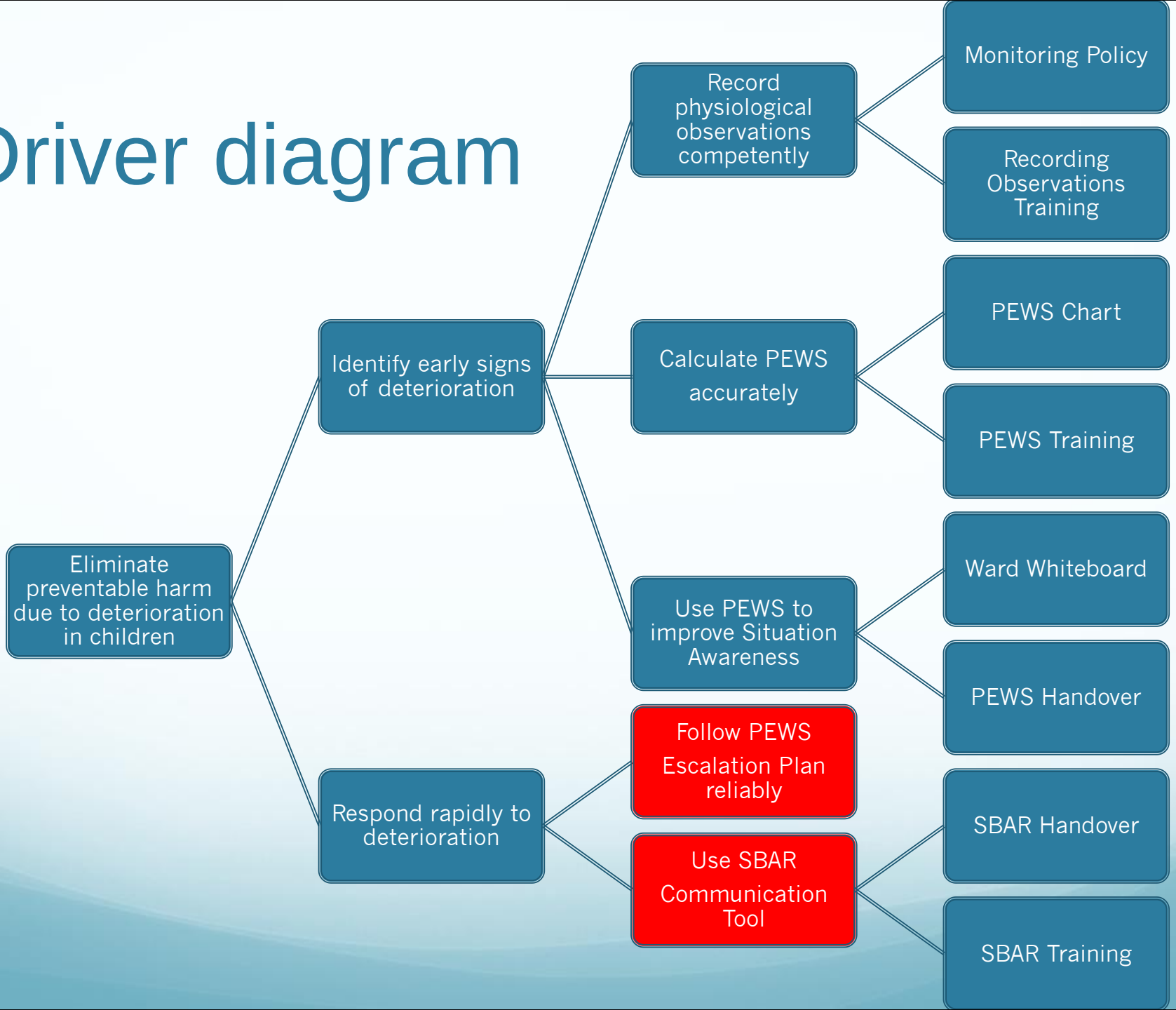

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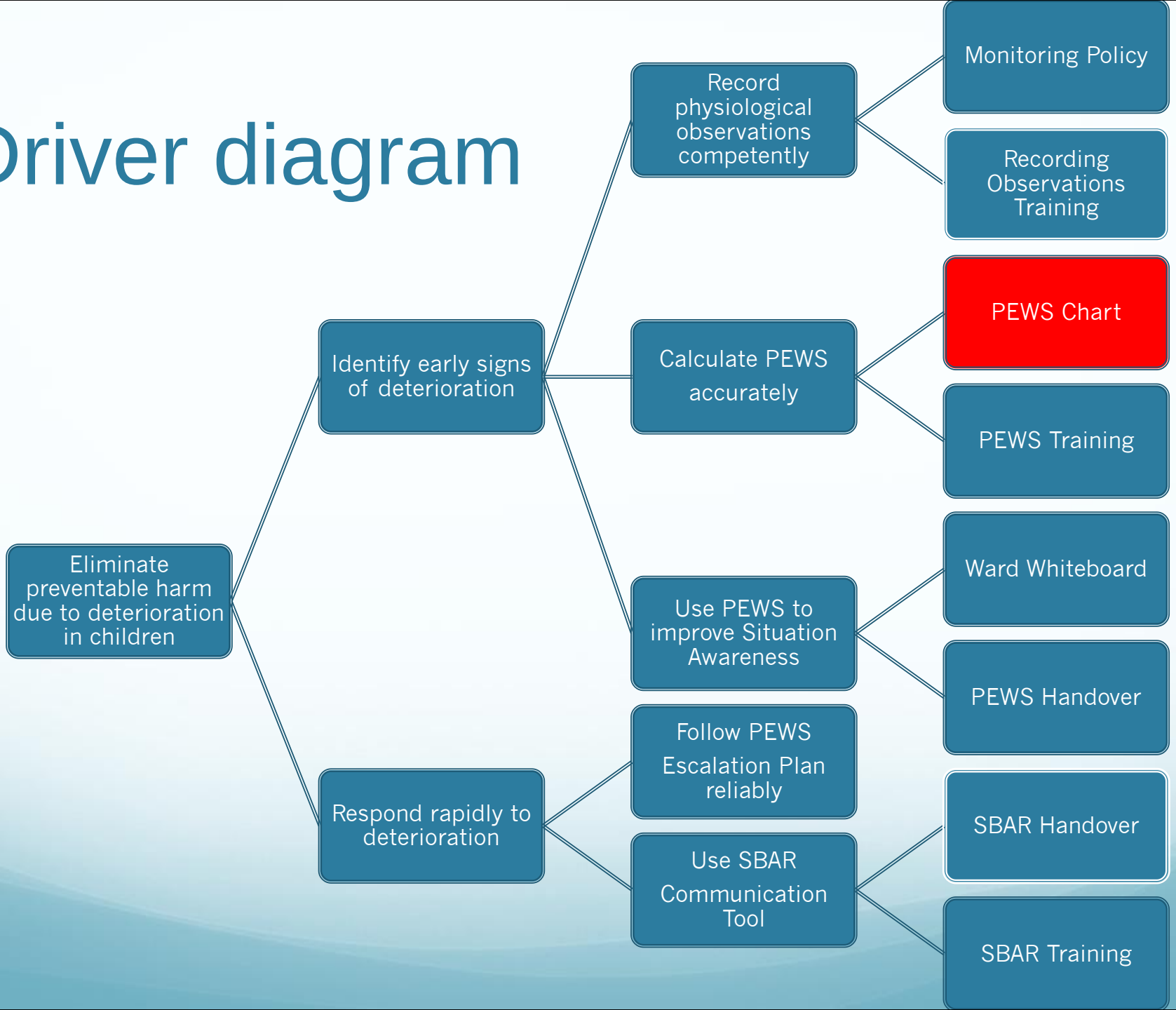
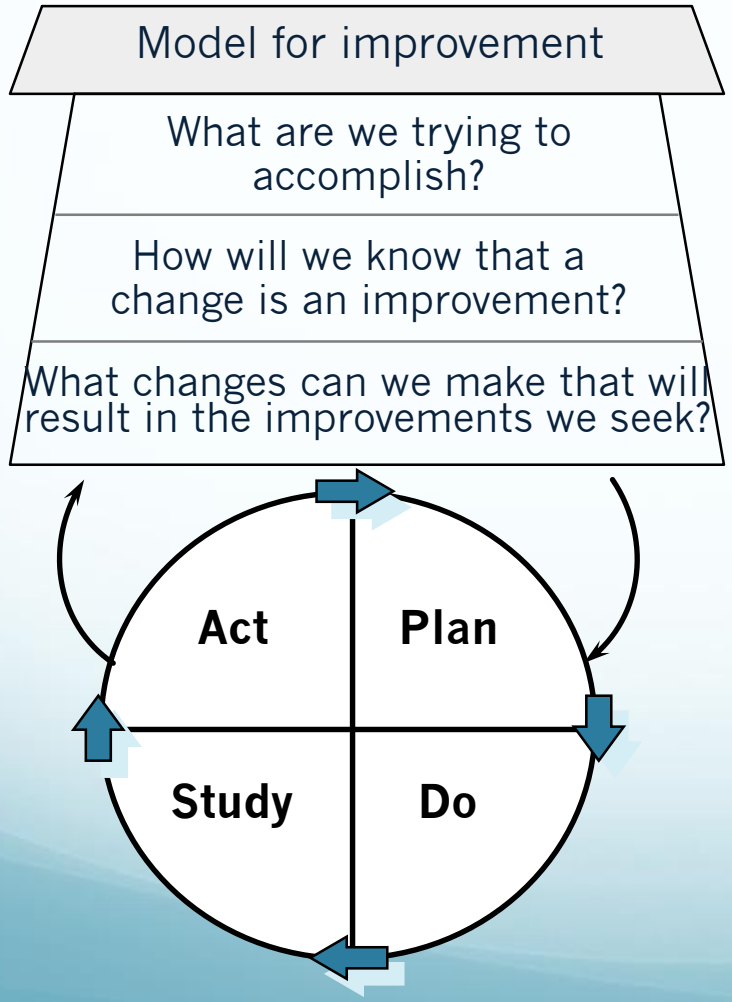


Model For Improvement



- Aim – ↑ Days between crash calls to 180 within 1 year and 365 within 2 years
- Measurement: Process, Outcome and Balancing
- Frontline staff suggest innovative ideas to overcome problems
- Test ideas before implementing. PDSA Cycles are mini-audits

The Improvement Guide: A practical approach to enhancing organizational performance (2nd Edition 2009)
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PDSA Cycle Template

PDSA Cycle Template for Testing Changes

PDSA Cycle Number:	Start Date:	End Date:
What is the purpose of this test / cycle?	1. Collect data to develop a change ☐ 2. Test a change ☐	
Short Description of Cycle Objective:		
PLAN	Question 1: Prediction:	
	Question 2: Prediction:	
	Question 3: Prediction:	
	Question 4: Prediction:	
What change(s) will be tested?		
How will the change be tested? Test in the optimal conditions with your champions at first. Then see if it works under normal & finally, challenging conditions	Who, What, Where, When, How? Consider both the preparation and the actual test itself	
Data Collection Plan Ideally the frontline clinicians will collect, analyse and own the data (measures or observations)	Who, What, Where, When, How? Ensure data is "need to have", not "nice to have"	

DO:	Carry out the test, collect the data and begin the analysis Describe what actually happened when you ran the test.
STUDY:	Complete analysis of the data. Insert graphic analysis whenever possible Describe the measured results and how they compared to the predictions
	Question 1: Prediction: Results: Learning:
	Question 2: Prediction: Results: Learning:
	Question 3: Prediction: Results: Learning:
	Question 4: Prediction: Results: Learning:
Summarise what was learned overall:	
ACT	Plan for the next PDSA cycle. Are we ready to make a change?
Recognise Contributors:	

Start small…….

- 1 patient
- 1 nurse
- 1 doctor
- 1 day

Testing: 1 ➡ 3 ➡ 5 ➡ All

Normal Parameters			
Age group	Respiratory rate	Heart rate	Systolic BP
Birth – 1 month	40-60	100-180	70-90
1-12 months	35-40	100-180	70-90
1-6 years	25-30	95-140	80-100
6-12 years	20-25	80-120	90-110
[illegible]	[illegible]	[illegible]	100-120

		0	[illegible]	[illegible]	3	Score
Resp	Resp Rate	Normal	10 > Normal	20 > Normal	5 < Normal	(0-3)
	Recession	None	Mild	Moderate	Severe	
	Oxygen	None	0.1-2 l/min	2.1-6 l/min	>6 l/min	
CVS	Colour	Pink	Pale	Grey	Grey/Mottled	(0-3)
	Cap refill	<2 secs	2-3 secs	3-4 secs	>4 secs	
	Heart Rate	Normal	Normal	20 > Normal	30 > Normal	
Neuro		Normal	Inappropriately Sleepy	Irritable	Lethargic / confused	(0-3)
Score 2 extra for ¾ hourly nebs or persistent vomiting post surgery					Total score:	(0-11)

Write the total score on the observation chart

	0-1	2	3	4	5
Code:	White	Green	Yellow	Orange	Red
Response	Nurse	Nurse in charge	SHO Review	SHO Review & inform cons	SHO & cons
Observations	2-4 hourly	1-2 hourly	Hourly	Hourly	½ hourly
Do you need more help?				Total score:	

If you are worried about a patient, ask someone more senior to review

Paed SHO	Bleep 1006	
Paed Cons	Bleep 1000	
PARRT	Bleep 2525	
ITU Float Reg	Bleep 1030	
CATS	0800-085-0003	

Engage the experts!

PDSA PEWS Forms

RFH Paediatric Early Warning Score – Pilot study

Normal Parameters			
Age group	Respiratory rate	Heart rate	Systolic BP
Birth – 1 month	40-60	100-180	0-90
1-12 months	35-40	100-180	0-90
1-5 years	25-30	95-140	80-100
6-12 years	20-25	80-120	90-110
13-18 years	15-20	55-90	100-120

		0	1	2	3	Score
Resp	Resp Rate	Normal	10 > Normal	20 > Normal	5 < Normal	(0-3)
	Recession	None	Mild	Moderate	Severe	
	Oxygen	None	0.1-2 l/min	2.1-6 l/min	>6 l/min	
CVS	Colour	Pink	Pale	Grey	Grey Mottled	(0-3)
	Cap refill	<2 sec	2-3 sec	3-4 sec	>4 sec	
	Heart Rate	Normal	Normal	20 > Normal	30 > Normal	
Neuro		Normal	Inappropriately Sleepy	Irritable	Lethargic confused	(0-3)
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Observations	2-4 hourly	1-2 hourly	Hourly	Hourly	½ hourly
Do you need more help?				Total score:	

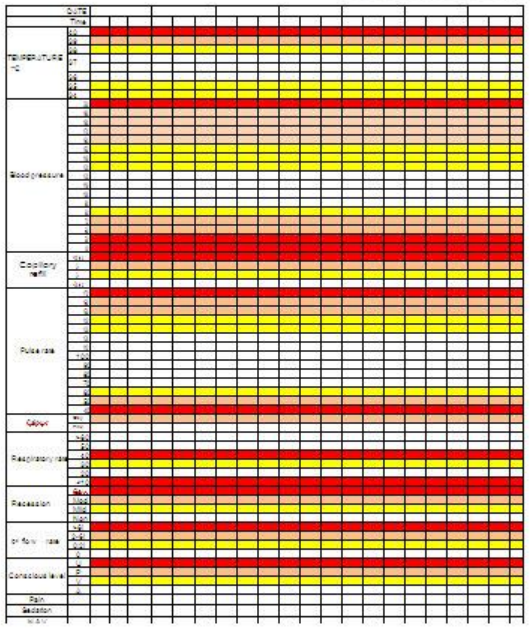
If you are worried about a patient, ask someone more senior to review

Paed SHO	Bleep 1006	
Paed Cons	Bleep 1000	
PARRT	Bleep 2525	
ITU Float Reg	Bleep 1030	
CATS	0800-085-0003	

ROYAL FREE HAMPSTEAD NHS TRUST

PAEDIATRIC OBSERVATION CHART AGE 5-12

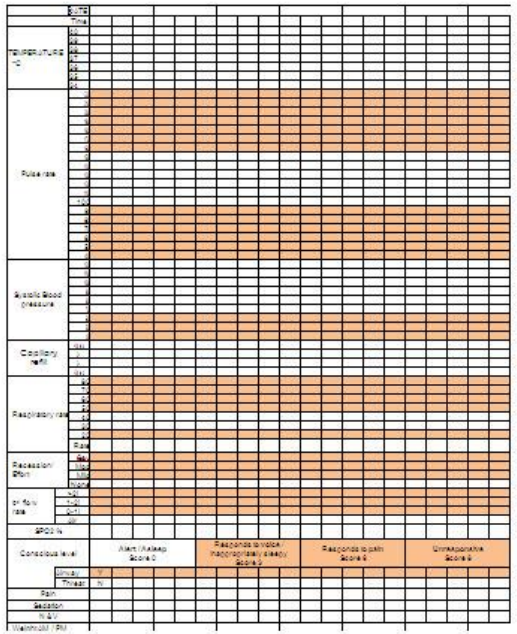
NAME
HOSP. NUMBER
DOB



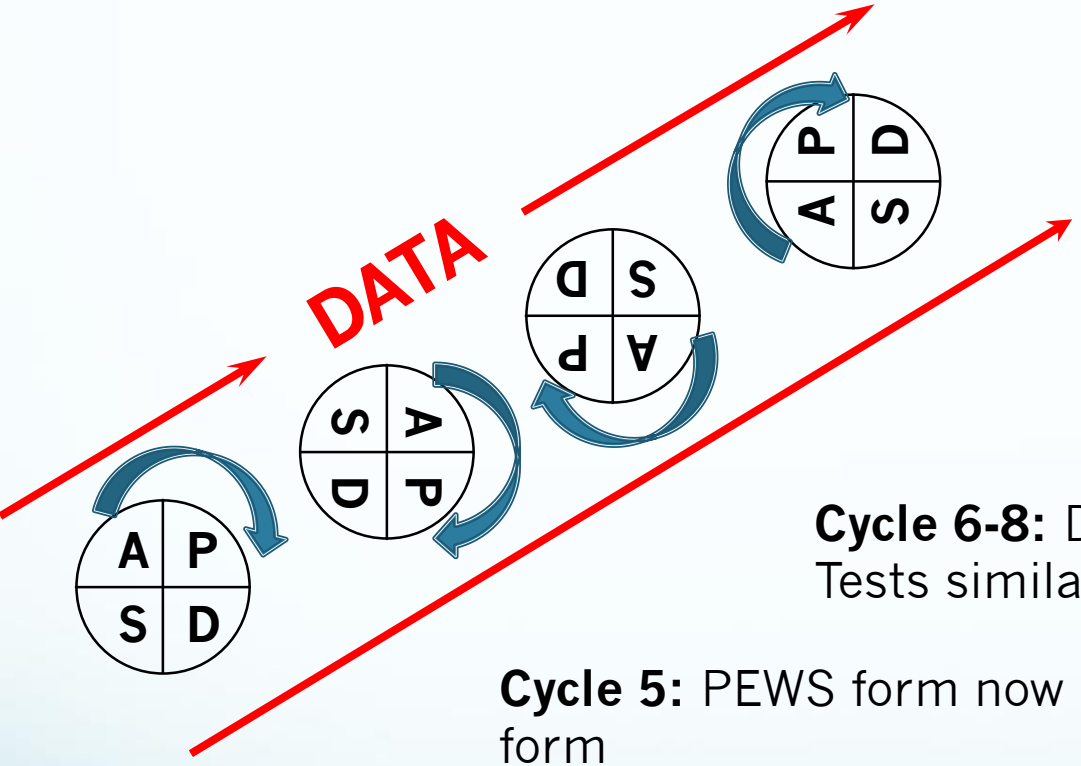
ROYAL FREE HAMPSTEADNHS TRUST
PAEDIATRIC OBSERVATION CHART

BIRTH-1 YEAR SP TRIAL B

NAME
HOSP. NUMBER
DOB



PEWS Cycles 1-9



Result: Increased buy-in from stakeholders

Cycle 9: PEWS design simplified Tests increase from 1-3-5-all

Cycle 6-8: Design of PEWS form improved. Tests similar to Cycle 1

Cycle 5: PEWS form now incorporated into observation form

Cycle 2-4: Design of PEWS form improved. Tests similar to Cycle 1

Cycle 1: First draft of modified Brighton PEWS – 1 nurse, 1 child, 1 shift

RFH Paediatric Early Warning Score – Pilot study

Normal Parameters		
Age group	**Respiratory rate**	**Heart rate**
Birth – 1 month	40-60	100-180
1-11 months	25-40	90-180
1-4 years	20-30	80-140
5-11 years	20-25	70-120
12-18 years	15-20	55-90

		0	1	2	3	Score
Resp	Resp Rate	Normal	10 > Normal	20 > Normal	5 < Normal	(0-3)
	Recession	None	Mild	Moderate	Severe	
	Oxygen	None	0-2 l/min	2 l-5 l/min	>5 l/min	
CVS	Colour	Pink	Pale	Grey	Grey /blotchy	(0-3)
	Cap refill	<2 secs	2-3 secs	3-4 secs	>4 secs	
	Heart Rate	Normal	Normal	20 > Normal	30 > Normal	
Neuro		Normal	Inappropriately Sleepy	Irritable	Lethargic/ confused	(0-3)
Score 2 extra for ¾hourly nebs or persistent vomiting post surgery					Total score:	(0-11)

Write the total score on the observation chart

	0-1	2	3	4	5
Code:	White	Green	Yellow	Orange	Red
Response	Nurse	Nurse in charge	SHO Review	SHO Review & inform cons	SHO & cons
Observations	2-4 hourly	(+2 hourly)	Hourly	Hourly	½ hourly
Do you need more help?				Total score:	

If you are worried about a patient, ask someone more senior to review

Paed SHO	Bleep 1006	
Paed Cons	Bleep 1000	
PARRT	Bleep 2525	
ITU Float Reg	Bleep 1030	
CATS	0800-058-0003	

RFH PEWS v01 – 17.11.08

RFH Paediatric Early Warning Score – Pilot study

Normal Parameters	
Age group	**Respiratory rate**	**Heart rate**
Birth – 1 month	40-60	100-180
1-11 months	25-40	90-180
1-4 years	20-30	80-140
5-11 years	20-25	70-120
12-18 years	15-20	55-90

Calculate the PEWS score below, using highest component for Resp, CVS & Neuro

		0	1	2	3	Score
Resp	Resp Rate	Normal	10 > Normal	20 > Normal	5 < Normal	(0-3)
	Distress	None	Mild	Moderate	Severe	
	Oxygen	None	0-2 l/min	2 l-5 l/min	>5 l/min	
CVS	Colour	Pink	Pale	Grey	Grey/ blotched	(0-3)
	Cap refill	<2 secs	2-3 secs	3-4 secs	>4 secs	
	Heart Rate	Normal	Normal	20 > Normal	30 > Normal	
Neuro		Normal	Inappropriately Sleepy	Irritable	Lethargic/ confused	(0-3)
					Total score:	(0-9)

Write the total score on the observation chart, each time you check the observations

Score:	0-1	2	3	4	5 or more
The Nurse-in-Charge should review all patients with a score of 2 or more					
Action:	Nurse Review	Nurse in charge Review	SHO Review	SHO Review & inform cons	SHO Review & inform cons + parent
Reviews to take place within 30 minutes					
Observations:	2-4 hourly	1-2 hourly	Hourly	Hourly	½ hourly

Do you need more help?

If you are worried about a patient, ask someone more senior to review

Paed SHO	Bleep 1006
Paed Cons	Bleep 1000
PARRT	Bleep 2525
ITU Float Reg	Bleep 1030
CATS	0800-058-0003

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PAEDIATRIC OBSERVATION CHART AGE 5-12

NAME
HOSP. NUMBER
DOB

PEWS SCORE

ROYAL FREE HAMPSTEAD NHS TRUST
PAEDIATRIC OBSERVATION CHART

BIRTH-1MTH

NAME
HOSP. NUMBER
DOB

PEWS SCORE

ROYAL FREE HAMPSTEAD NHS TRUST
PAEDIATRIC OBSERVATION CHART

BIRTH-1 YEAR V05

NAME
HOSP. NUMBER
DOB

ROYAL FREE HAMPSTEAD NHS TRUST
PAEDIATRIC OBSERVATION CHART

BIRTH-1 YEAR V06

NAME
HOSP. NUMBER
DOB

Score 1 extra point for each of the following:
1. Airway problem (including stridor)
2. Conscious level below normal
3. Doctor or nurse concern

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PAEDIATRIC OBSERVATION CHART

BIRTH-1 YEAR V07

NAME
HOSP. NUMBER
DOB

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PAEDIATRIC OBSERVATION CHART

BIRTH-1 YEAR V08

NAME
HOSP. NUMBER
DOB

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PAEDIATRIC OBSERVATION CHART

BIRTH-1 YEAR V09

NAME
HOSP. NUMBER
DOB

ROYAL FREE HAMPSTEAD NHS TRUST
PAEDIATRIC OBSERVATION CHART

BIRTH-1 YEAR V10

NAME
HOSP. NUMBER
DOB

Royal Free Hampstead NHS
PAEDIATRIC OBSERVATION CHART

0-1 YR v11

Name:
Hospital Number:
D.O.B.:

Royal Free Hampstead NHS
PAEDIATRIC OBSERVATION CHART

0-1 YR v12

Name:
Hospital Number:
D.O.B.:

ROYALFREE Paediatrics

Name:
Hospital Number:
Date of Birth:

1. Record observations. 2. Add up shaded boxes (1 point each). 3. Enter Total PEWS 4. Act on Total PEWS (PTO)

PTO

ROYALFREE Paediatrics

Name:
Hospital Number:
Date of Birth:

1. Record observations. 2. Add up shaded boxes (1 point each). 3. Enter Total PEWS 4. Act on Total PEWS (PTO)

PTO

PEWS FORM

12+ Yrs

Total PEWS = Sum of entries in shaded areas — Act on Total PEWS

PEWS Form
12+ Yrs

Name
Date of Birth
Hospital Number
Consultant
Ward

Date	30/11																						
Time	18:00																						
Doctor/Nurse/Family concern?	✓																						
Temperature °C	40																						
	39																						
	38	•																					
	37																						
	36																						
	35																						
Heart Rate & Blood Pressure (BP NOT Used to calculate PEWS)	180	EXAMPLE																					
	170																						
	160																						
	150																						
	140																						
	130																						
	120																						
	110	•																					
	100	X																					
	90																						
	80																						
	70																						
	60	X																					
	50																						
	40																						
	30																						
Heart Rate (number)	110																						
Respiratory Rate (Over 1 minute)	50																						
	40																						
	30	•																					
	20																						
	10																						
	0																						
Respiratory Rate (number)	35																						
Respiratory Distress	Severe	✓																					
	Mild-Moderate																						
	None																						
O_2 Saturation %	95																						
Receiving O_2 l/min	2																						
Wheeze (+) (++)	+																						
If Stridor (S) Apnoea (A)																							
Conscious Level	Normal																						
	Decreased	✓																					
Total PEWS	0-2 / 3-4 / 5-7	6																					

Total PEWS = Number of shaded boxes P.T.O for Action

P.T.O

PEWS Form
12+ Yrs

Name
Date of Birth
Hospital Number
Consultant
Ward

PEWS | Escalation Plan

Remember: If you feel you need more help at any time, call for help – regardless of PEW Score

0 1 — **Continue monitoring**

2 — **Nurse in Charge review**

3 — **Nurse in Charge & SHO review**

Ward SHO M-F 9am-5pm:	BLEEP	1005
Out of hours or Patient in Emergency Dept:	BLEEP	1006

4 — **Nurse in Charge & SHO review & inform Consultant**

Ward Consultant Monday-Friday 9am-5pm:	BLEEP	2315
Out of hours or patient in Emergency Dept	BLEEP	1000

5 6 7 — **Nurse in Charge & Consultant review**

Patient At Risk Team Needed?	BLEEP	2525
Crash Team Needed?	CALL	2222

Record Call When PEWS 3 Or More				Record Time of Review & Plan		
Date	Time	PEWS	Print Name *(nurse in charge)*	Time	Plan	Print Name

NHS Institute for Innovation and Improvement

PDSA Test Form

Safer Care

P.T.O

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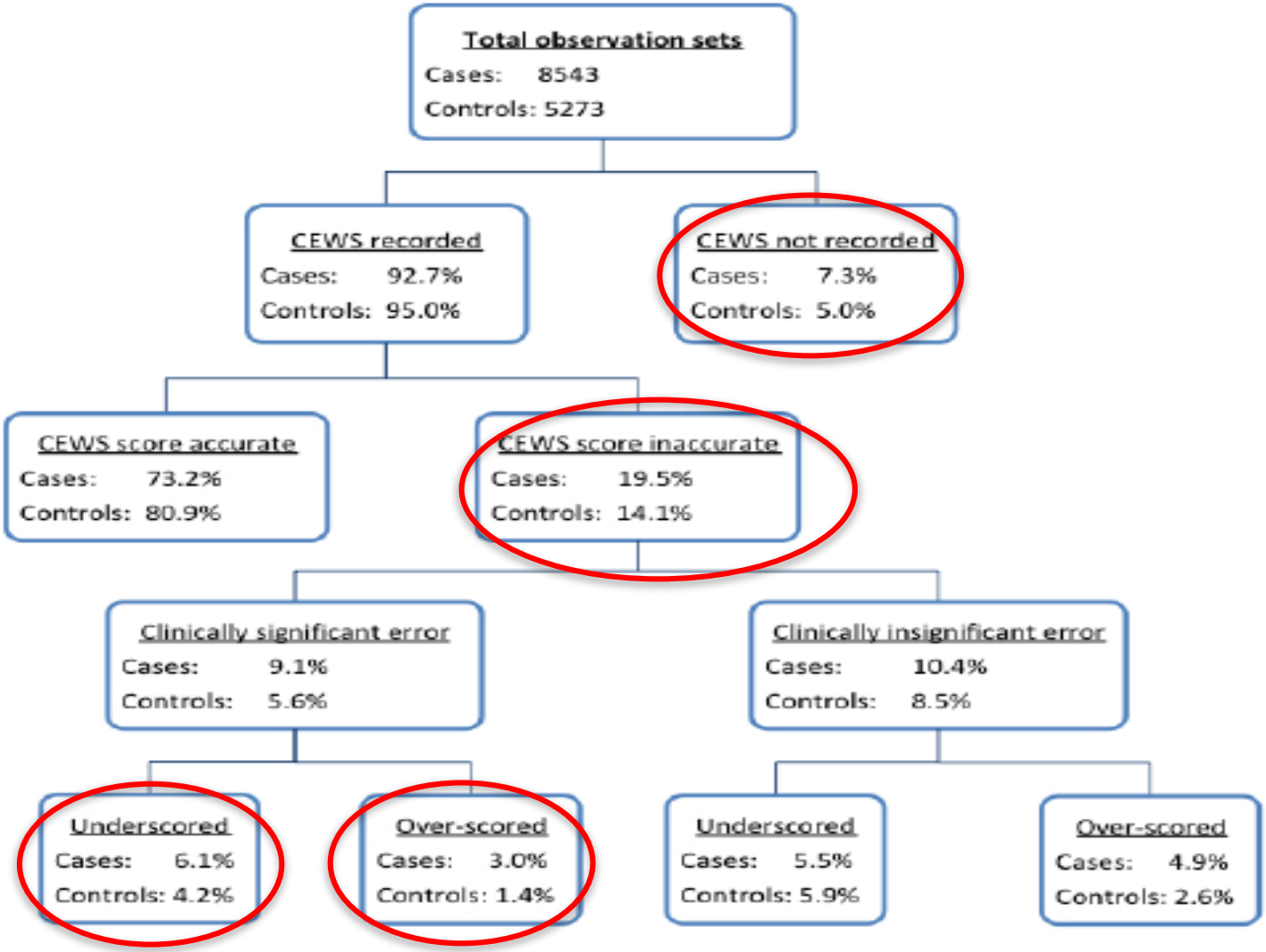
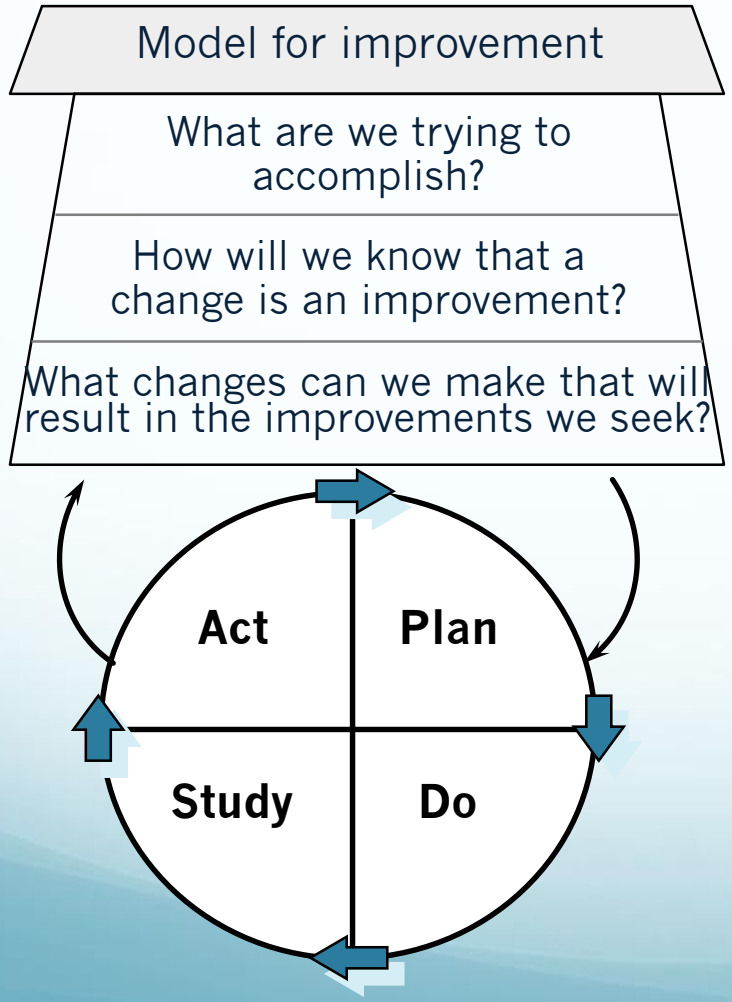
Measurement

- Process measures – CEWS scores
  - Completeness
  - Accuracy
- Standardised definitions
- Regular measurement
- Dashboards

Incomplete and inaccurate PEWS recording



Model for improvement



Aim – how much, by when?

Measurement

Frontline staff suggest innovative ideas to overcome problems

Test ideas before implementing.
PDSA Cycles are mini-audits

The Improvement Guide: A practical approach to enhancing organizational performance (2nd Edition 2009)
Gerard J. Langley, Kevin M. Nolan, Thomas W. Nolan, Clifford L. Norman, Lloyd P. Provost

Deteriorating child bundle

1. Observation plan in place
2. Observations taken in line with plan
3. All PEWS scores recorded
4. PEWS escalated appropriately
5. Escalation communicated using SBAR
6. Response appropriate (Recall)

Aim

- 95% compliance with all 6 parts of the bundle for all patients on ward A by 1 Jan

Measure:

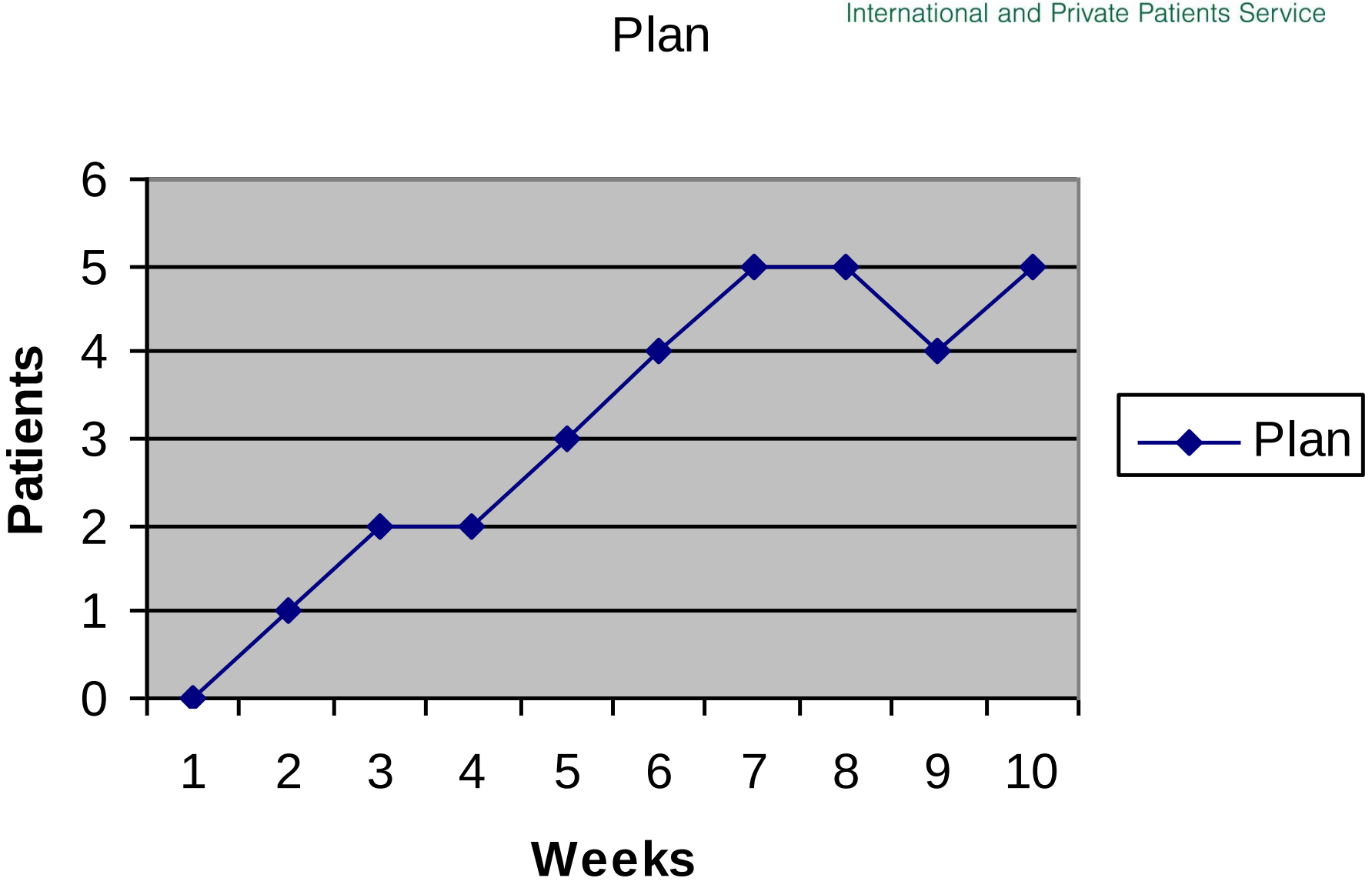
- 5 randomly selected charts per week of children who required escalation of care

Single patient measures

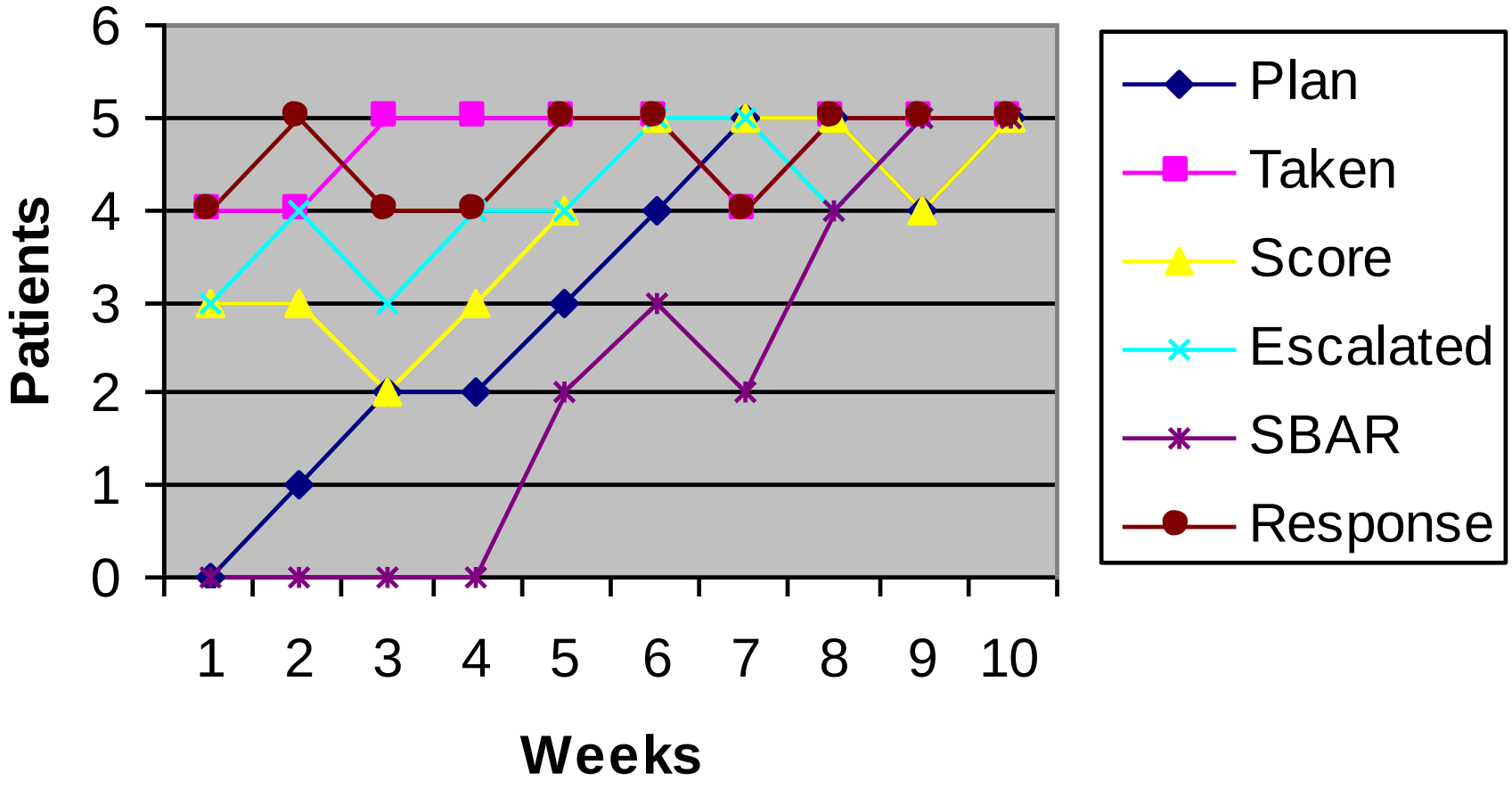
	1. Plan	2. Taken	3. Score	4. Escalate	5. SBAR	6. Response	Total	
A	X	√	√	X	√	√		

	1. Plan	2. Taken	3. Score	4. Escalate	5. SBAR	6. Response	Total	
A								
B								
C								
D								
E								
Total								

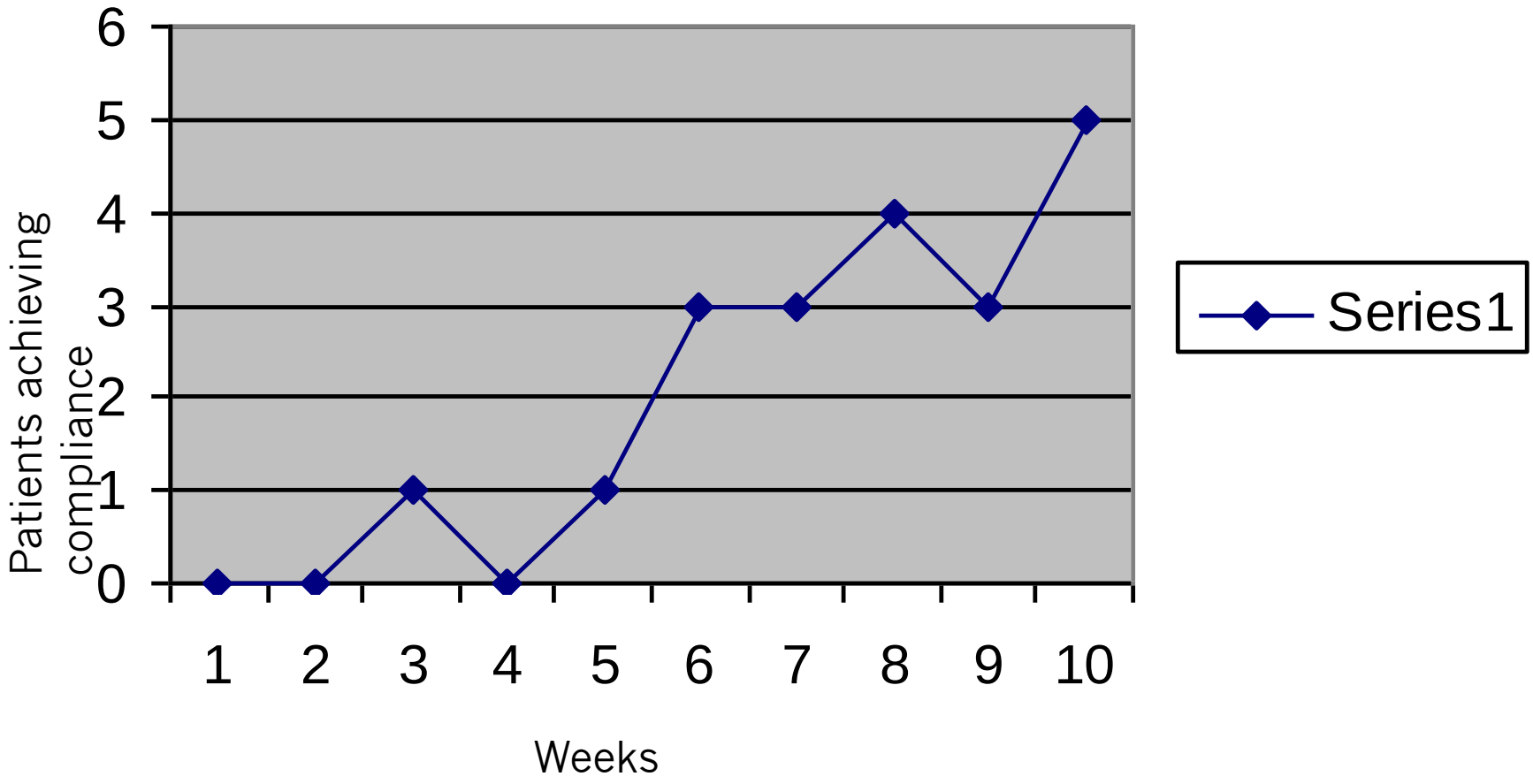
Bundle part → **Patient ↓**	1. Plan	2. Taken	3. Score	4. Escalate	5. SBAR	6. Response	Total	
A		√	√	√		√	**67%**	
B		√	√		√	√	**67%**	
C	√	√	√	√		√	**83%**	
D		√	√		√	√	**67%**	
E		√		√	√		**50%**	
Total	**20%**	**100%**	**80%**	**60%**	**60%**	**80%**		


Plan
Patients
0
1
2
3
4
5
6
1
2
3
4
5
6
7
8
9
10
Weeks
Plan

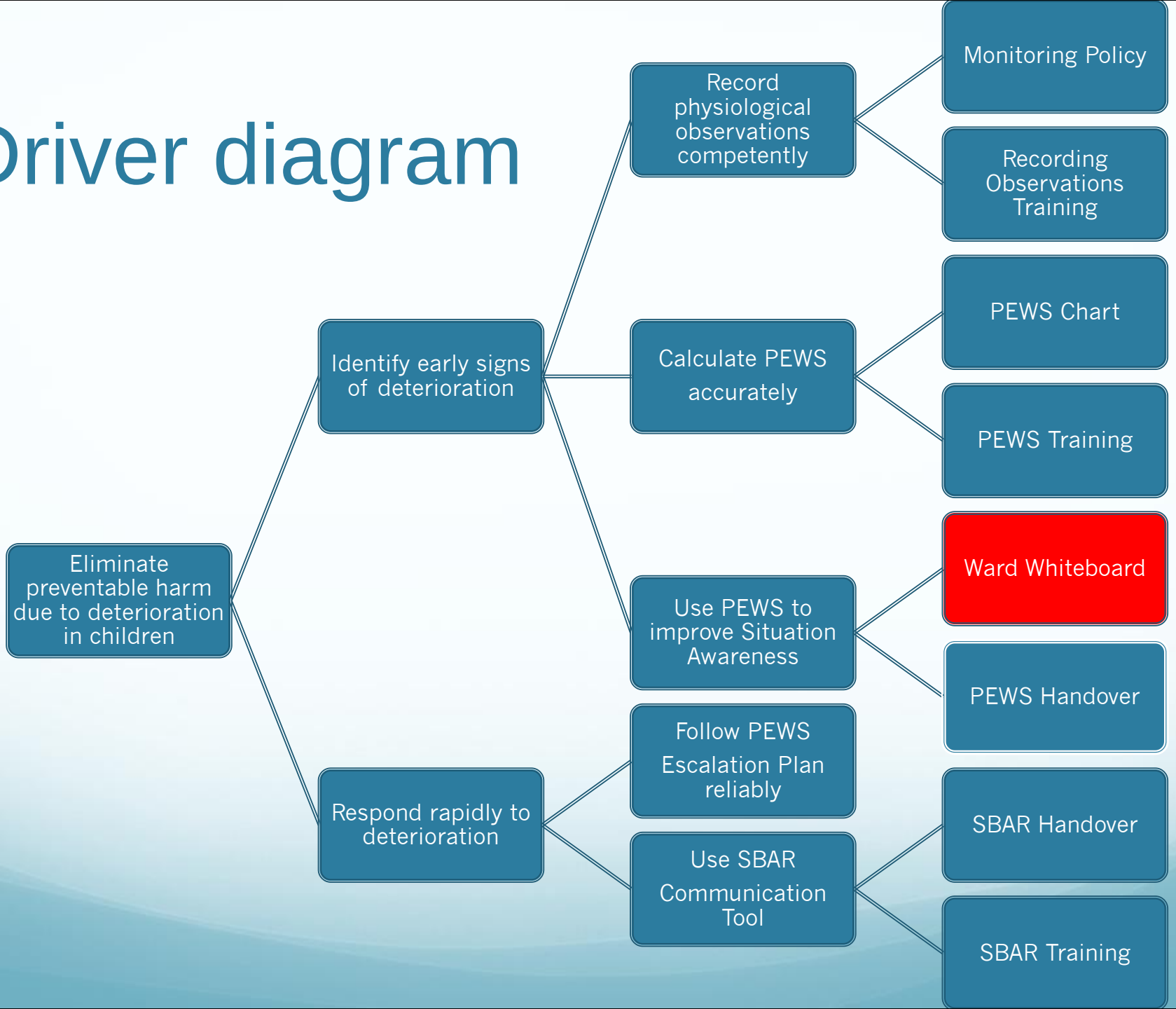
Measures over time



Total compliance with bundle

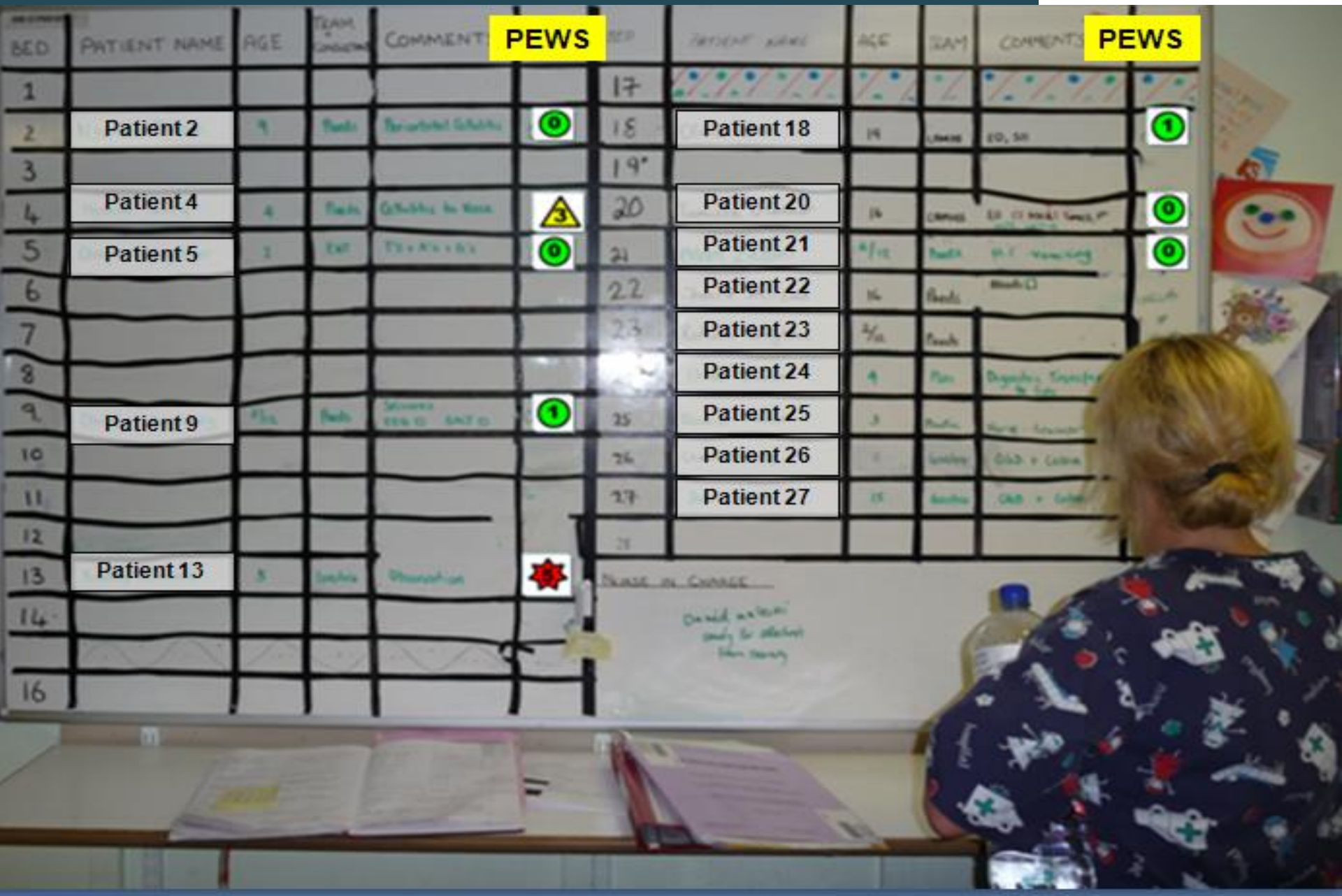


Driver diagram



Patient Status At A Glance

NHS Institute for Innovation and Improvement



Safety Huddle

- 5 minute daily meeting at the ePSAG board at a specified time.
- Attended by all nurses, lead doctors and any other appropriate staff members
- PEWS & escalation plans
- Identify the sickest patient on the ward
- Identify any 'Watchers'

Safety Huddle Script

Nurse in charge

Good morning/afternoon/evening, I am... (*nurses name*)... and I will be leading this Safety Huddle. We have 5 minutes to discuss all of our patients. We will run through all of our patients in bed order. For each patient the bedside nurse will present their CEWS score. If the CEWS is higher than 2 or the patient is a "watcher" the nurse will explain why. We will discuss them as a group so that everyone is aware of the management plan and any escalation that needs to happen

Run through each patient on the ward and ask...

1. What is their CEWS?
2. If CEWS >2 or patient is a "Watcher":
a) Why is the patient a high CEWS / "Watcher"?
b) What is the management plan?
c) Who should their care be escalated to?
[Once the team have run through every patient...]
3. Have parents or child raised any clinical concerns?

What is a "Watcher"?

The idea of the watcher system is to identify patients who do not have a high CEWS score but who the team feel may still be at risk of getting sicker. People will often talk about a gut feeling, or feeling worried about a patient without being able to put their finger on why. Watchers should always be discussed at the huddle.

Nurse in charge

- Does anybody wish to identify any other concerns which have not been raised, or offer a different perspective on anything we've discussed?
- At this time, who do we agree is the sickest patient on the ward?

[If any actions have been identified during the huddle please make sure these are all allocated to individuals and are documented if necessary]

Thanks for attending. The Huddle is now finished.

FIRE
EXIT

Measurement

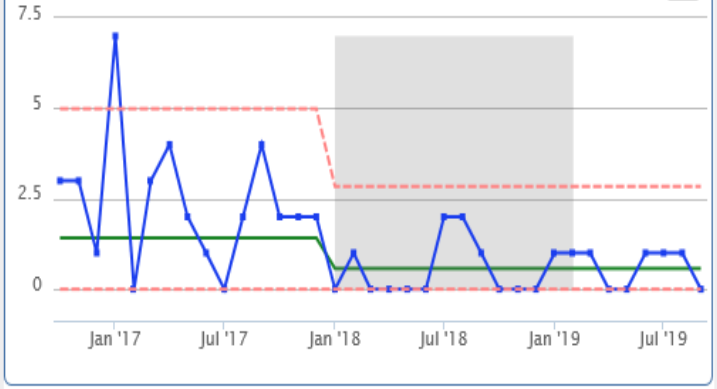
- Clinical outcomes
  - Cardiac arrest
  - Respiratory arrest
  - 2222 calls
- Standardised definitions
- Regular measurement
- Dashboards

Deteriorating Patient Dashboard

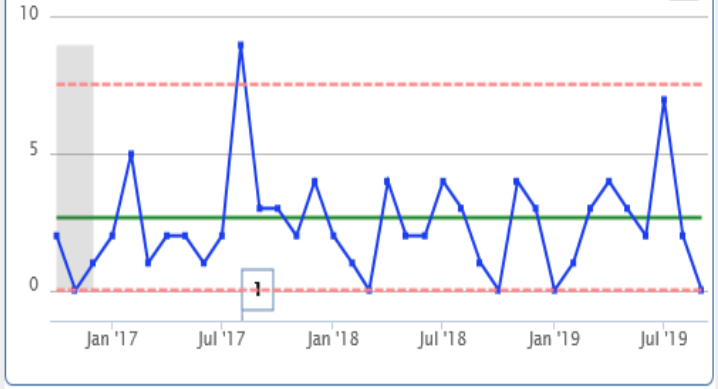
Great Ormond Street Hospital for Children
International and Private Patients Service

Location: All Locations | Run report

Cardiac and Respiratory Arrests — Count of arrests

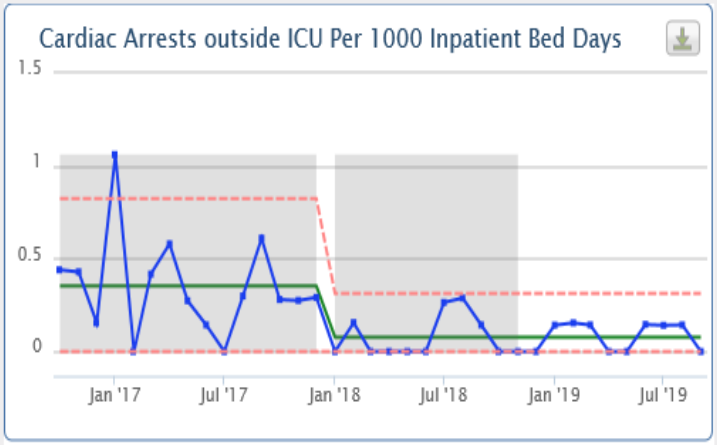


Detailed chart | What is this? | id: 647

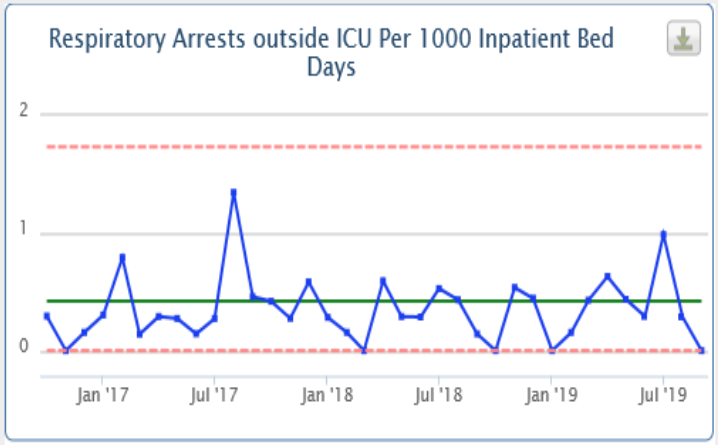


Detailed chart | What is this? | id: 648

Cardiac and Respiratory Arrests — per 1000 bed days



Detailed chart | What is this? | id: 854



Detailed chart | What is this? | id: 855

ChartView

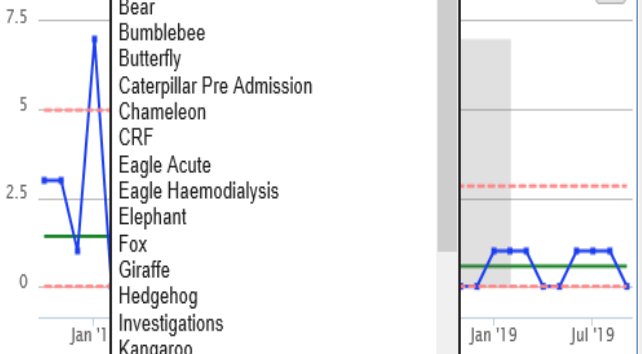
Deteriorating Patient Dashboard

Location: All Locations
_All Wards (exc non-ward locations)
_Areas outside wards
_Charles West, Portfolio A
_Charles West, Portfolio B
_International & Private Patients Division
_JM Barrie, Portfolio A
_JM Barrie, Portfolio B
Bear
Bumblebee
Butterfly
Caterpillar Pre Admission
Chameleon
CRF
Eagle Acute
Eagle Haemodialysis
Elephant
Fox
Giraffe
Hedgehog
Investigations
Kangaroo
Kingfisher
Koala
Leopard
Lion
Mildred Creak
Nightingale
Non-Clinical Area
Other

Run report

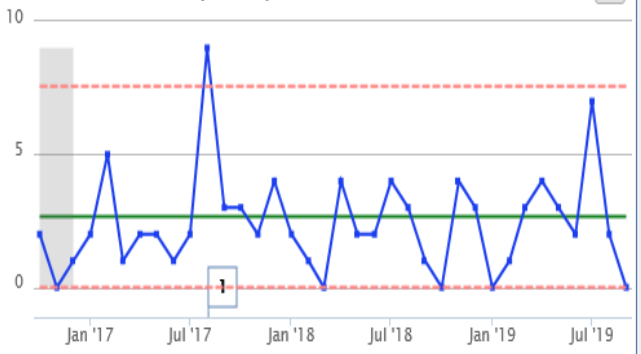
Cardiac a ... of arrests

The Nu... theatres



Detailed char... is this? id: 647

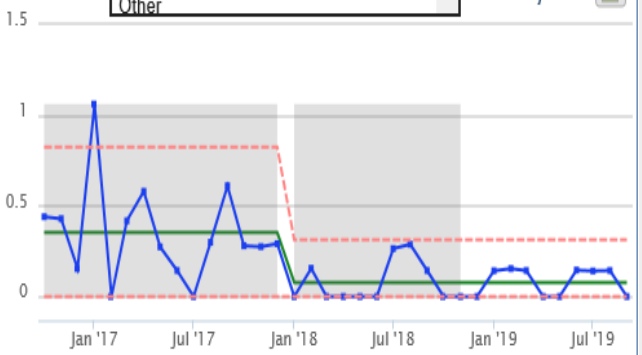
The Number of Respiratory Arrests outside ICU / theatres



Detailed chart What is this? id: 648

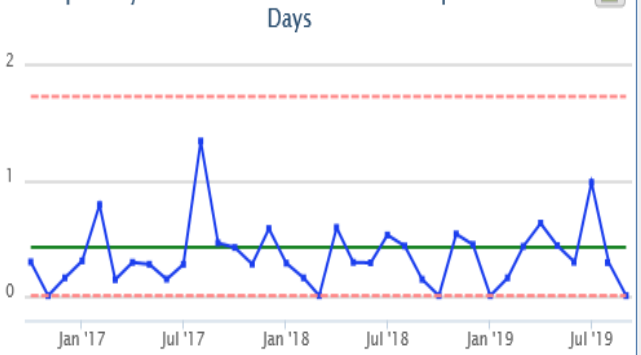
Cardiac a ... 00 bed days

Cardiac A... Bed Days



Detailed chart What is this? id: 854

Respiratory Arrests outside ICU Per 1000 Inpatient Bed Days



Detailed chart What is this? id: 855

http://qst/SPCWorks/ChartView#measureID=647&p1=%&dashboard=-28

Dashboards | Ward and admissions informat... | SPC Works

ChartView

Great Ormond Street Hospital for Children

International and Private Patients Service

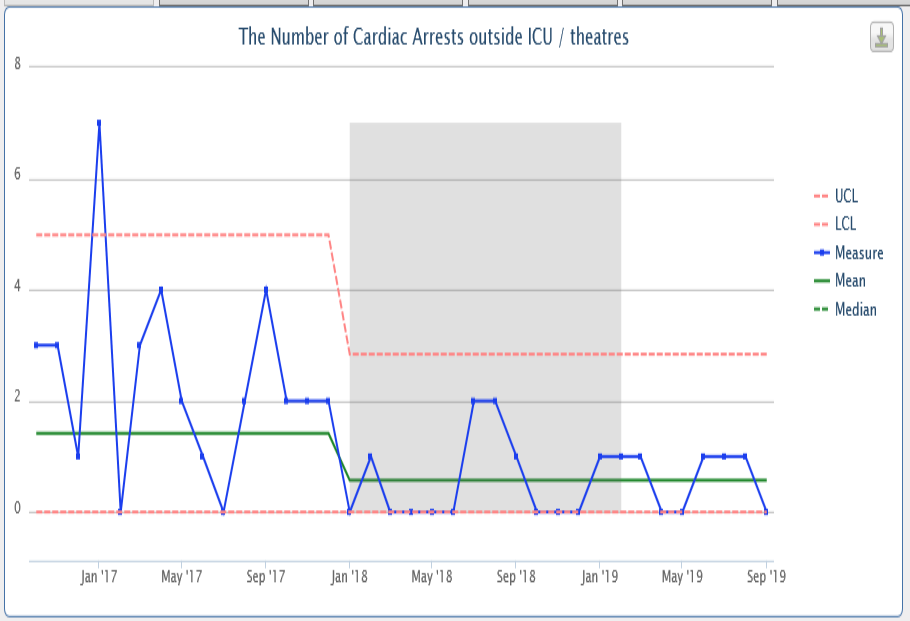
Measure: 647 - The Number of Cardiac Arrests outside ICU / theatres

Detail: The monthly number of cardiac arrests outside of ICU wards / theatres (recorded from calls made to the 2222 Clincal Emergency Team). Cardiac arrests are defined by any patient requiring cardiac compressions and/or defibrillation. Cardiorespiratory arrests count towards the cardiac arrests total, not the respiratory arrests total.

Select a new measure

ALL LOCATIONS |

Show chart | Hide control limits | Export chart data | Export to image | Export to PDF | Export raw data



Share this chart

Annotations			
Number	Date	Annotation	Description

Ranges			
Start date	End date	Annotation	Comment
01/01/10	01/12/10	Baseline	
01/12/12	01/04/14	Decrease	
01/08/14	01/07/15	Increase	7 of 7 Above
01/01/18	01/02/19	PEWS Implementation	PEWS implemented on Mar 13th 2018

http://qst/SPCWorks/ChartView#measureID=64

Click on a date to view the underlying da

Data			
Month	Measure	Mean	Median
01/09/2019	0	0.57	0
01/08/2019	1	0.57	0
01/07/2019	1	0.57	0
01/06/2019	1	0.57	0
01/05/2019	0	0.57	0
01/04/2019	0	0.57	0
01/03/2019	1	0.57	0
01/02/2019	1	0.57	0
01/01/2019	1	0.57	0
01/12/2018	0	0.57	0
01/11/2018	0	0.57	0
01/10/2018	0	0.57	0
01/09/2018	1	0.57	0
01/08/2018	2	0.57	0
01/07/2018	2	0.57	0
01/06/2018	0	0.57	0
01/05/2018	0	0.57	0
01/04/2018	0	0.57	0
01/03/2018	0	0.57	0
01/02/2018	1	0.57	0
01/01/2018	0	0.57	0
01/12/2017	2	1.42	1
01/11/2017	2	1.42	1
01/10/2017	2	1.42	1
01/09/2017	4	1.42	1
01/08/2017	2	1.42	1
01/07/2017	0	1.42	1
01/06/2017	1	1.42	1
01/05/2017	2	1.42	1
01/04/2017	4	1.42	1
01/03/2017	3	1.42	1
01/02/2017	0	1.42	1
01/01/2017	7	1.42	1
01/12/2016	1	1.42	1
01/11/2016	3	1.42	1
01/10/2016	3	1.42	1

ard=-28 Dashboards | Ward and admissions informat... | SPC Works | SPC Works | SPC Works

Drill down

Date	Location	Location (as recorded)	Attending CSP	Hospital No	Underlying Diagnosis	Category of Event	OXYGEN: B-V-M	OXYGEN: OTHER	CHEST COMPRESSIONS	DEFIBRILLATION/CARDIOVERSION	Transferred To
07/07/19	Giraffe		Melissa & Bea	3017248	grade 4 germ cell tumour	Cardiac Arrest. Respiratory Arrest.	Yes		Yes		

http://qst/SPCWorks/ChartView#measureID=647&p1=%&dashboard=-28

Dashboards | Ward and admissions informat... | SPC Works

ChartView

Great Ormond Street Hospital for Children
International and Private Patients Service

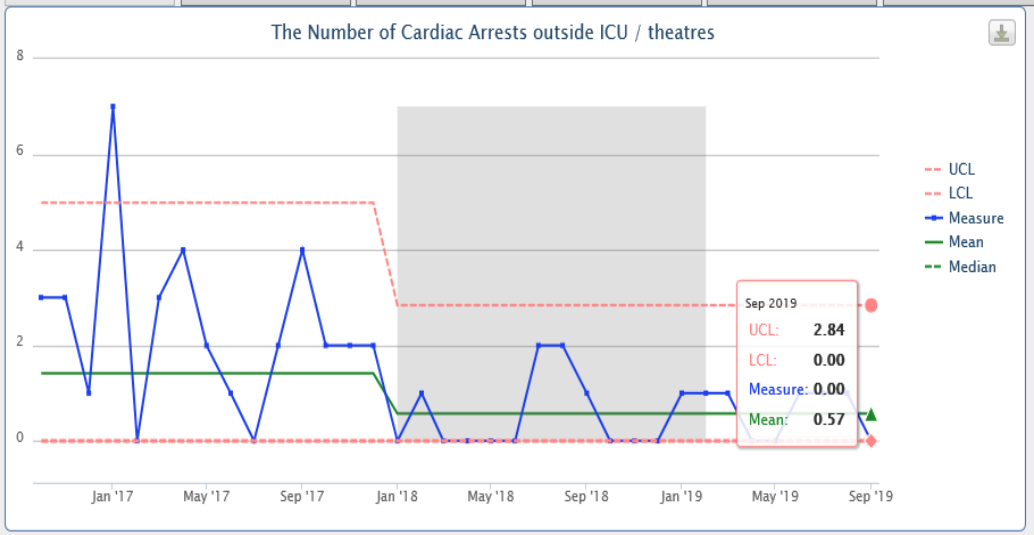
Measure: 647 - The Number of Cardiac Arrests outside ICU / theatres

Detail: The monthly number of cardiac arrests outside of ICU wards / theatres (recorded from calls made to the 2222 Clincal Emergency Team). Cardiac arrests are defined by any patient requiring cardiac compressions and/or defibrillation. Cardiorespiratory arrests count towards the cardiac arrests total, not the respiratory arrests total.

Select a new measure

ALL LOCATIONS |

Show chart | Hide control limits | Export chart data | Export to image | Export to PDF | Export raw data



Share this chart

Annotations			
Number	**Date**	**Annotation**	**Description**

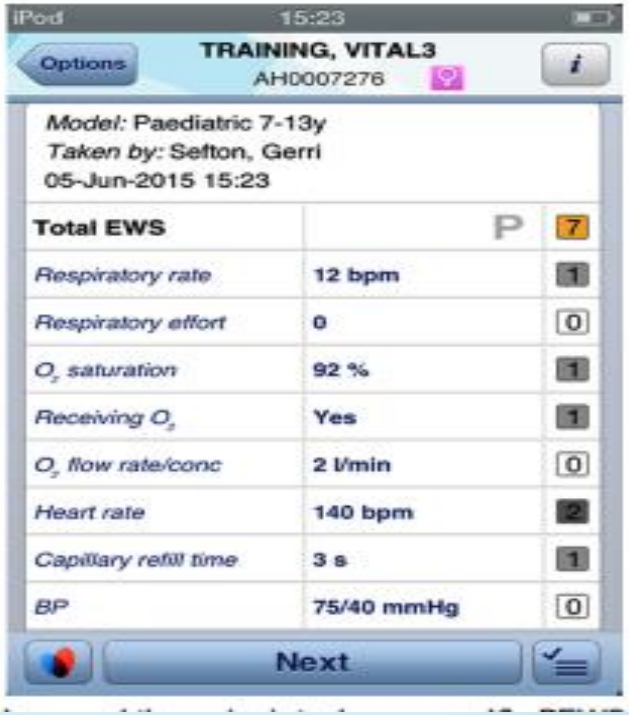
Ranges			
Start date	**End date**	**Annotation**	**Comment**
01/01/10	01/12/10	Baseline	
01/12/12	01/04/14	Decrease	
01/08/14	01/07/15	Increase	7 of 7 Above
01/01/18	01/02/19	PEWS Implementation	PEWS implemented on Mar 13th 2018

Click on a date to view the underlying data.

Data			
Month	**Measure**	**Mean**	**Median**
01/09/2019	0	0.57	0
01/08/2019	1	0.57	0

Technology

iPod
15:24
Clin. info
TRAINING, VITAL3
AH0007276
TPR
O2
EWS
Full data
A W
240
220
200
180
160
140
120
100
80
60
40
20
0
40
38
36
34
Today 15:23
Obs details
P 7
Temp 38.8 °C
Sys 75 mmHg
Dia 40 mmHg
HR 140 bpm
RR 12 bpm
AVPU Voice
2015
6 Jun 2015
Jun 2015


iPod
15:23
Options
TRAINING, VITAL3
AH0007276
Model: Paediatric 7-13y
Taken by: Sefton, Gerri
05-Jun-2015 15:23
Total EWS P 7
Respiratory rate 12 bpm 1
Respiratory effort 0 0
O2 saturation 92 % 1
Receiving O2 Yes 1
O2 flow rate/conc 2 l/min 0
Heart rate 140 bpm 2
Capillary refill time 3 s 1
BP 75/40 mmHg 0
Next

ADC Online First, published on March 14, 2017 as 10.1136/archdischild-2016-311088

'The Score Matters': wide variations in predictive performance of 18 paediatric track and trigger systems

Susan M Chapman,[1,2,3] Jo Wray,[2,4] Kate Oulton,[2,4] Christina Pagel,[5,6] Samiran Ray,[6,7] Mark J Peters[6,7]

▶ Additional material is published online only. To view please visit the journal online (http://dx.doi.org/10.1136/archdischild-2016-311088).

[1]Great Ormond Street Hospital, London, UK
[2]UCL Great Ormond Street Institute of Child Health, London, UK
[3]Department of Children's Nursing, London South Bank University, London, UK
[4]Outcomes and Experience Research in Children's Health, Illness and Disability (ORCHID), Great Ormond Street Hospital, London, UK
[5]Clinical Operational Research

ABSTRACT

Objective To compare the predictive performance of 18 paediatric early warning systems (PEWS) in predicting critical deterioration.

Design Retrospective case-controlled study. PEWS values were calculated from existing clinical data, and the area under the receiver operator characteristic curve (AUROC) compared.

Setting UK tertiary referral children's hospital.

Patients Patients without a 'do not attempt resuscitation' order admitted between 1 January 2011 and 31 December 2012. All patients on paediatric wards who suffered a critical deterioration event were designated 'cases' and matched with a control closest in age who was present on the same ward at the same time

What is already known on this topic?

- Paediatric early warning systems (PEWS) are widely used to detect deterioration in hospitalised children.
- The component parameters, weighting frameworks and scoring thresholds vary between differing PEWS.
- Of the numerous PEWS in the literature and clinical practice, only a minority have been previously evaluated for their predictive performance.

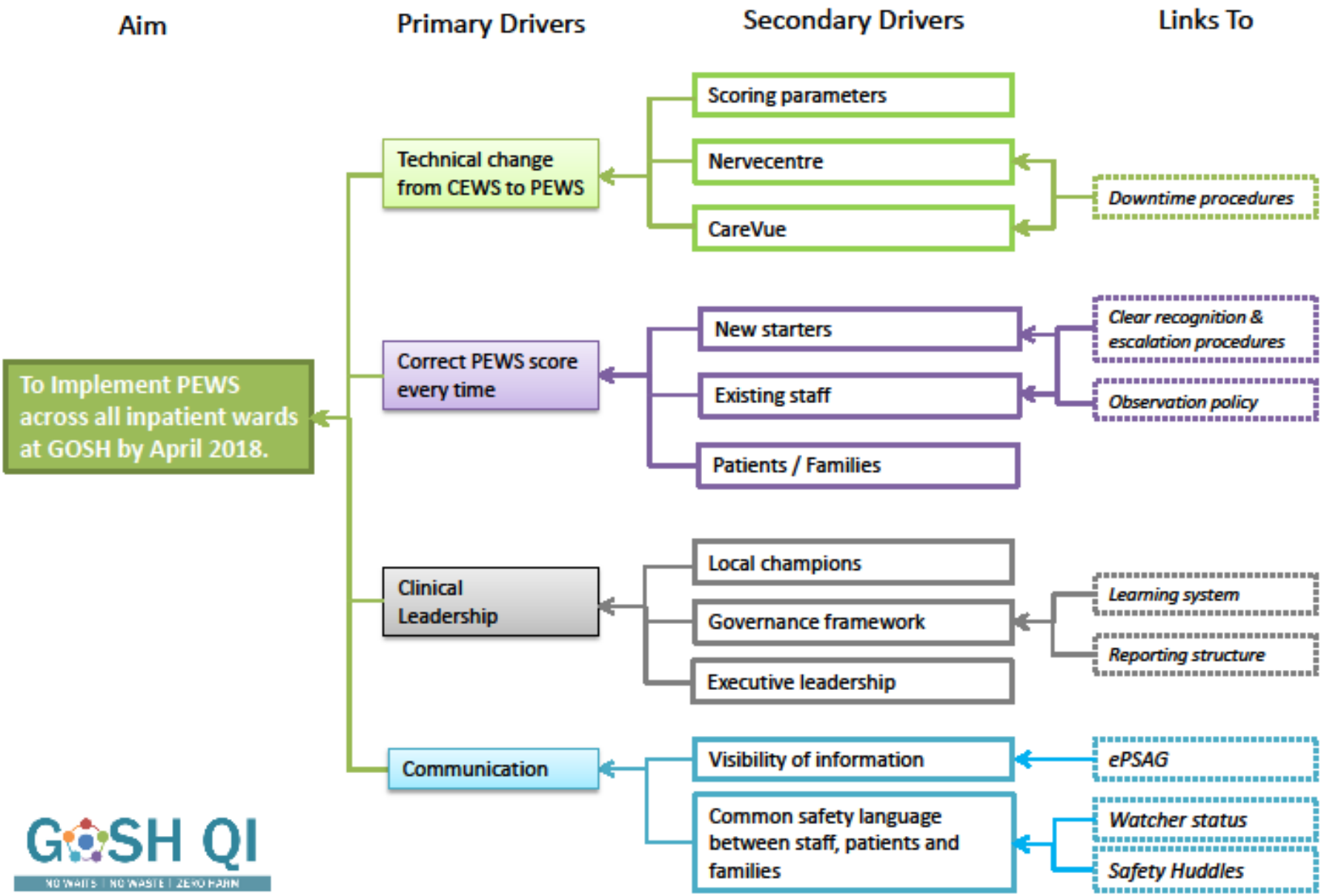
Table 3 Comparative performance

	AUROC (95% CI)	z-Score	p Value
Scoring systems			
Cardiff and Vale PEWS	0.89 (0.86 to 0.91)	N/A	N/A
Bedside PEWS	0.88 (0.85 to 0.91)	0.72	0.47
Modified PEWS III	0.87 (0.85 to 0.90)	1.58	0.11
Children's Early Warning Tool	0.85 (0.82 to 0.88)	3.21	0.001
Modified PEWS II	0.85 (0.82 to 0.88)	2.87	0.004
PEWS I	0.83 (0.80 to 0.86)	4.06	<0.001
NHSI PEWS	0.82 (0.79 to 0.86)	4.52	<0.001
PEWS system score	0.82 (0.78 to 0.85)	4.42	<0.001
PEWS II	0.79 (0.75 to 0.82)	6.00	<0.001
CEWS	0.79 (0.75 to 0.82)	7.12	<0.001
ITAT score	0.77 (0.74 to 0.81)	7.12	<0.001
Modified PEWS I	0.74 (0.70 to 0.78)	8.06	<0.001
Trigger systems			
THSC MET calling criteria	0.73 (0.69 to 0.77)	9.31	<0.001
MET activation criteria I	0.71 (0.70 to 0.75)	10.70	<0.001
MET activation criteria II	0.71 (0.70 to 0.75)	10.70	<0.001
PMET triggers I	0.71 (0.67–0.75)	10.82	<0.001
Modified Bristol PEWS	0.62 (0.58 to 0.67)	16.01	<0.001
Bristol PEWS	0.62 (0.58 to 0.67)	16.01	<0.001

Performance was assessed by calculation of the AUROC. Systems were then ranked, and performance was compared with the highest ranked PEWS (Cardiff and Vale PEWS) using Delong's test for correlated curves. z-scores represent comparison of mean values. Significance testing was adjusted for the multiple comparisons of AUROC with Bonferroni's correction, meaning values of $p<0.0025$ were considered significant.

AUROC, area under the receiver operator characteristic curve; CEWS, Children's Early Warning Score; ITAT, inpatient triage, assessment and treatment score; MET, Medical Emergency Team; NHSI, NHS Institute; PEWS, paediatric early warning system; PMET, Paediatric Medical Emergency Team; THSC, Toronto Hospital for Sick Children.

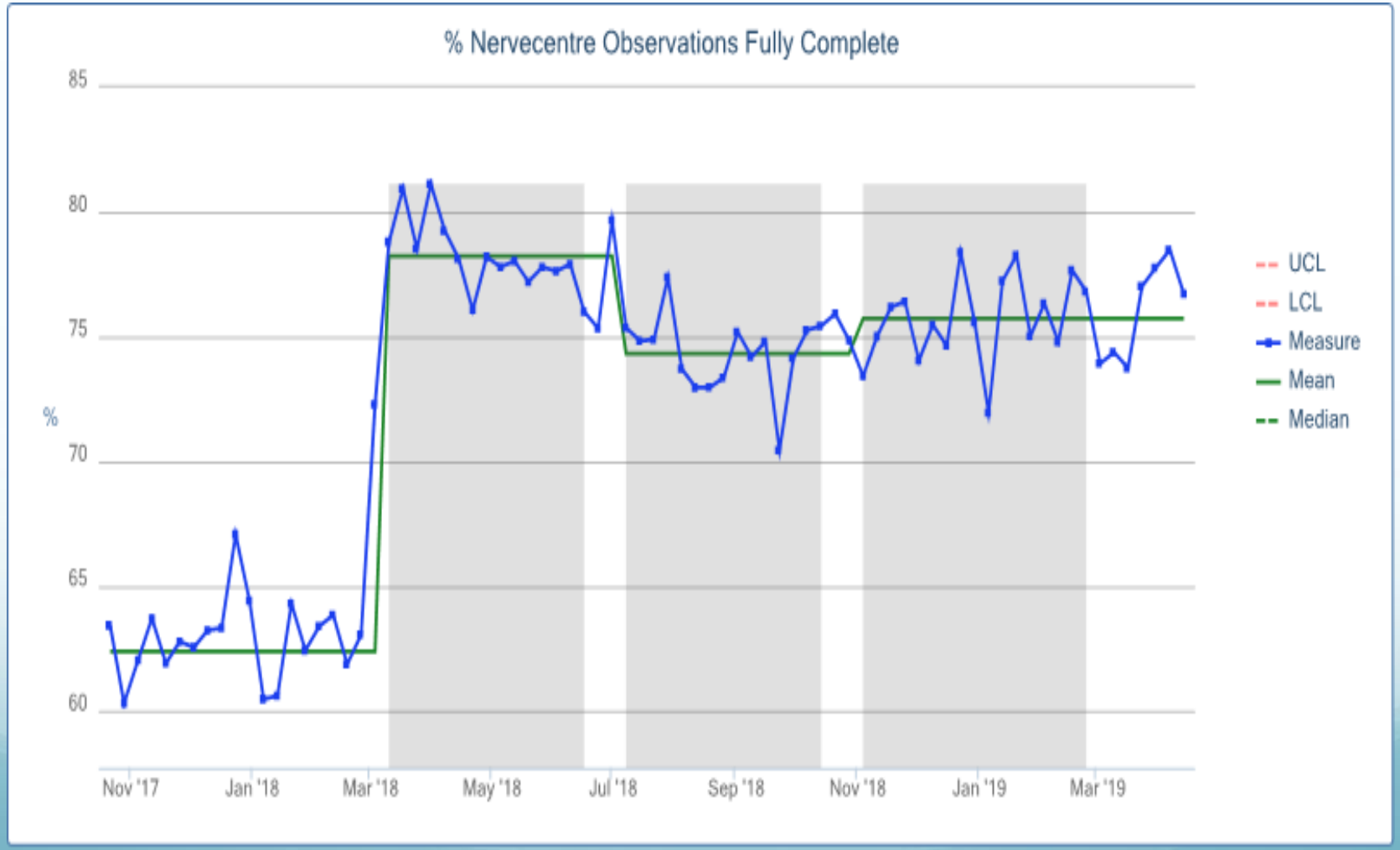
Driver Diagram – PEWS Implementation



GOSH QI

NO WAITS | NO WASTE | ZERO HARM

Change to B-PEWS



NHS

Conclusion

- Quality improvement is everyone's responsibility
- Start small
- Start simple
- Measure
- Use a variety of tools
- Nurses are in great position to lead QI

References and useful links

- Chapman SM, Wray J, Oulton K, Pagel C, Ray S, Peters MJ. "The Score Matters": wide variations in predictive performance of 18 paediatric track and trigger systems. Arch Dis Child 2017;102:487–95. doi:10.1136/archdischild-2016-311088.

- Chapman SM, Oulton K, Peters MJ, Wray J. Missed opportunities: incomplete and inaccurate recording of paediatric early warning scores. Arch Dis Child 2019:archdischild–2018–316248–6. doi:10.1136/archdischild-2018-316248.

- **The Health Foundation** 2013 Quality improvement made simple: What everyone should know about health quality improvement https://www.health.org.uk/sites/default/files/QualityImprovementMadeSimple.pdf

- I**nstitute of Healthcare Improvement:** http://www.ihi.org

- **RCPCH guideline:** http://www.rcpch.ac.uk/safer-system-children-risk-deterioration

- **Re-ACT:** https://improvement.nhs.uk/resources/re-act-respond-ailing-children-tool/

- **RCN Vital signs monitoring:** https://www.rcn.org.uk/professional-development/publications/pub-005942

- **PEWS charts:** http://webarchive.nationalarchives.gov.uk/20161105155914/https://www.england.nhs.uk/patientsafety/re-act/design/what-works/pews-charts/

Many thanks for your attention

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