

Introduction of a 24/7 critical care outreach service within a private hospital, to reduce the number of out-of-hours Emergency Calls, Unplanned ICU admissions, and ultimately improve staffs' level of satisfaction

A Quality Improvement Project

The Princess Grace Hospital

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BACKGROUND

CCOT in the UK

1

Three essential objectives were set by the Department of Health (2000):

- Prevent admissions to and facilitate discharges from intensive care units (ICUs)
- Share specialized knowledge with the wards

2

In 2004 a thorough evaluation of CCOSs identified positive effects in:

- Early recognition, initial management, and escalation of deteriorating patients,
- Communication between teams across NHS Hospitals (Rowan et al. 2007)

3

In 2005, the NCPOD report analysing data from 226 ICU admissions and 1677 questionnaires responses by physicians and intensivists, reported that:

- 44% of hospitals did not have an established CCOS
- only 15% provided this service overnight.

4

In 2018, NICE recommended that hospitals should provide a 24/7 CCOS to improve patient outcomes

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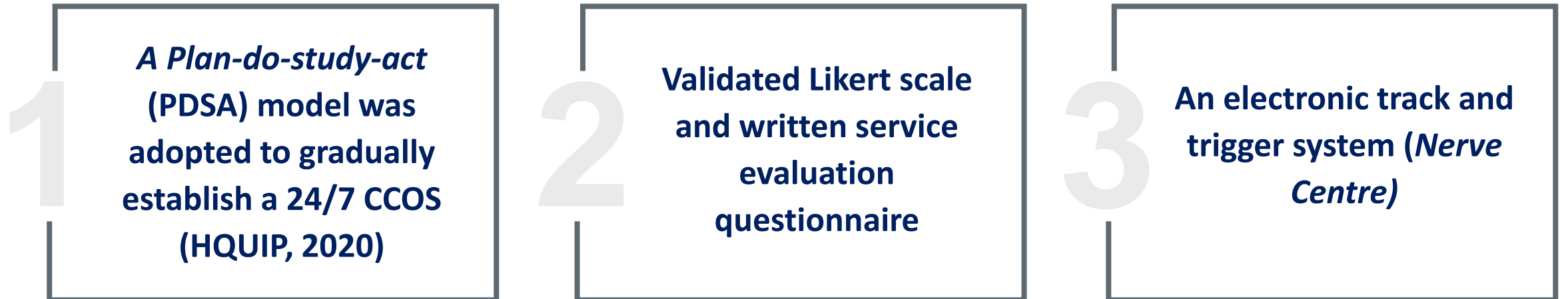
BACKGROUND

The lack of a clear national strategy for implementation of CCOSs motivated the NOrF to create the Quality and Operational Standards for Critical Care Outreach framework in 2012 (updated in 2021)

Currently, 24/7 CCOSs are well established and widely endorsed within the NHS, however they are not extensively used in the independent sector

METHODOLOGY

Implementation and Evaluation of the CCOS



AIM

This QIP pioneered the implementation of a 24/7 CCOS in a private hospital in London without an established Medical Emergency Team with the objective to:

- Reduce out-of-hours emergency calls and ICU unplanned admission by 10% within 12 months
- Staff satisfaction with the service provided by the team was additionally evaluated

LOCAL PROBLEM ANALYSIS

- 1 In 2020, it was identified a rise in the number of 2222 calls and unplanned admissions to ICU occurring out-of-hours (change in Hospital acuity)
- 2 No MET system or CCOS in place - ?potential cause
- 3 Deteriorating patients likely not being referred to the medical teams during the early stages of deterioration
- 4 24/7 CCOS was necessary to increase the support given to the ward teams

- ❖ CCOT implemented in Dec 2020 and operating during business hours
- ❖ Consisted solely of one Outreach Nurse.
- ❖ Ward nurses were instructed to contact the CCOT if patients met the referral criteria (table 1)
- ❖ Threshold for referral was set to be lower than NHS Hospitals
- ❖ CCOT referred patients to ICU and followed-up ICU step-downs, yet this support was not available out-of-hours.

Table 1 - Criteria for referral for CCOT (Royal College of Physicians, 2017, The UK Sepsis Trust, 2022)

- **NEWS>4 or score of 3 in individual parameter**
- **Acute deterioration**
- **Nurse /Dr concerned**
- **Advice regarding management of the acutely unwell patient**
- **Pain**
- **Sepsis**
- **Hypoxia**
- **Arrhythmia**
- **Haemodynamic instability**
- **Electrolyte imbalance**
- **Acute kidney injury**

PDSA CYCLES AND DATA COLLECTION

To explore the effectiveness of the CCOS, the following quantitative data was collected quarterly, at the end of each PDSA cycle:

Table 2 – Quantitative Data Collected for each PDSA Cycle	
-	Total number of 2222 calls
-	Number of out-of-hours 2222
-	Total number of ICU unplanned admissions
-	Number of out-of-hours ICU unplanned admissions
-	Total number of patients seen by the CCOT

CCCOT Data Collection Sample

Total of calls/bleeps to Outreach		D
		N
Total of patients seen by Outreach		D
		N
Number of patients referred to Outreach	Nurses	D
		N
	RMO	D
		N
Other		D
		N
Follow up visits post ICU/PACU discharge		D
		N
Outreached Admissions in to ICU		D
		N
Re-admissions to ICU (within 48 hrs)		D
		N
Re-admissions to ICU (>48 hrs)		D
		N
Total Number of Patients with Sepsis seen by CCOT		D
		N
Peri arrest calls		D
		N
Cardiac arrest Calls/ Major Haemorrhage Calls		D
		N
High NEWS (5-6)		D
		N
Critical NEWS (≥ 7)		D
		N
Advice/trouble shooting		D
		N
Inter/Intra Hospital Transfers		D
		N
Venepuncture/Cannulation		D
		N
Pre-op visits		D
		N

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Baseline data collected from January 2020 until December 2020 (before CCOS), confirmed that most emergency calls and unplanned ICU admissions occurred out-of-hours.

Table 4 - Baseline Measures - Data Before implementation of the CCOS (2020)						
Total patients admitted to the Hospital (inpatients)		2222 calls (total)	2222 calls (out-of-hours)	Unplanned ICU admissions (total)	Unplanned ICU admissions (out-of-hours)	Total number of patients admitted (inpatients, Day cases)
Q1	Total Q1	2	2	24	20	4056
Q2	Total Q2	7	4	22	20	2898
Q3	Total Q3	5	3	21	19	2499
Q4	Total Q4	4	2	15	13	2459
Total for 2020		18	11	82	72	11912

Table 4- Planned PDSA Cycles and Interventions

PDSA cycle 1 – Quarter 1 2021

- **Extend provision of the CCOS: Monday to Sunday long day shifts (from 08:00h until 20:00h) with the support of the ICU senior nurses.**
- Identify and train ICU senior nurses (SSN) who are interested in working Outreach shifts.
- Roster ICU SSN to work Outreach shifts
- Inform all departments across the hospital about the change, using posters and verbally at handovers.
- Open recruitment for 3 full time equivalents Outreach Nurses.
- Collect data (unplanned ICU admissions, 2222 calls and referrals to CCOT).

PDSA cycle 2 – Quarter 2 2021

- **Extend CCOS service provision to night shifts (20:00h until 08:00h) over the weekend only (Friday, Saturday, Sunday).**
- Use temporary staff to cover any gaps left in the ICU, to allow ICU SSN to support provision of the CCOS.
- Ensure adequate skill mix is maintained in the ICU.
- Inform all departments across the hospital about the change, using posters and verbally at handovers.
- Collect data (unplanned ICU admissions, 2222 calls and referrals to CCOT).

PDSA cycle 3 – Quarter 3 2021

- **CCOS to start operating 24/7 using CCOT new starts and ICU senior nurses; limit the use of ICU SSN once induction is completed.**
- Induct new starters to the CCOT.
- New starters to complete induction programme and core competencies in view to start working independently.
- CCOS to be provided solely by Outreach nurses by the end of this cycle, however ICU senior team to continue to be rostered to the CCOS when required.
- Create posters and liaise with ward managers to remind staff that CCOS is operating 24/7 and referral criteria.
- Collect data (unplanned ICU admissions, 2222 calls and referrals to CCOT).

PDSA cycle 4 – Quarter 4 2021

- **24/7 CCOS being provided by outreach nurses only, which means service no longer relying on the support from the ICU team.**
- Continue to educate staff on referral criteria (microteaching at the bedside).
- Collect data (unplanned ICU admissions, 2222 calls and referrals to CCOT).

System Performance Measures

Table 5: QIP System Performance Measures (IHI, 2022b)

Outcome measures	Process measures	Balancing measures
Gradually expand the CCOT to operate out-of-hours and work independently from ICU.	<p>Identification and training of ICU senior nurses to perform the Outreach role until recruitment for the CCOT is completed.</p> <p>Create CCOT data collection sheet and document referrals to the CCOT on a referral sheet</p>	<p>Evidence that ward nurses are contacting the service out-of-hours.</p> <p>Induction plan for new starters joining the CCOT created and implemented.</p>
Reduction of the number of 2222 calls and unplanned admissions.	<p>Collect data at the end of every quarter/PDSA cycle.</p>	<p>Analyse trends and improvement out-of-hours.</p>
Improvement on the levels of clinical support on the wards and staff level of satisfaction.	<p>Service evaluation questionnaire after 12 months following the expansion of the CCOS.</p>	<p>Areas for service improvement identified.</p>

Data After Expansion of the CCOS

Table 6- 2021 Data: After the expansion of the CCOS

Total patients admitted to the Hospital (inpatients)			2222 calls (total)	2222 calls (out-of-hours)	ICU unplanned admissions (total)	ICU unplanned admissions (out-of-hours)	Total Patients Seen by CCOT	Total number of patients admitted (inpatients, Day cases)
PDSA cycle 1	Q1	Total Q1	10	6	14	10	168	2825
PDSA cycle 2	Q2	Total Q2	7	4	9	7	272	2300
PDSA cycle 3	Q3	Total Q3	5	3	3	3	293	2447
PDSA cycle 4	Q4	Total Q4	3	1	3	3	468	2048
Total for 2021			25	14	29	18	1201	8620

KEY FINDINGS

- 1 A reduction of 71% in the number of unplanned admissions to ICU was observed in 2021
- 2 A reduction of 75% in the number of out-of-hours unplanned admissions to ICU was observed in 2021
- 3 Reduction of 25.8% in the percentage of unplanned admissions occurring out-of-hours (87.8% vs 62.1%)

Private Hospital, London-Wards covered by the CCOS starting 01/01/20

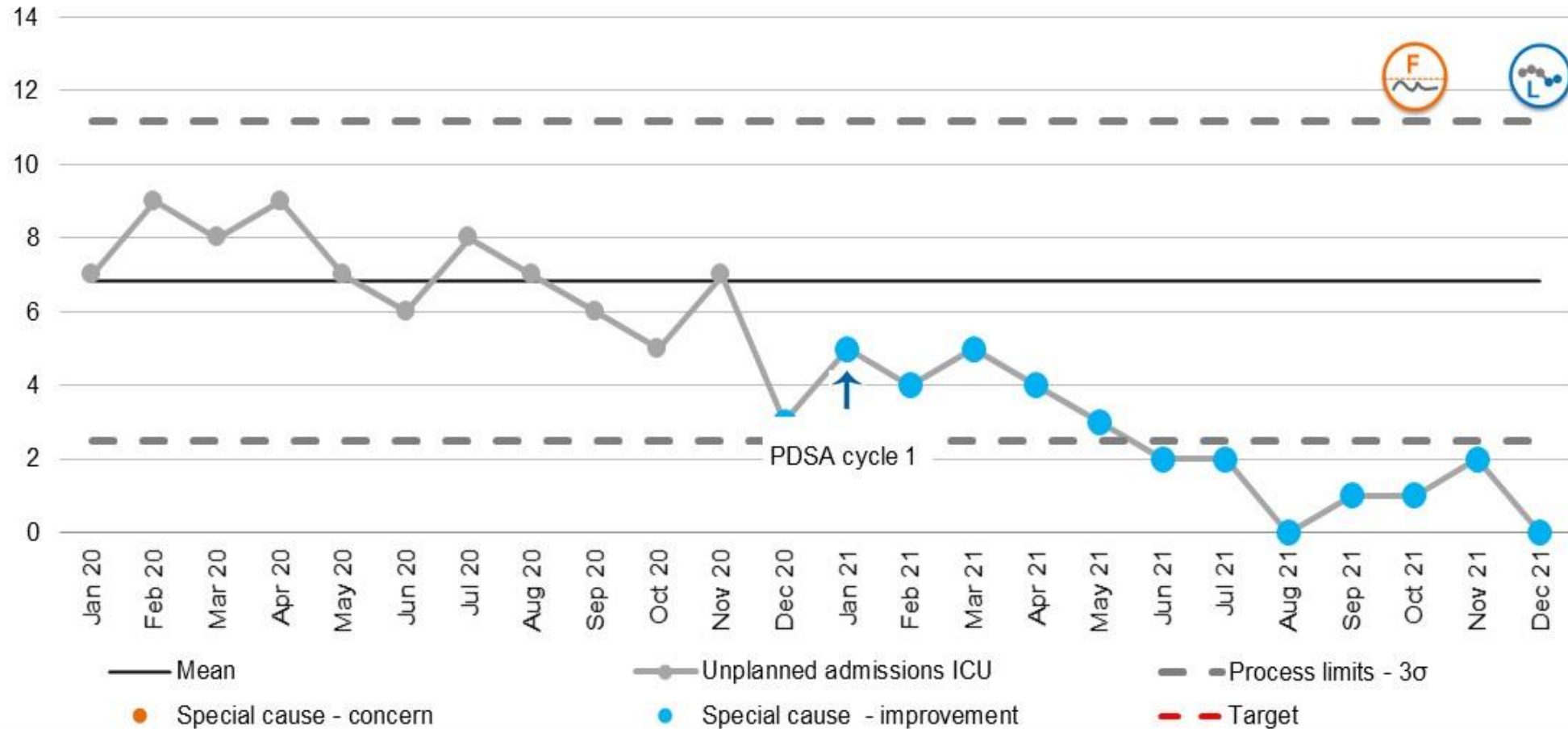


Fig. 1 –Total number of out-of-hours unplanned admissions to ICU 2020/2021

Private Hospital, London-Wards covered by the CCOS starting 01/01/20

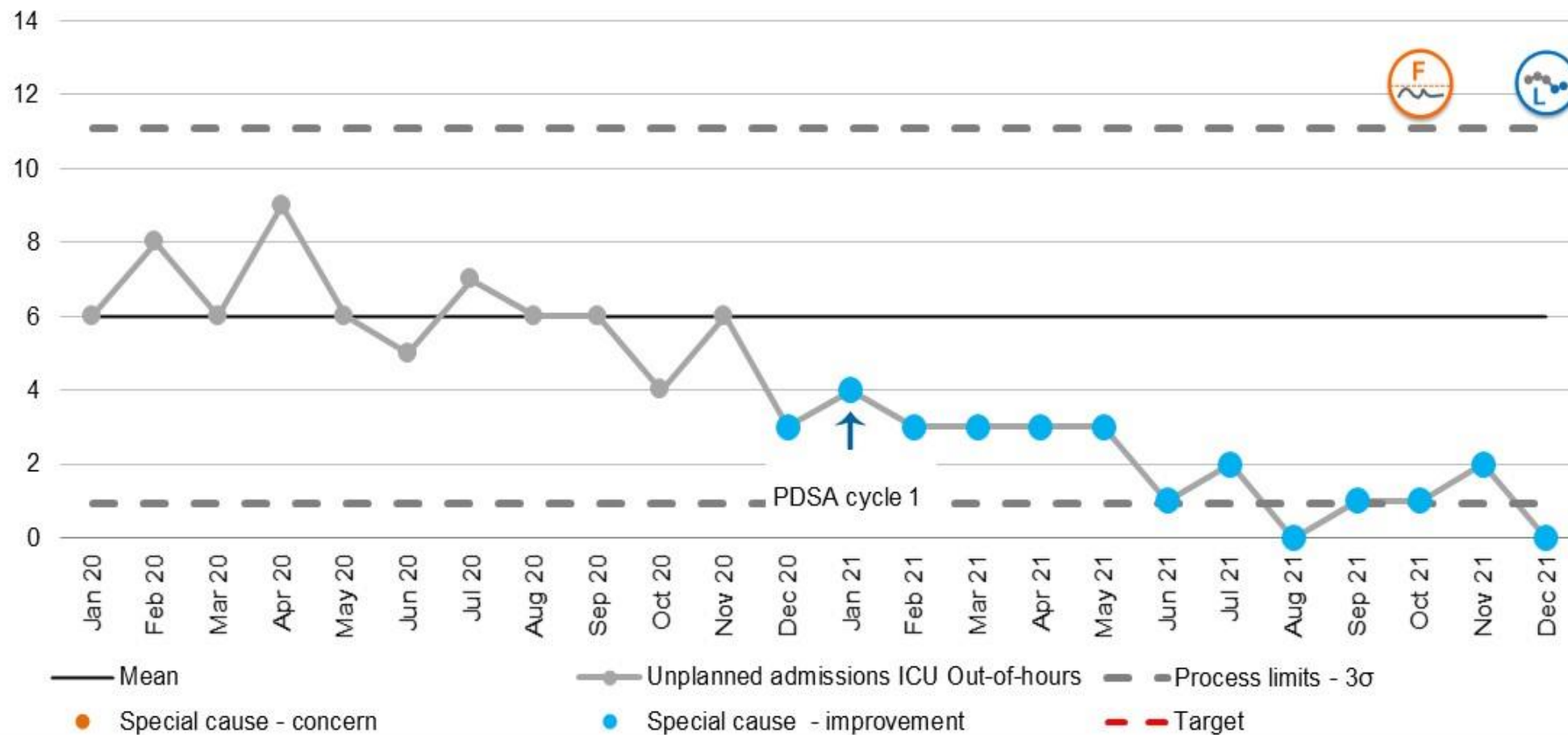


Fig. 2 –Total number of out-of-hours unplanned admissions to ICU 2020/2021

The total number of 2222 calls increased 28% in 2021. However, a steady decline can be observed after PDSA cycle 1

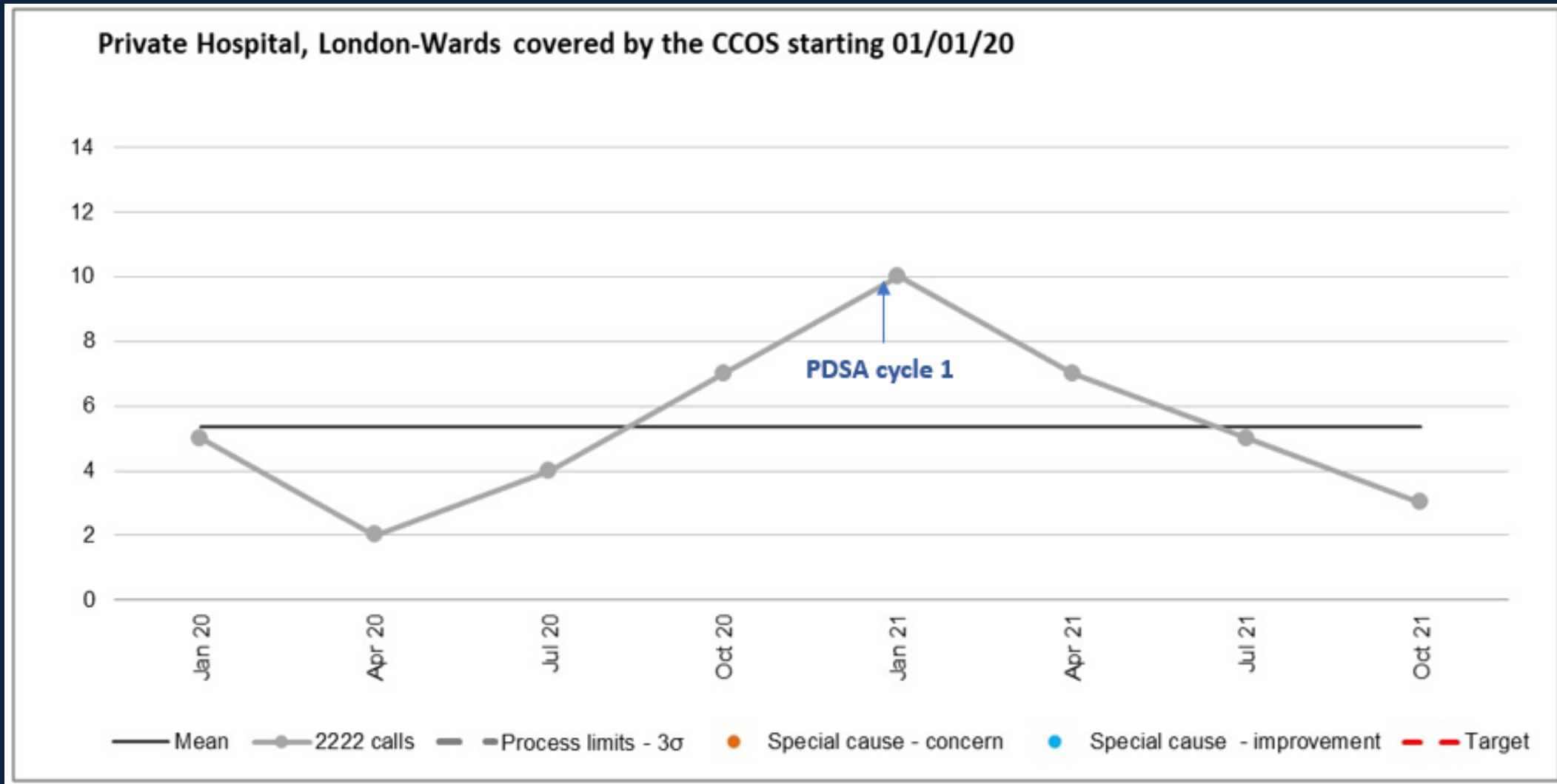


Fig. 3 –Total number of 2222 calls

It was noted a slight reduction in the percentage (5%) of 2222 calls occurring out-of-hours hours

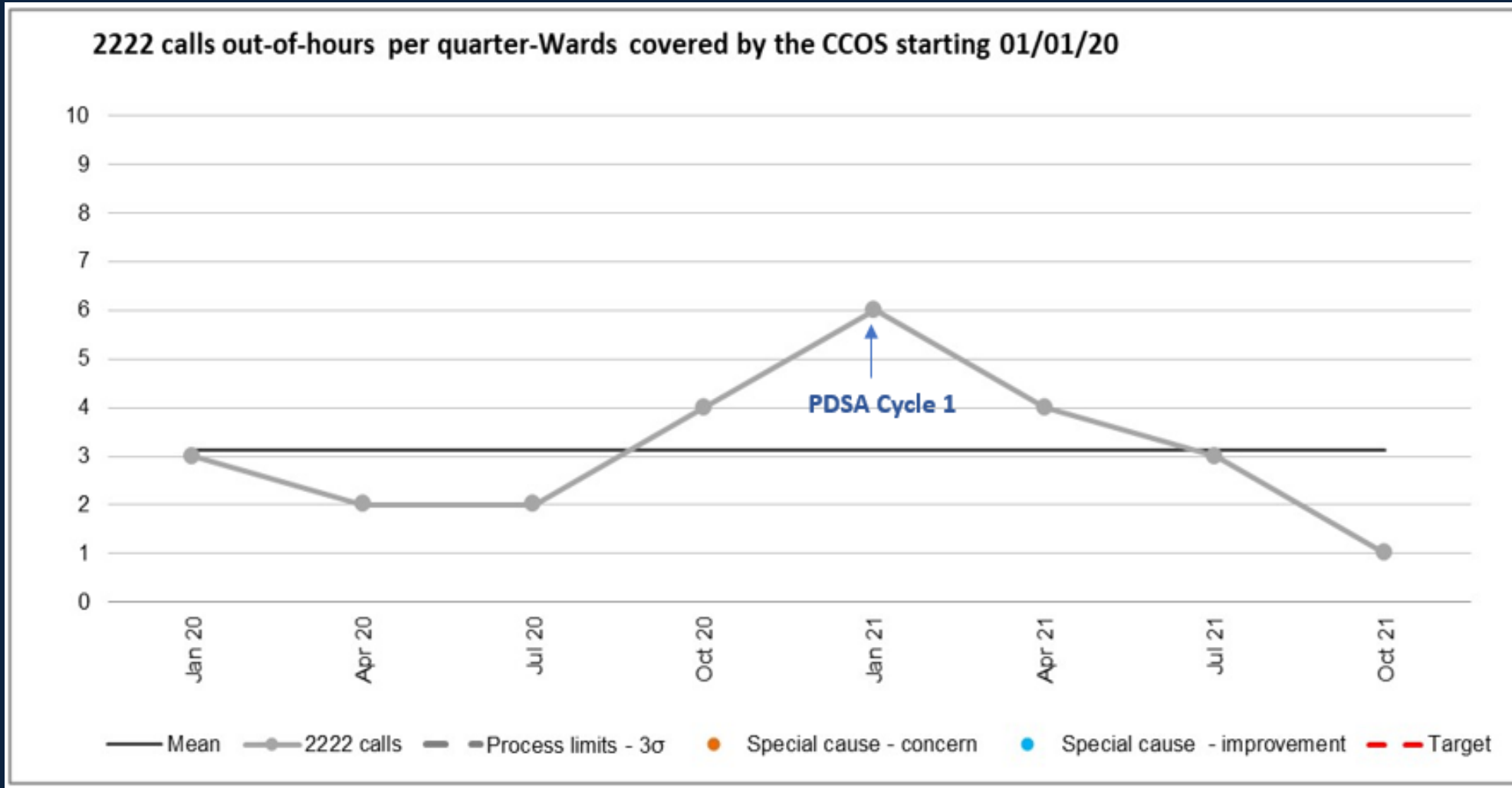


Fig 4 –Total number of 2222 calls to ICU 2020/2021 per quarter: out-of-hours

QUESTIONNAIRES

- ❖ Phase 2 of the QIP encompassed the use of validated service evaluation questionnaire (Hyde-Wyatt & Garside,2019)
- ❖ Questionnaires distributed to RNs and Drs working in the 4 departments where calls for CCOS were more predominant and following a three-month period of the establishment of the 24/7 CCOS.
- ❖ From 60 eligible staff, 27% (n=16) answered the questionnaire

Table 7 – Demographics of the Participants of the Service Evaluation Questionnaire	
<u>Professional group</u>	<u>Total of participants</u>
RMOs	4
RNs	12
<u>Departments</u>	<u>Total of participants</u>
Medical Ward	5
Surgical Ward	4
Orthopaedic Ward	4
AAU	3

- ❖ All participants stated they knew how to contact the CCOT and had direct contact with the service in the past
- ❖ The main motives to contact the CCOS were:
 - *'elevated NEWS'* (87.5%)
 - *'emergency patient care'* (81.3%)
 - *'patient concern'* (81.3%)
- ❖ 75% of the staff rated the service provided to patients as *'very satisfactory'*
- ❖ 25% as *'satisfactory'*
- ❖ 56.3% rated the service provided to staff as *'very satisfactory'*
- ❖ 43.7% as *'satisfactory'*
- ❖ None of the participants scored the service as *'unsatisfactory'*

Table 8 - If you have used Outreach what did you call the team for? (Hyde-Wyatt & Garside,2019)

Elevated National Early Warning Score	n=14
Emergency patient care	n=13
Concern for the patient	n=13
Arterial Blood Gas	n=12
Peripheral venous cannulation	n=12
Liaison between ward team and critical care team	n=8
Because you want the patient to be admitted to ICU/HDU	n=8
Tracheostomy care	n=7
Medication advice	n=6
Care planning	n=5
Because someone told you to	n=5
Central line (CVC)/Peripherally inserted central catheter (PICC) care/advice	n=4
Urinary catheter insertion	n=3
Nasogastric tube insertion	n=3
Discussion with family members	n=2
End of life care	n=2
Do not resuscitation/limitation of treatment decision making	n=2
Hospital policy advice	n=1
Other	n=0

QUALITATIVE DATA

After analysing the free-text answers three main themes emerged:

- 1) support to the ward staff in managing deteriorating patient
- 2) assessment and escalation of unwell patients
- 3) Education and staff development

Staff also perceived CCOS as a valuable resource in:

- Facilitating communication between the ward and critical care staff
- Bridging decision-making between the two areas

Table 9 - What do you perceive the role of the Outreach team to be?

- Identify and provide support to the wards managing deteriorating patients (n=11)
- Expert advice during Medical Emergencies (n=4)
- Prevention of deterioration and ICU admissions (n=3)
- Share clinical expertise and educate Ward staff (n=2)
- Extension of the critical care service (n=3)
- Facilitate communication between the MDT (n=2)
- Bridge between ICU and the wards (n=2)
- Support with clinical interventions (i.e., cannulation, Venepuncture, arterial gas) (n=1)

Table 10: Do you feel that the Critical Care Outreach Service enhances your clinical practice

- Yes, empower nurses by supporting the development of new skills (n=7)
- Yes, clinical support and advice managing deteriorating patients and medical emergencies (n=6)
- Yes, supports decision making and implement care plans that help the clinical practice (n=3)

Table 11 - Do you think that Critical Care Outreach benefits patients?

- Provides reassurance after ICU discharge (n=5)
- Yes (n=3)
- Rapid response, especially on night shifts when Drs are not available (n=2)
- Monitor patient comprehensively (n=2)
Yes, reduces length of stay, prevents deterioration and ICU admissions (n=2)
- Yes, enhances patient care and improve outcomes (n=2)

BARRIERS

- ❖ Insufficient knowledge and awareness of staff regarding the referral criteria and the support the service could provide
- ❖ Reluctance of the MDT to change from the traditional ways of managing deteriorating patients
- ❖ Nursing staff hesitant to accept suggestions without consultant's advice

Some of these barriers were overcome by creating a clear protocol for the escalation of deteriorating patients and close communication with the primary consultants

IMPLICATIONS TO PRACTICE

Aside the Clinical Role, the CCOT became dynamic throughout the first 12 months:

- 1** The CCOT currently carries pre-operative visits for all planned ICU admissions
- 2** Provides educational workshops on topics identified from recent incidents
- 3** Play an active role in some of the hospital committees

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CONCLUSION

- ❖ The implementation of a 24/7 CCOS on a private hospital reduced the number of unplanned admissions to ICU, however the same was not observed for the total of 2222 calls
- ❖ The reduction observed in the number of out-of-hours unplanned admissions to ICU was above the proposed 10%, however a comparable finding was not detected for the out-of-hours 2222 calls (26% vs 5%)
- ❖ Main benefits of CCOT acknowledged in the qualitative data are comparable to those identified in the literature review
- ❖ CCOT role should be seen as a complementary service and not a replacement for the medical team input

Given the characteristics and business driven aspect of private healthcare systems and the higher pay rates for ICU admissions, reducing the number of admissions to ICU may not be seen as profitable

Nevertheless, unplanned admissions to ICU are associated with psychological distress, anxiety, depression, delirium, and acute and PTSD (Rose, Muttalib, Adhikari, 2019), hence the importance of preventing unnecessary admissions to ICU

FUTURE PROJECTS

The educational component identified on the questionnaire was not explored

It would similarly be interesting to understand the influence of the CCOS on mortality, hospital length of stay, and number of 2222 after a longer period following the implementation of the 24/7 CCOS

ANY QUESTIONS?



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REFERENCES

- Allen, E., Elliott, D., & Jackson, D. (2017). Recognising and responding to in-hospital clinical deterioration: An integrative review of interprofessional practice issues. *Journal Of Clinical Nursing*, 26(23-24), 3990-4012. doi: 10.1111/jocn.13839
- Atwal, A., Phillip, M., & Moorley, C. (2020). Senior nurses' perceptions of junior nurses' incident reporting: A qualitative study. *Journal Of Nursing Management*, 28(6). <https://doi.org/10.1111/jonm.13063>
- Athifa, M., Finn, J., Brearley, L., Williams, T. A., Hay, B., Laurie, K., ... Leslie, G. (2011). A qualitative exploration of nurse's perception of Critical Outreach Service: A before and after study. *Australian Critical Care*, 24(1), 39–47. <https://doi.org/10.1016/j.aucc.2010.09.001>
- Baker-McCleary, D., & Carmel, S. (2008). Impact of critical care outreach services on the delivery and organization of hospital care. *Journal of Health Services Research & Policy*, 13(3), 152–157. <https://doi.org/10.1258/jhsrp.2008.008003>
- Beauchamp, T., & Childress, J. (2019). *Principles of biomedical ethics*. 8th ed.. Oxford University Press, pp. 334-352
- Brophy, S., Snooks, H. & Griffiths, L. (2008). Storing data. *Small-scale evaluation in health* (pp. 120-130). SAGE Publications, Ltd, <https://dx.doi.org/10.4135/9781849209892>
- Buck, D. L., Christiansen, C. F., Christensen, S., & Møller, M. H. (2018). Out-of-hours intensive care unit admission and 90-day mortality: a Danish nationwide cohort study. *Acta Anaesthesiologica Scandinavica*, 62(7), 974–982. <https://doi.org/10.1111/aas.13119>
- Chen, J., Bellomo, R., Flabouris, A., Hillman, K., & Finfer, S. (2009). The relationship between early emergency team calls and serious adverse events (The MERIT Study). *Critical Care Medicine*, 37(1), 148-153. doi: 10.1097/ccm.0b013e3181928ce3
- Critical Appraisal Skills Programme. (2022). *CASP Case Control Study Checklist*. Retrieved April 4, 2022, from: https://casp-uk.b-cdn.net/wp-content/uploads/2018/03/CASP-Case-Control-Study-Checklist-2018_fillable_form.pdf
- Critical Appraisal Skills Programme (2022). *CASP Cohort Study Checklist*. Retrieved April 4, 2022, from: https://casp-uk.b-cdn.net/wp-content/uploads/2018/03/CASP-Cohort-Study-Checklist-2018_fillable_form.pdf
- Critical Appraisal Skills Programme (2022). *CASP Qualitative Research Checklist*. Retrieved April 4, 2022, from: https://casp-uk.b-cdn.net/wp-content/uploads/2018/03/CASP-Qualitative-Checklist-2018_fillable_form.pdf
- Critical Appraisal Skills Programme (2022). *CASP Systematic Review Checklist*. Retrieved April 4, 2022, from: https://casp-uk.b-cdn.net/wp-content/uploads/2018/03/CASP-Systematic-Review-Checklist-2018_fillable-form.pdf
- Department of Health (2000). *Comprehensive critical care: A review of adult critical care services*. London: Department of Health.
- DeVita, M., Braithwaite, R., Mahidhara, R., Stuart, S., Foraida, M., & Simmons, R. (2004). Use of medical emergency team responses to reduce hospital cardiopulmonary arrests. *Quality And Safety in Health Care*, 13(4), 251-254. doi: 10.1136/qshc.2003.006585
- Doric, A., & Charlesworth, D. (2013). Change for the better: Introduction of a clinical deterioration framework. *Australian Critical Care*, 28(1), 46–47. <https://doi.org/10.1016/j.aucc.2013.02.029>
- Eriksen, M., & Frandsen, T. (2018). The impact of patient, intervention, comparison, outcome (PICO) as a search strategy tool on literature search quality: a systematic review. *Journal Of the Medical Library Association*, 106(4). doi: 10.5195/jmla.2018.345

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- Freathy, S., Smith, G. B., Schoonhoven, L., & Westwood, G. (2019). The response to patient deterioration in the UK National Health Service — A survey of acute hospital policies. *Resuscitation*, 139, 152–158. <https://doi.org/10.1016/j.resuscitation.2019.04.016>
- Hyde-Wyatt, J., & Garside, J. (2019). Critical care outreach: A valuable resource?. *Nursing In Critical Care*, 25(1), 16-23. doi: 10.1111/nicc.12453
- Institute for Healthcare Improvement. (2017). *IHI: Quality Improvement Essentials Toolkit*. Retrieved April 4, 2022, from: <http://www.ihl.org/resources/Pages/Tools/Quality-Improvement-Essentials-Toolkit.aspx>
- Institute for Healthcare Improvement. (2022a). *IHI: Rapid Response Teams: The Case for Early Intervention*. Retrieved April 4, 2022, from: <http://www.ihl.org/resources/Pages/ImprovementStories/RapidResponseTeamsTheCaseforEarlyIntervention.aspx>
- Institute for Healthcare Improvement. (2022b). *IHI: Science of Improvement: Establishing Measures*. Retrieved April 4, 2022, from: <http://www.ihl.org/resources/Pages/HowtoImprove/ScienceofImprovementEstablishingMeasures.aspx>
- Hyman, L., Bulmer, M., & Lamb, J. (2006, April). *The use of pre-existing survey questions: implications for data quality*. Paper presented at The Conference on Quality in Survey Statistics, Cardiff.
- Healthcare Quality Improvement Partnership (HQIP) (2020). *A Guide to Quality Improvement Tools*. Retrieved April 4, 2022, from: <https://www.hqip.org.uk/wp-content/uploads/2021/01/Final-Quality-Improvement-QI-Tools-09-12-20.pdf>
- Iddrisu, M. S., Considine, J., & Hutchinson, A. (2018). Frequency, nature and timing of clinical deterioration in the early postoperative period. *Journal of Clinical Nursing*, 27(19-20), 3544–3553. <https://doi.org/10.1111/jocn.14611>
- Jones D., Rinaldo Bellomo², Samantha Bates³, Stephen Warrillow⁴, Donna Goldsmith⁵, Graeme Hart⁶, Helen Opdam⁷ and Geoffrey Gutteridge⁸ (2005b). Long term effect of a medical emergency team on cardiac arrests in a teaching hospital. *Critical Care*, 9(4), R808 – R815DOI 10.1186/cc3906
- King’s Improvement Science (2022). *KIS guides to Quality Improvement: Step 1*. Retrieved April 4, 2022, from: https://kingsimprovementscience.org/cms-data/resources/KIS_QI_step_1_December_2018.pdf
- King’s Improvement Science (2022). *KIS guides to Quality Improvement: Step 2*. Retrieved April 4, 2022, from: https://kingsimprovementscience.org/cms-data/resources/KIS_Step_2_December_2018_revised.pdf
- King’s Improvement Science (2022). *KIS guides to Quality Improvement: Step 2*. Retrieved April 4, 2022, from: https://kingsimprovementscience.org/cms-data/resources/KIS_QI_step%203_December_2018.pdf
- Kolic, I., Crane, S., McCartney, S., Perkins, Z., & Taylor, A. (2015). Factors affecting response to National Early Warning Score (NEWS). *Resuscitation*, 90, 85–90. <https://doi.org/10.1016/j.resuscitation.2015.02.009>
- Lavrakas, P. (2008). *Encyclopedia of survey research methods*. SAGE Publications.
- Mackintosh, N., Rainey, H., & Sandall, J. (2012). Understanding how rapid response systems may improve safety for the acutely ill patient: learning from the frontline. *BMJ Quality & Safety*, 21(2), 135–144. <https://doi.org/10.1136/bmjqs-2011-000147>
- Martin, E.A. (2010). *Concise medical dictionary*. 8th ed. Oxford University Press, p. 397
- Molloy, J., Pratt, N., Tiruvoipati, R., Green, C., & Plummer, V. (2018). Relationship between diurnal patterns in Rapid Response Call activation and patient outcome. *Australian Critical Care*, 31(1), 42–46. <https://doi.org/10.1016/j.aucc.2017.01.009>

- Peberdy, M. A., Ornato, J., Larkin, G., Braithwaite, R., Kashner, T., Carey, S., ... Praestgaard, A. (2008). Survival From In-Hospital Cardiac Arrest During Nights and Weekends. *JAMA*, 299(7), 785. <https://doi.org/10.1001/jama.299.7.785>
- Rose, L., Muttalib, F., & Adhikari, N. (2019). Psychological Consequences of Admission to the ICU. *JAMA*, 322(3), 213. <https://doi.org/10.1001/jama.2019.9059>
- Rowan, K., Adam, S., Ball, C., Bray, K., Baker-McLearn, D., ... Young, D. (2007). *Evaluation of outreach services in critical care - Health Services and Delivery Research*. Retrieved April 4, 2022, from: <https://www.journalslibrary.nihr.ac.uk/programmes/hsdr/081404074/#/documentation>
- Royal College of Physicians. (2012). *National Early Warning Score (NEWS): standardising the assessment of acute-illness severity in the NHS*. Royal College of Physicians.
- Royal College of Physicians. (2017). *National Early Warning Score (NEWS) 2: standardising the assessment of acute-illness severity in the NHS*. Royal College of Physicians
- Smith, D. J., Aitken, L. M. (2015). Use of a single parameter track and trigger chart and the perceived barriers and facilitators to escalation of a deteriorating ward patient: a mixed methods study. *Journal of Clinical Nursing*, 25(1-2), 175–185. <https://doi.org/10.1111/jocn.13104>
- Smith, D., Sekhon, M., Francis, J., & Aitken, L. (2019). How actionable are staff behaviours specified in policy documents? A document analysis of protocols for managing deteriorating patients. *Journal Of Clinical Nursing*, 28(21-22), 4139-4149. doi: 10.1111/jocn.15005
- The National Patient Safety Agency Annual Report and Accounts. (2005). Annual Report and Accounts 2005-2006. Retrieved April 4, 2022, from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/231451/0116.pdf.
- The UK Sepsis Trust. (2022). *Clinical Tools - Sepsis Trust*. Retrieved April 4, 2022, from: <https://sepsistrust.org/professional-resources/clinical-tools/>
- Thomas, A., & Panchagnula, U. (2008). Medication-related patient safety incidents in critical care: a review of reports to the UK National Patient Safety Agency. *Anaesthesia*, 63(7), 726-733. <https://doi.org/10.1111/j.1365-2044.2008.05485.x>
- Tobin, A. E., Santamaria, J.D. (2012) Medical emergency teams are associated with reduced mortality across a major metropolitan health network after two-year service: a retrospective study using government administrative data. *Critical Care*, 16(5), 210. <http://doi.org/10.1186/cc11843>.
- White, K., Scott, I. A., Bernard, A., McCulloch, K., Vaux, A., Joyce, C., & Sullivan, C. M. (2016). Patient characteristics, interventions and outcomes of 1151 rapid response team activations in a tertiary hospital: a prospective study. *Internal Medicine Journal*, 46(12), 1398–1406. <https://doi.org/10.1111/imj.13248>
- Williams, G., Pirret, A., Credland, N., Odell, M., Raftery, C., & Smith, D. et al. (2022). A practical approach to establishing a critical care outreach service: An expert panel research design. *Australian Critical Care*. <https://doi.org/10.1016/j.aucc.2022.01.008>
- Yiu, C. J., Khan, S. U., P Subbe, C., Tofeek, K., & Madge, R. A. (2014). Into the Night: Factors affecting response to abnormal Early Warning Scores out-of-hours and implications for service improvement. *Acute Medicine Journal*, 13(2), 56–60. <https://doi.org/10.52964/amja.0343>
- National Confidential Enquiry into Patient Outcome and Death (2005). - *AAP: An Acute Problem?* Retrieved April 4, 2022, from: <https://www.ncepod.org.uk/2005aap.html>

- National Health Service. (2022). *NHS Plan, Do, Study, Act (PDSA) cycles and the model for improvement*. Retrieved April 4, 2022, from: <https://www.england.nhs.uk/wp-content/uploads/2022/01/qsir-pdsa-cycles-model-for-improvement.pdf>
- National Institute of Health and Clinical Excellence. (2018). *NICE Guidance: Emergency and acute medical care in over 16s: service delivery and organisation*. Retrieved April 4, 2022, from: <https://www.nice.org.uk/guidance/ng94>
- National Outreach Forum. (2020). *Quality and Operational Standards for the Provision of Critical Care Outreach Services*. Retrieved April 4, 2022, from: <https://www.norf.org.uk/resources/Documents/QOS%20CCOS%20NOrF/NOrF%20QOS%20Final%20December%202020.pdf>
- Ofoma, U. R., Basnet, S., Berger, A., Kirchner, H. L., Girotra, S., Abella, B., ... Peberdy, M. A. (2018). Trends in Survival After In-Hospital Cardiac Arrest During Nights and Weekends. *Journal of the American College of Cardiology*, 71(4), 402–411. <https://doi.org/10.1016/j.jacc.2017.11.043>
- Ogbeiwi, O. (2017). Why written objectives need to be really SMART. *British Journal Of Healthcare Management*, 23(7), 324–336. doi: 10.12968/bjhc.2017.23.7.324
- Page SA, Nyeboer J. Improving the process of research ethics review. *Research Integrity and Peer Review*. 2017;2(1) doi: 10.1186/s41073-017-0038-7.