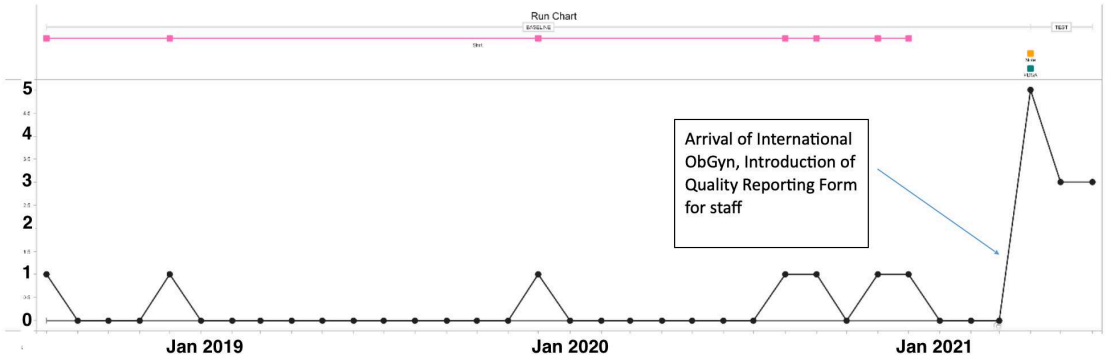
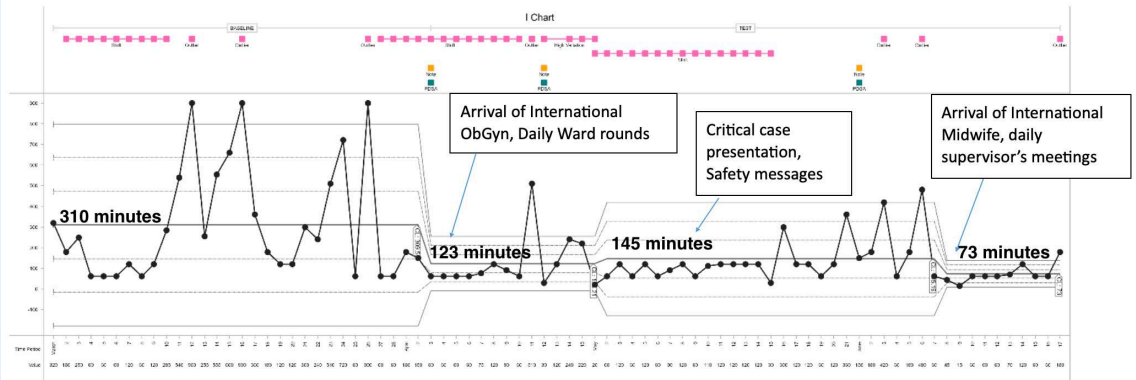
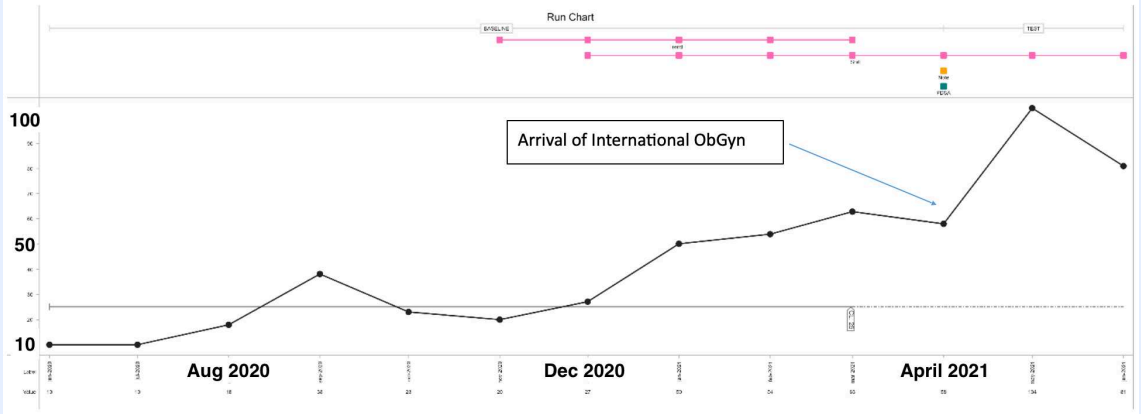
	PLAN	DO	STUDY	ACT
1	Replacing Incident Reporting system with "Quality Reporting" – set of conditions that require reporting ("adverse" outcomes such as maternal hysterectomy, massive obstetric haemorrhage >2.5L, neonatal or intrapartum demise of a baby>2.5kg, maternal intensive care transfer, any other patient care near miss or incident).	Staff found the new form easier to complete. The old incident reporting form required more statement writing by the person reporting the incident and was framed as the action taken when a mistake is made.	Of 7 Quality Reports submitted by staff, 4 were determined to have useful teaching points for the team (fed back through circulars and presentations), and 1 was escalated to the level of a clinical incident. The run chart below shows the monthly incident reporting rate from August 2019-June 2021.	We decided to continue with this initiative but anticipate that creating a culture of reporting of clinical outcomes will take continued reminders and encouragement from management staff. Also, many incidents were reported to management staff verbally.
				
2.	Daily ward rounds from International Obstretrician and Gynaecologist (ObGyn), 6th April 2021	Presence of a senior ObGyn meant that the National team was better supported in clinical decision-making for difficult cases and there was more opportunity for discussion and education during ward rounds.	The International ObGyn was able to assess the areas that needed to be prioritized for improvement and use QI expertise to involve staff in this improvement project.	Feedback from national staff was positive, and overwhelmingly that they desired a physical presence from the senior management team and appreciated having a level of clinical accountability in order to improve standards.
3.	Re-design of drug chart – staff opinions about how we could encourage better prescribing and recording of drugs given were sought and a new chart tested. (9th May 2021)	We found that pre-populated drug doses and frequencies made it easier for these drugs to be recorded accurately when they are given.	Anti-hypertensives were clearly prescribed in 45-75% of charts from March-May 2021. The new chart was introduced on the 9th May 2021. In June, 100% of antihypertensive prescriptions had dose, timing and frequency documented.	Qualitative feedback from staff was good once they got used to the chart as there was more space to prescribe drugs and the layout decreased risk of errors. We decided to adopt this change.

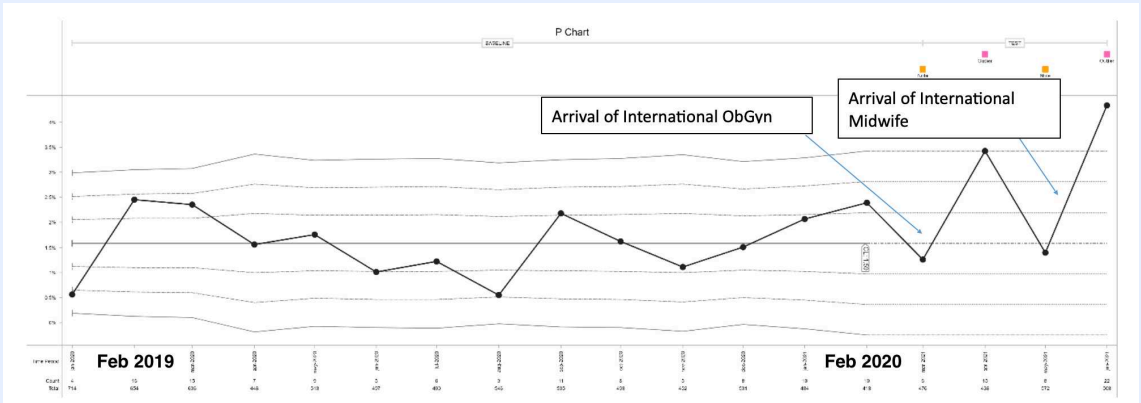
4.	Re-design of magnesium sulfate chart	We found that though the project had adopted intravenous MgSO4 (over intra-muscular) for eclampsia treatment and prophylaxis, the chart monitoring vital signs and fluid management was designed for intra-muscular dosing. There were no fields for oral fluid intake, other IV fluid intake, and temperature. We designed a new chart with these fields included.	The new chart brought to light that the midwives and doctors were not practicing fluid restriction in women with eclampsia and severe pre-eclampsia. Fluid boluses and oral fluids were not clear in the previous chart. This enabled us to do education around fluid restriction. We circulated a local guideline specifying that women should be restricted to 80ml/h total fluids and found adherence improved. From March-May 2021, fluid restriction was carried out in 0%-30% of women. In June 2021, fluid restriction was carried out in 70%.	There as a proposal to replace magnesium sulfate chart with a double-sided vitals and fluid balance chart was taken into consideration but felt that staff were not ready for too many changes in paperwork. This idea was parked. We adopted the new MgSO4 chart.
5.	Weekday morning meetings between International Midwife and Maternity Supervisors	The International Midwife arrived on the project on 23rd May 2021. She was able to have daily feedback to the Maternity Supervisors on key nursing and midwifery management. She also involved the maternity managers in the doctors' ward round.	We were better able to feedback to the midwives regarding escalating vital signs such as hypertension and teaching them how to use the new MgSO4 chart and new drug chart in a more effective way.	This daily presence of management staff on the ward was appreciated by the nurses and midwives (from feedback). We decided to continue this as long as the international midwife is present.
6.	Re-design of vitals chart + education regarding use	We realized that the current vitals chart did not have systolic and diastolic blood pressures aligned with the numerical values, causing some confusion amongst staff as to which parameters warrant immediate action. We re-formatted the chart to address this issue.	The new chart was not much different from the old chart in terms of how staff should use it. It took away all ambiguity, placing a systolic blood pressure of 160 and a diastolic of 110 firmly in the Red zone - requiring escalation.	We were not able to use the new chart as the old chart had already been printed with supply for 4 months. We planned to start using the new chart in July 2021.

7.	Education campaign regarding acute blood pressure control (23rd April 2021)	We started weekly case presentations and Safety Message of the week circulated via Whatsapp in two languages. We put up printed flowcharts in Arabic and English that displayed a standardized algorithm for acute blood pressure management. See Figure 3 for English version.	See I-chart below for the time taken to control each acute hypertensive episode in successive cases. The baseline mean time to control a hypertensive episode was 310 minutes. This decreased to a mean of 123-145 minutes. After the arrival of the International midwife, who was able to promote recognition and escalation of hypertension amongst the midwives, the mean further decreased to 73 minutes per episode.	These behavioural nudges and reminders were effective in getting midwives to escalate high blood pressure, and doctors to prescribe antihypertensives in a systematic way until the episode is resolved.



8.	Education campaign regarding PPH management: 1. Pink cannulae were taken away from the maternity and emergency departments and replaced with green cannulae. 2. Weekly case presentations with Emergency Department and Anaesthetic teams. 3. Transfer of patients with an emphasis on SBAR (Situation, Background, Assessment, Recommendation) handover. 4. Tranexamic acid was highlighted as being a first-line drug to use whenever the estimated blood loss is >500ml.	Case presentations led to cross department consensus that it was unacceptable to use pink cannulae (20 gauge) for intravenous access points for maternity patients. SBAR has been promoted as the standard of handover practice that is expected. Presence of International ObGyn on site, who would usually be called for severe PPH cases, meant that use of tranexamic acid could be role modelled. The WOMAN trial (9) was circulated via Whatsapp groups to educate doctors about the underlying evidence base for tranexamic acid in PPH.	We did not collect numerical data on the use of appropriate cannula gauge for maternity patients. We observed that the change in policy of transfer to bedside had resulted in fewer delays resulting from transfer. Simulation training revealed that many staff are still unaware of SBAR but were able to demonstrate effective SBAR handover in simulated scenarios. Case file audit showed that estimated blood loss was only recorded in 40-50% of patients, even with PPH as a diagnosis. Tranexamic acid consumption was already trending upwards in consumption prior to our project but went up further with these behavioural nudges (see run chart below). June consumption may be falsely depressed as there were some days when the department ran out of stock.	Simulation training discussions revealed tension between Emergency Department and Maternity teams but was an opportunity to work together in simulated stressful situations, and SBAR was used effectively by staff. Low levels of PPH identification and low levels of estimated blood loss documentation in case files where PPH is listed as a diagnosis has led us to conclude that PPH is grossly underestimated.



9.	Midwives and doctors encouraged to carry out routine estimation of blood loss at each birth (13th June 2021)	Visual estimation of blood loss charts was put up in the Delivery rooms, following a critical case presentation of a PPH case. The International Midwife has been presented to promote and explain the importance of routine estimated blood loss recording.	We studied the effect of this intervention through routinely collected data reflecting PPH identification rates. Through observation on ward rounds, we have found an increase in number of deliveries with routine estimated blood loss documented.	We will continue to add data points as this work is continued by the International Midwife. We hope that in identifying "mild-moderate PPH", early initiation of first line treatment can occur. Staff have asked if we can obtain graduated collection drapes, and this is being investigated by the team.
				
10.	Multi-professional Obstetric Emergency Simulation Drills	We wrote a bank of five scenarios and recruited a multiprofessional team to act as faculty members to run the scenarios, act as the patients, and to give feedback.	We ran two simulation days and took feedback from the first to improve and modify the second. We added a lecture on communication tools such as checklists and SBAR to the start of the second simulation day. Feedback from the simulation days were overwhelmingly positive. We asked participants to rate certain safety behaviors on a Likehart scale of 1-5, 5 meaning they were "very confident". See Appendix 2. The average score from before the training was 4.4 and the average from after the training was 4.6.	Due to the positive feedback and overwhelming feeling from the faculty group that the simulation days were useful exercises for the staff to bond as a team, explore and discuss differences in opinions in a safe space, and to practice SBAR communication, we had aimed to continue this training on a monthly rotational basis. However, when the International ObGyn left in July 2021, there was a vacuum in expertise in simulation training and this intervention was not sustained.