

Reducing inappropriate arterial blood gas testing within Critical Care

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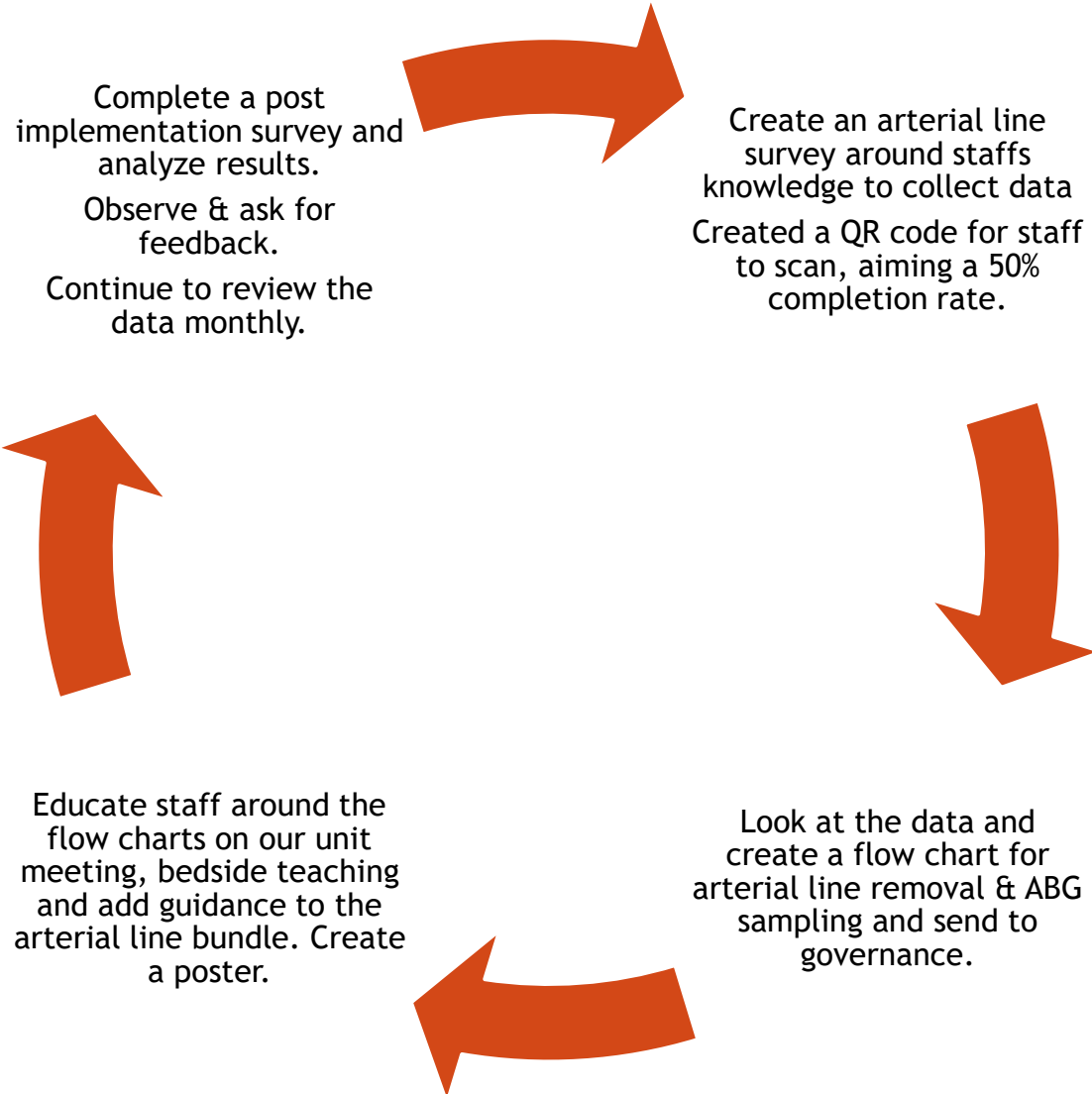
Introduction

- Arterial blood gas (ABG), is the most commonly performed within critical care.
- ABG analysis is mainly used to assess the accuracy of ventilator & oxygenation status, acid base status, gas exchange, electrolytes & lactate.
- ABG sampling can be crucial in helping and diagnosing patients effectively (National institutes of health 2025).
- Arterial lines also carry various complications such as, phlebitis, discolouration/blanching, infection and thrombus.
- Frequent sampling can leave long term CC patients requiring blood transfusions. (Mortality increases from 10% of those not receiving a blood transfusion to 25% for those receiving blood transfusions) This can have a significant impact to patients within critical care.

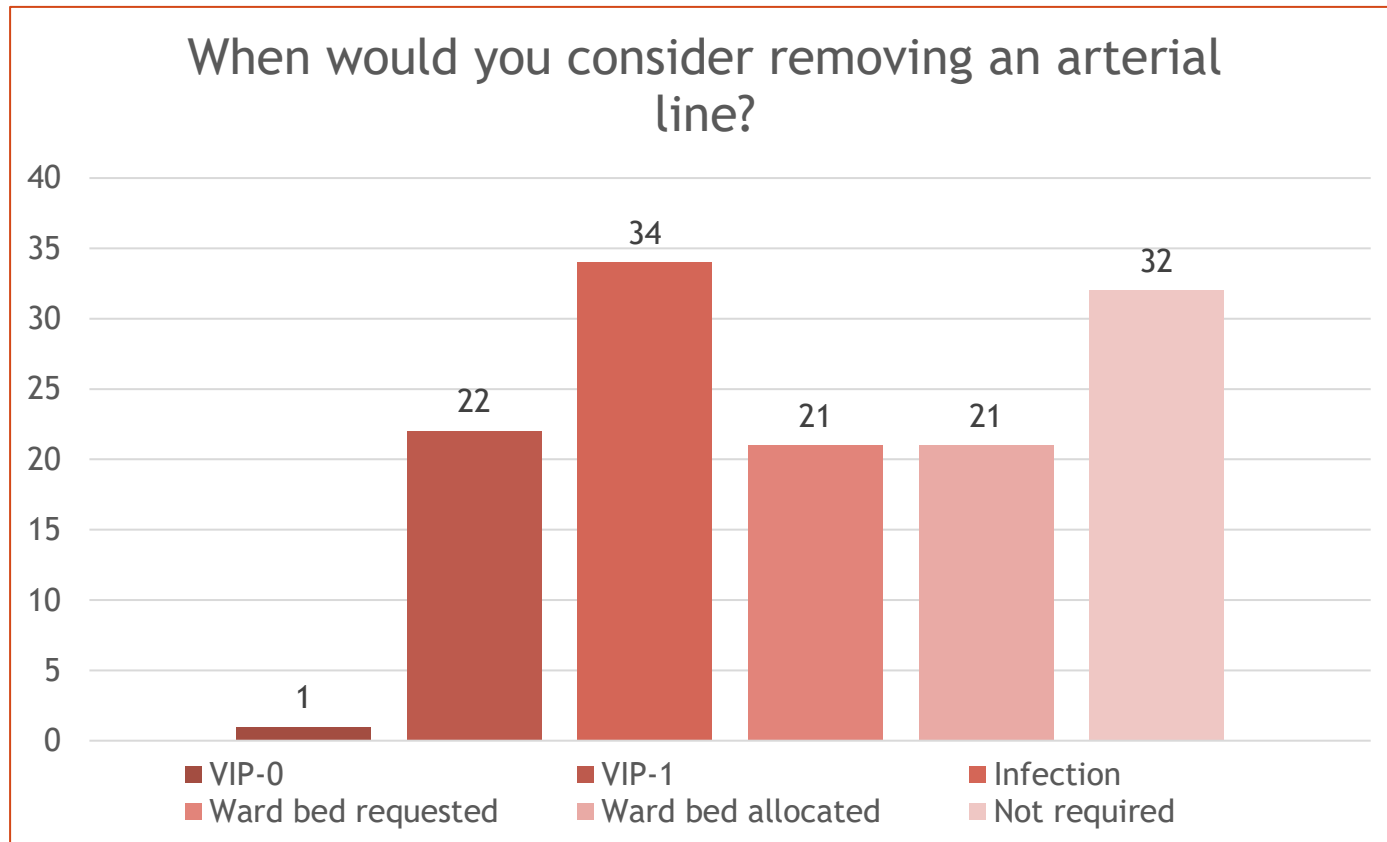
Aim & Objectives

- Reduce inappropriate arterial blood gas testing on patients
- Staff education- form a systemic flowchart for staff to follow, with aim to reduce inappropriate ABG sampling and appropriate arterial line removal.
- Aim to improve patient experience & treatment by reducing the frequency of unnecessary blood gas sampling on the day of discharge to the ward by 50%.
- Aim to improve cost by reducing the amount of inappropriate blood gas sampling, by reducing the amount of consumables by 50% on the day of discharge.

Plan

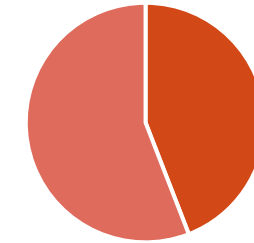


Data collection results



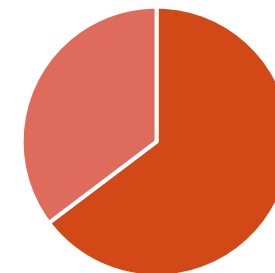
34 people responded, over 50%

Would you carry out a blood gas on a stable patient on normal flow with decreasing O2 requirements



Yes No

Would you carry out a blood gas prior to removal of an arterial line?



Yes No

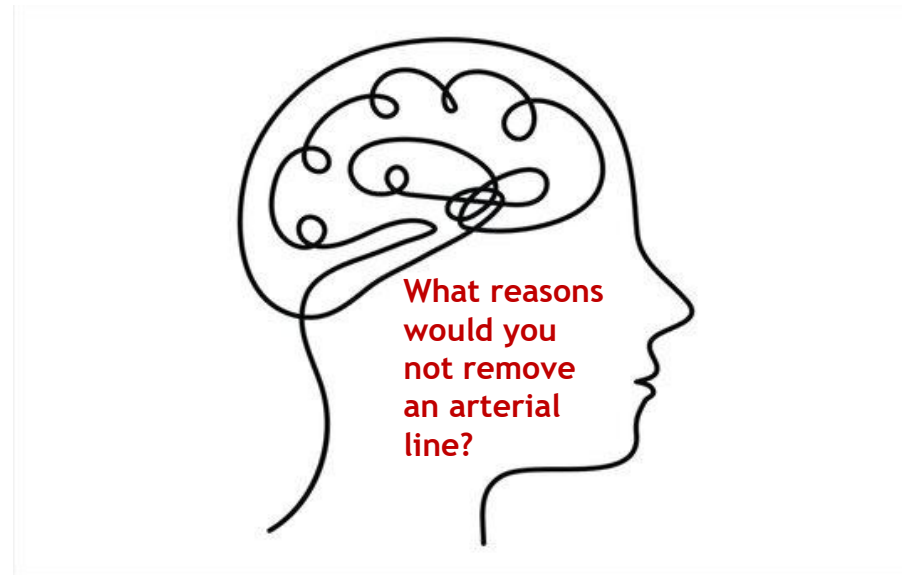
Data collection results- Themes (34 responses)

Interventions

- Requires ABG and bloods
- Needs bloods examination often
- Frequent blood sampling/monitoring
- Hard to site lines
- Fluid management monitoring
- Still required for bloods
- If line been in for 7 days but too poorly to replace it

Respiratory

- High FiO2 requirements
- On ventilation
- Patient on respiratory support



General

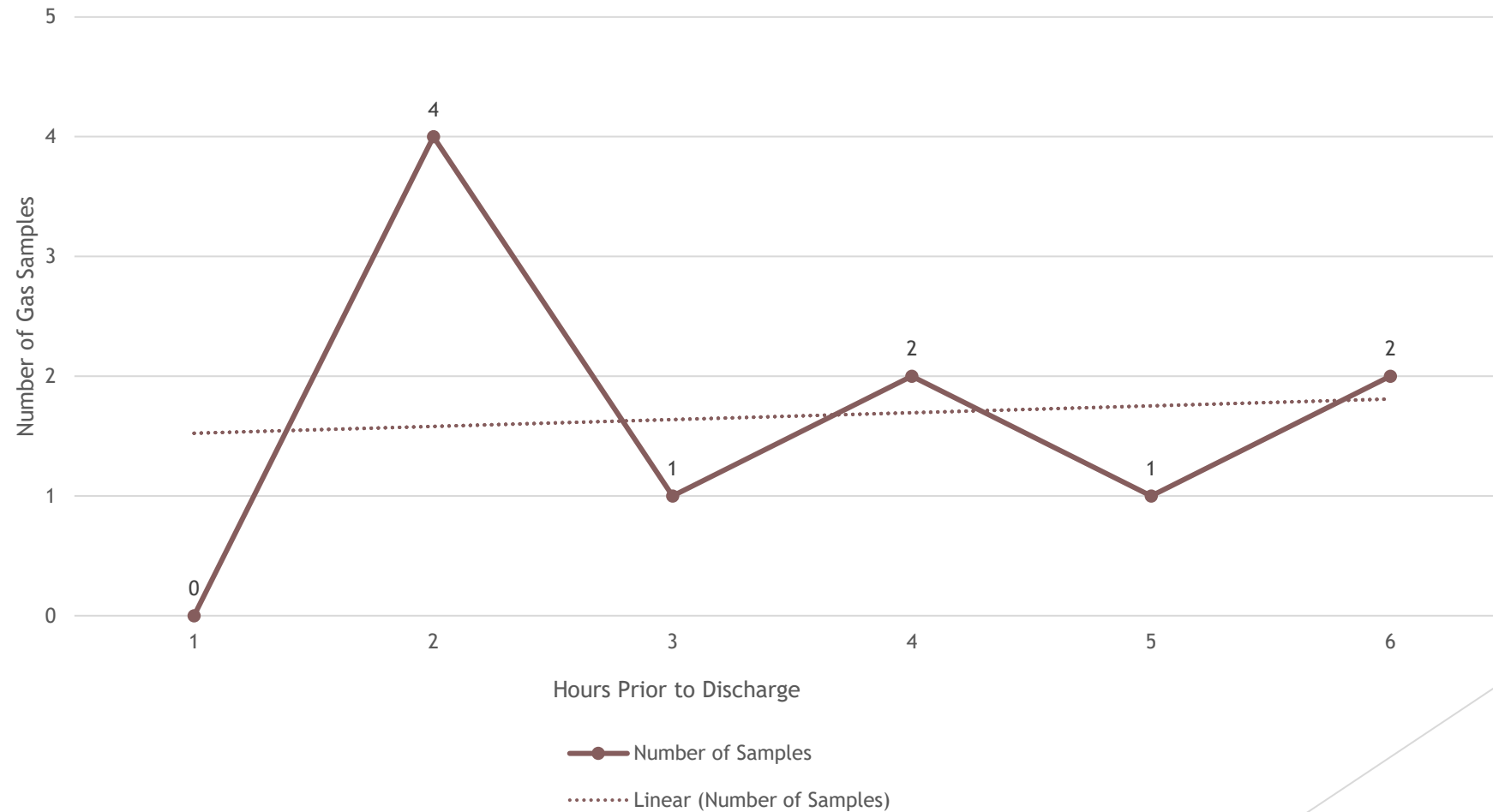
- Electrolyte imbalance
- Ongoing level 2/3 care
- Still in use
- If a patient requested because they didn't like it
- Deteriorating patient
- On any organ support
- If still in use, no trace but still obtainable
- If patient's condition requires them to have one
- Deranged clotting
- No discharge plan, expired or damaged transducer set
- Patient too unwell
- Platelet is below 50
- On strong potassium
- ON CVVHDF
- Generally unwell
- Drs orders

CVS

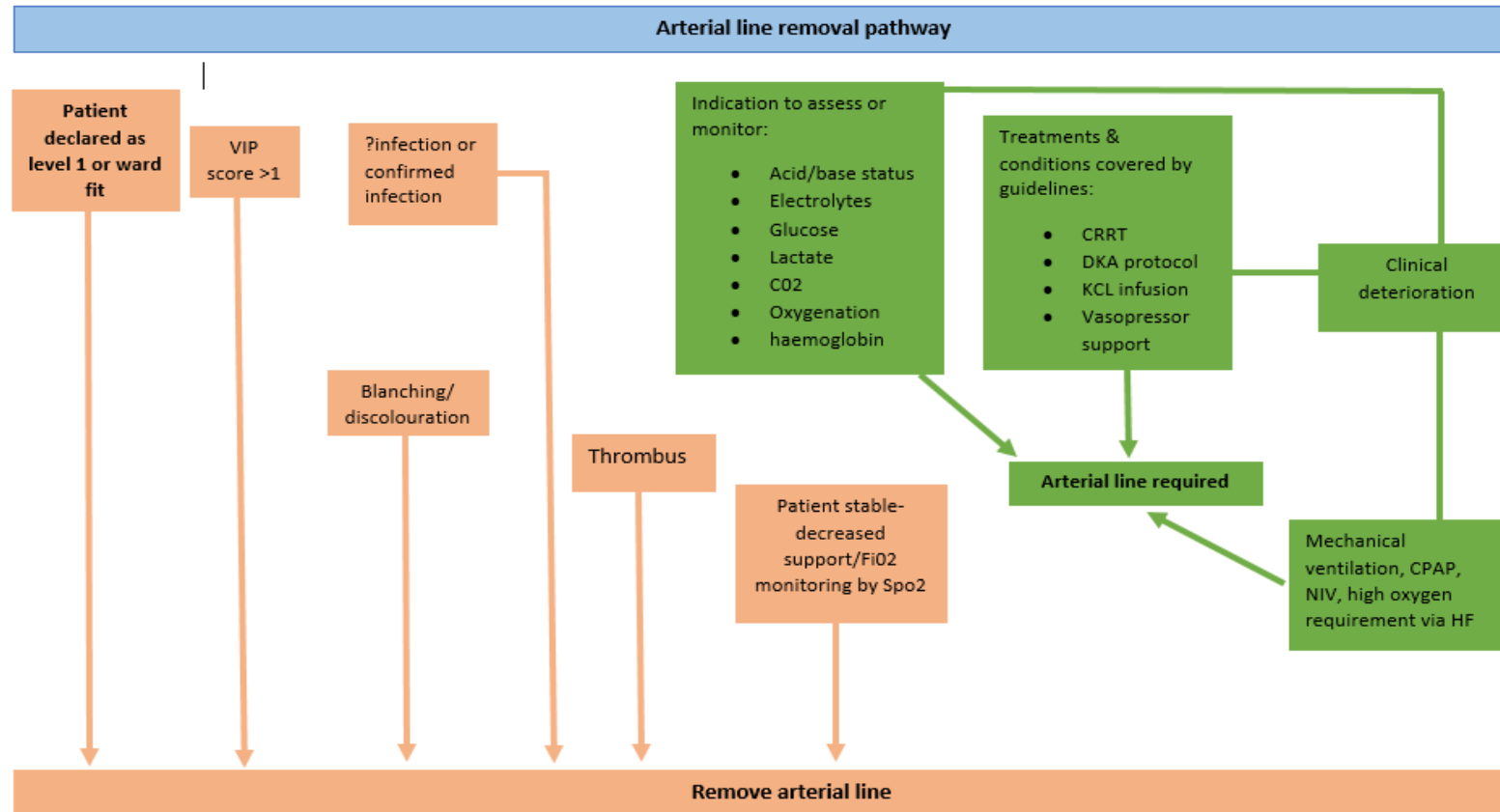
- Patients requiring continuous BP monitoring vasopressin's/ noradrenaline
- CVS unstable needing regular blood samples, on vasopressors
- Continuous BP management needing CVS support
- On noradrenaline
- For inotropic support, Dr instruction
- Continuous BP management, needing CVS support
- Hypotension or hypertension, CVS unstable
- Continuous BP monitoring, blood collection, patient on vasopressors
- Haemodynamically unstable
- If the patient is on vasopressors
- Requires continuous BP monitoring

Pre implementation results (10 people)

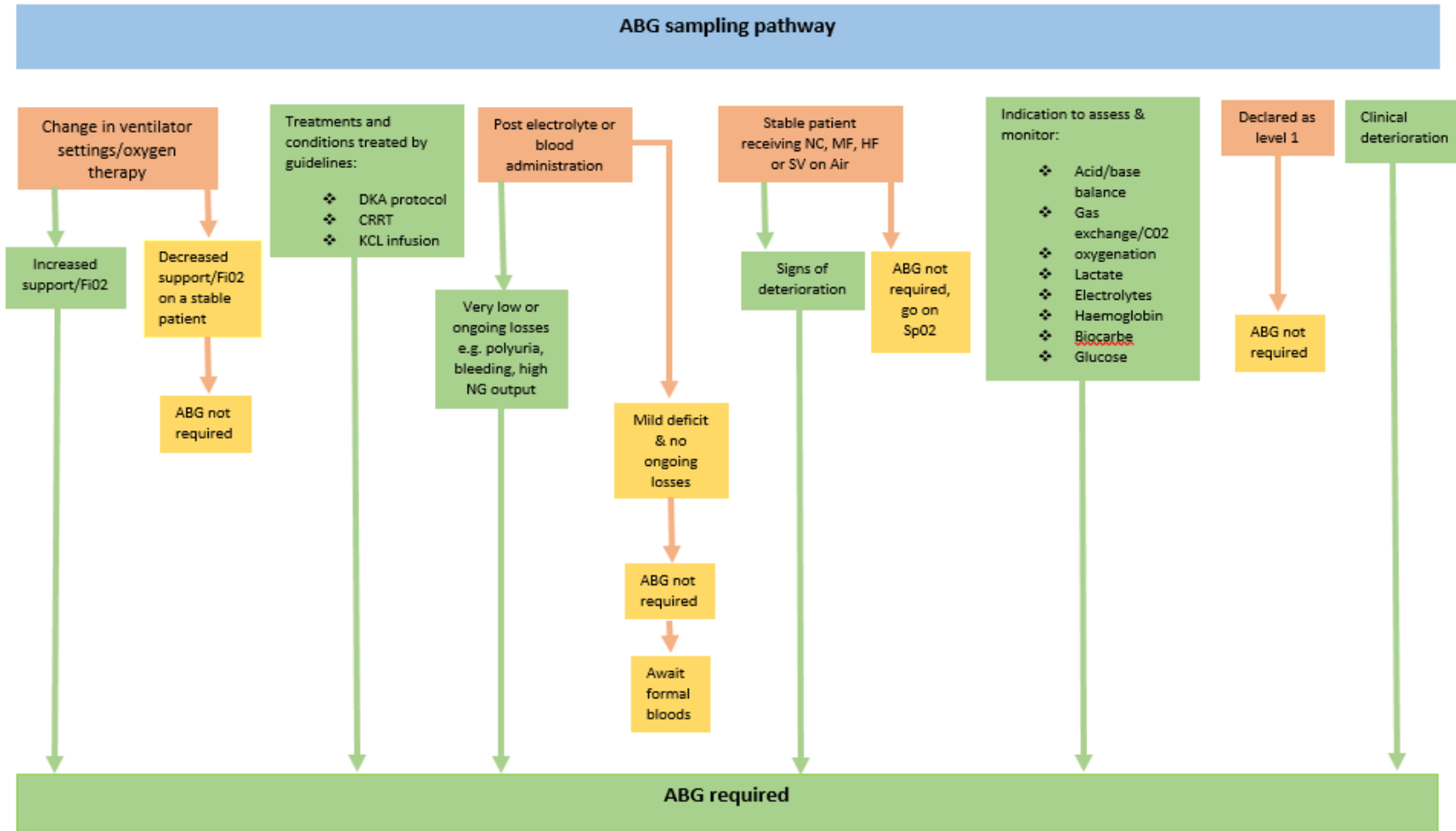
Number of Gas Samples Taken Up to 6 Hours Prior to Line Removal



Action- Arterial line removal flow chart



ABG sampling flow chart



Unintended consequences

- Quicker line removal
- Reduction in blood product administration
- Potential of re-insertion if patients deteriorate
- Reduction in cost- consumables, blood administration, infections/antibiotic use
- Reduction in infections

Implementation

Following my data collection it was highlighted that there wasn't any knowledge deficit amongst staff and their knowledge base was really good re arterial lines. It was actually a socially learnt habitual behaviour, which that practice has become a ritual and continued for a long time. Making it a challenge to break this behaviour.

The arterial and gas sampling guidelines produced have gone through governance for a peer review and has been approved. My next step is to implement this change by communicating this to my colleagues via teaching sessions and creating a poster. I aim to change peoples perception and make them think why I am doing this blood gas? Is it really needed? Both arterial line removal and blood gas sampling guidance will also be made available digitally on the arterial line bundles on medi-tech for staff to reflect back on.

Guidelines have shown to be an effective strategy for improving health outcomes and processes of care in healthcare (Gundersen, L). Despite the benefits, this does not guarantee health care practitioners to adopt and adhere these in practice (Grol, R) Tailored implementation strategies are needed to address these barriers and support update of guidelines in practice (Yost, T etal).

Guidelines can be beneficial to new starters, providing them with more structured approach. Generally the more established staff are resistant to using new guidelines and adapting to change. Due to us having new starters starting in the upcoming weeks I am hoping this can be snowballed and the more established staff will follow and accept in practice.

Change theory's

Lewins Theory

Kurt Lewin's change model suggested a three change step model that aids employees to adapt to change. This model highlights that restraining forces influence the behaviour of individuals and barriers to change (National Institutes of Health)

Unfreezing- Preparing for change

Change- Implementing the desired change

Refreeze- Solidifying & adopting the desired change

The next three steps show how the Kurt Lewin's theory was adopted into this QI project:

Unfreezing- Where currently at the unfreeze stage acknowledging that there is a problem, demonstrated by the data collected. Practices such as doing a gas sample on patients 1 hour prior to discharge.

Change- Currently starting by implementing a poster, guidelines onto the arterial line care bundle and a teaching session to change current behaviour.

Refreeze- Hopefully staff adopting the new behaviour's evidenced by my future data collection. Making them think about their practice e.g. why I am doing this gas? is it needed.

Banduras Social Theory

Banduras social theory emphasis the importance of observational learning where individuals require knowledge, skills, attitudes and beliefs by watching the actions of others, leading to the modelling and adoption of observed behaviours (Evans, O 2024).

Observational learning is a key concept of behavioural theory's. According to Banduras theory, if a behaviour is being reinforced, it is more than likely to be repeated in the future (Main, P 2022).

Bandura Outlines his theory through four key principles:

- Attention
- Retention
- Reproduction
- Motivation

The four principles below show how the Banduras theory was implemented in the QI:

Attention: Acknowledge there is problem from socially learnt habicthual behaviour re gas sampling via my teaching session on our unit meeting.

Retention: I hope positive behaviours from those willing to change can be observed and influence others.

Reproduction: I hope this practice can be filtered down and individuals can be positive role models to more junior staff/ new starters, so it is to be known as standard practice.

Motivation: my aim is to feedback positive results to my colleagues via unit meetings/governance and hopefully keep them motivated so this becomes standardised practice. Making them aware that their change in practice has been affective in changing outcomes for patients and the environment they work in.

Conclusion

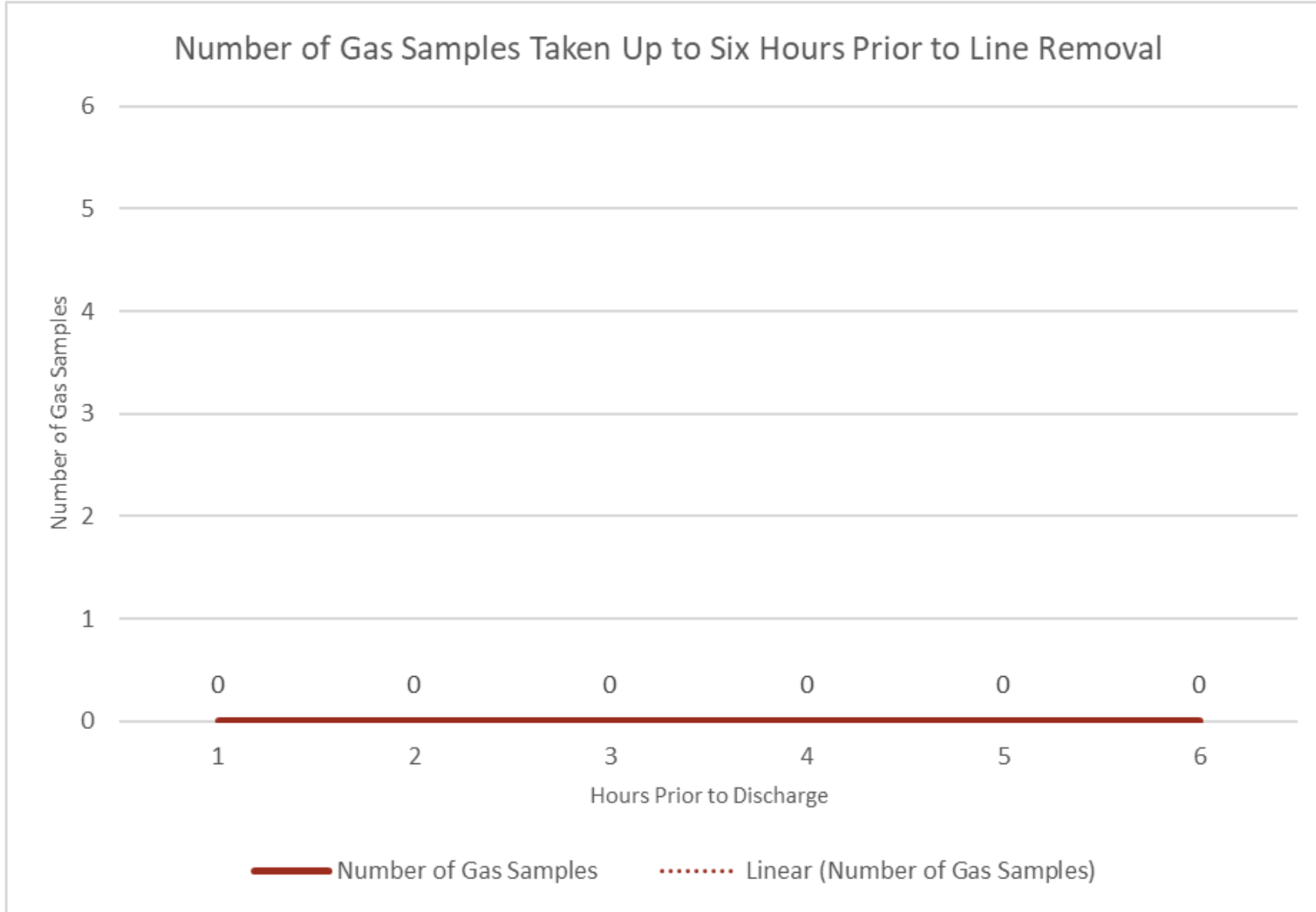
The quality improvement is currently at the change stage. After my teaching, poster creation and implementing the guidelines I hope that I can overcome the challenge of breaking ritualistic behaviours in practice.

By acknowledging that there's an issue when feeding back my data collection, I hope I can change my colleagues perception on it, making them think about their practice. Many bad habits can be due to fear, reassurance and ongoing practice that hasn't been changed for many years.

I have received many positive feedback from some colleagues who I have discussed this QI project with. Whom appear eager to change practice and encourage others to do so. Hopefully those in acceptance can influence positive behaviour to others and filter this down. Aiming for positive behaviours to be reinforced and eventually to be normal practice.

Due to my data collection, guidelines and waiting a while for governance approval I hope to have my post implementation results in a months time. I will then continue to review the data monthly to see whether change has been implemented and the guidelines have been affective in practice.

Post implementation results (10 people)



Conclusion

After gathering my post implementation results it is evident that this QI project has had a positive impact within the area I work.

After acknowledging that there was an issue around this area to my colleagues, following my teaching session and implementing the guidelines. A lot have been in acceptance of this and it is now being followed within practice. New starters are also being shown the guidelines and it is now apart of the arterial line package. I hope this can continue to be snow balled and continue to become normal practice.

Although I knew reinforcing change and positive behaviours within practice would be a challenge, the outcome has been better than expected. From looking at both pre and post implementation results you can see a constructive change within practice.

I will continue to snow ball this and challenge people that aren't using the guidelines practically by educating them and reverting them to the guidelines. The co-ordinators on shifts and clinical educator have also been reinforcing this and challenging when the guidelines aren't being followed.

My aim is to continue to enforce this practice and review this on a monthly basis.

Questions?