



**Scottish
Ambulance
Service**

Working in Partnership with Universities



Medical Gases

Preliminary Audit Report and Next Steps

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1. Purpose of Document

This document provides an update on the Medical Gas work that has been progressed throughout 2024-25 to understand the current position in terms of medical gas cylinder usage within the Service. This was a key best value programme and was linked to the proposal for a write off to BOC for lost cylinders, for which we continue to pay a monthly rental charge.

Specifically this paper will describe:

- The significant work that has taken place over the last year in relation to the medical gas issue. In particular the outputs from the cylinder management app trial and assurance that we can effectively operationalise the app across the Service to mitigate the further risk of lost cylinders
- the outputs from the recent audit of gas cylinders in use, linking to the information from the previous 2 audits
- detail on the agreement with BOC that if we pay for the lost cylinders (as a write off) then find these over the next 12 months, as the app and additional controls are operationalised, we will receive a refund from BOC which would be offset against the write off payment
- detail on the improved contract management arrangements with BOC to gain assurance that the contract is being managed robustly going forward
- the anticipated recurring revenue cost saving as a result of the proposed write off and
- the ownership, reporting and monitoring of medical gas usage going forward

[REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]

2. Background

There continues to be evidence to suggest that the Service's medical gas cylinder stock holding exceeds clinical requirements, this is within the context of the work undertaken in 2019 to review the level of gas cylinders in use within the Service. [Appendix A](#) provides a summary of the background to this and the clinical agreement on the number of cylinders now required. Work continues to review and update the guidance on the number of cylinders and type required Revised guidance to reflect additional vehicle types that routinely carry gases will however be published imminently as deliverable of the project.

Having greater clarity on the number of cylinders in use provides scope to rationalise stock to reduce year-on-year cylinder rental costs and re-baseline stock holding by returning unwanted cylinders. There has to date not been the facility to accurately track cylinders, nor understand usage rates, re-ordering patterns or variation between stations. Currently BOC delivers cylinders directly to 82 stations and scan them into their system for charging the rent on usage. All other stations and base locations replenish stock from one of the 82 stations. Stations contact BOC directly for the return of used cylinders, at which point BOC removes the cylinder from their system and cease charging rental. [REDACTED]

[REDACTED]

[REDACTED]
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[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

The Service has during 2024/25 set up a formal project structure to take this work forward.

An updated Service wide audit has been undertaken, assisted by the app, to quantify the number of cylinders that are operating within the Service. This allows comparison to the cylinders currently being paid for. [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]

Going forward it is considered the BOC cylinder management app can be used to track these, thereby providing traceability to mitigate the risk of future write-offs.

3. The Audit Approach

The system now available to scan cylinders was trialled in Edinburgh, East and Midlothian trial (June – November 2024). This proved scanning to be intuitive and quick – it takes a couple of minutes for staff to scan a cylinder between two locations. The trial was also a change initiative to get crews thinking differently about gases as a clinical commodity, and tracked and reported as such.

Since then, the Service has also undertaken a Service wide audit which was implemented in three phases and has involved participation from every station. The 3 phases took place Dec '24, Feb '25 and Mar '25 and the scope was for all stations to scan cylinders in store and onboard the vehicle fleet during a one-week period.

The high volume of stations and vehicles, combined with the dynamic nature of cylinder movements between locations requires an accepted tolerance by which to measure audit results. In addition, some of the vehicle fleet may be out of service for maintenance or repair. It's therefore inevitable that a percentage of the Service's stock holding will not be counted, thus underestimating the cylinders available. The Fleet department has confirmed the number of vehicles typically off the road due to maintenance, repair or impound should never exceed 25.

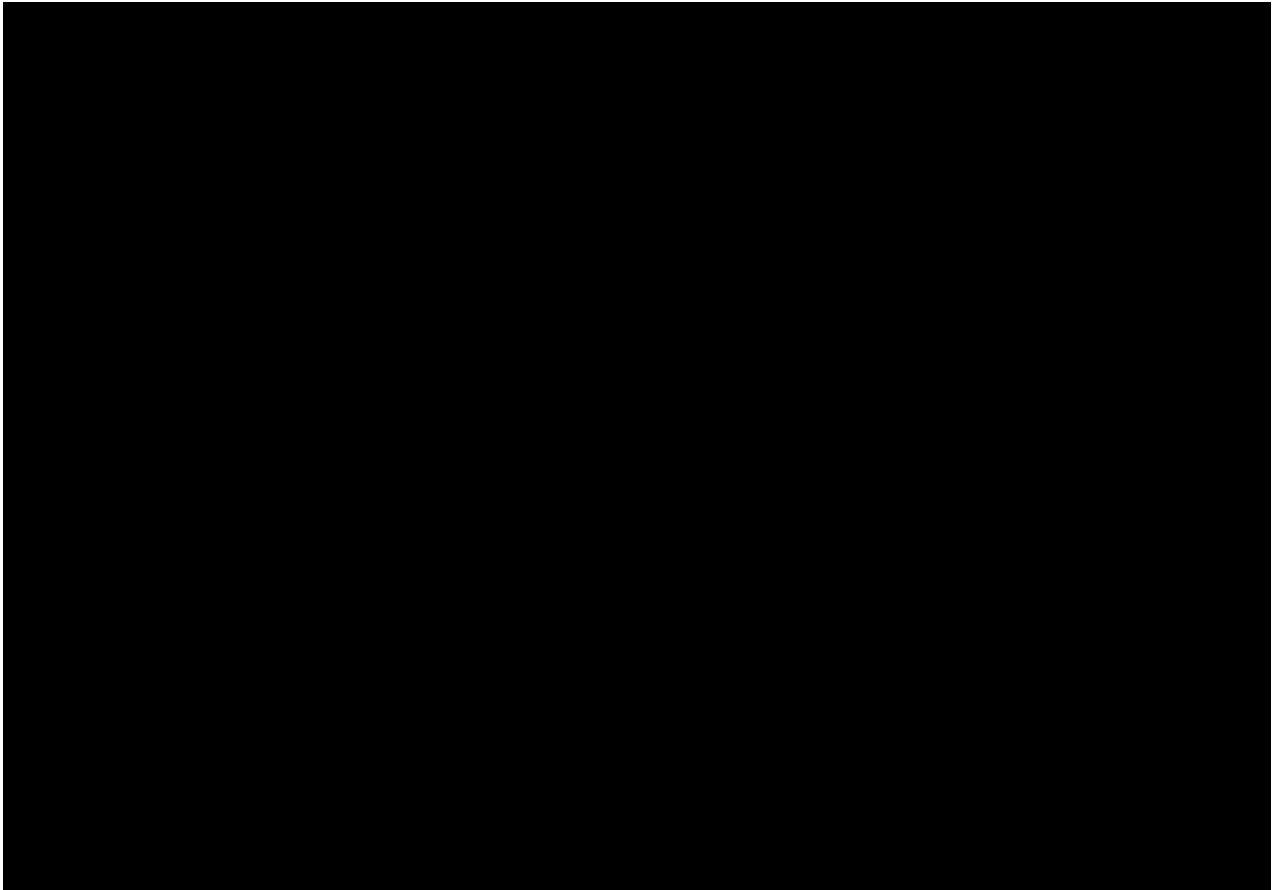
[REDACTED]. It was therefore imperative that all audit activity was coordinated across all stations within the same week to avoid misinterpreting results to reach wrong conclusions. This was led by the Regions.

Previous audits undertaken in 2018 and 2021 illustrated that the Service pays rental based on a stock holding considerably higher than the current operational levels which are required to operate safely. Work was also undertaken in 2019 to confirm the holding required by stations. However, rental costs continue to be based upon a greater number of cylinders than in rotation.

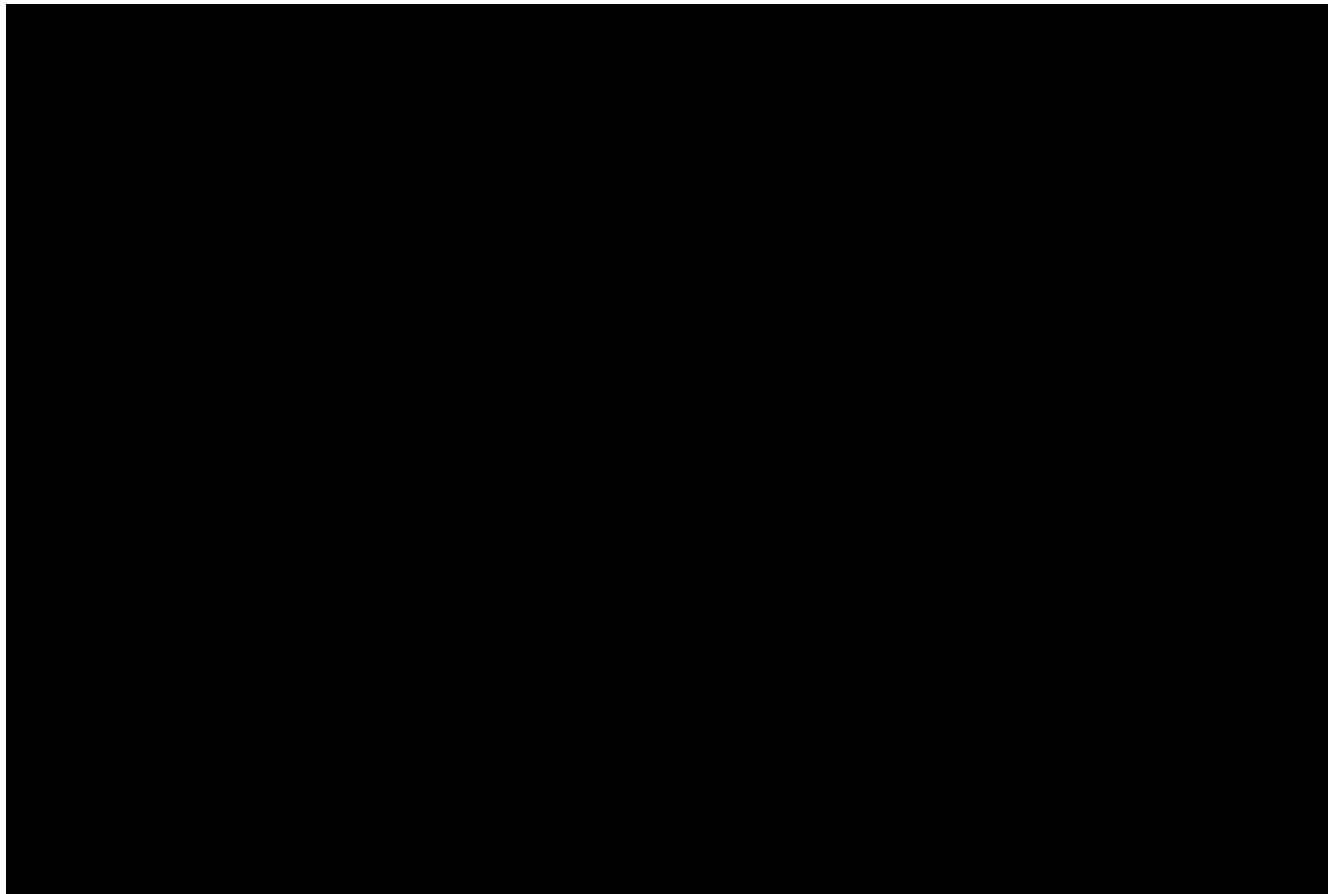
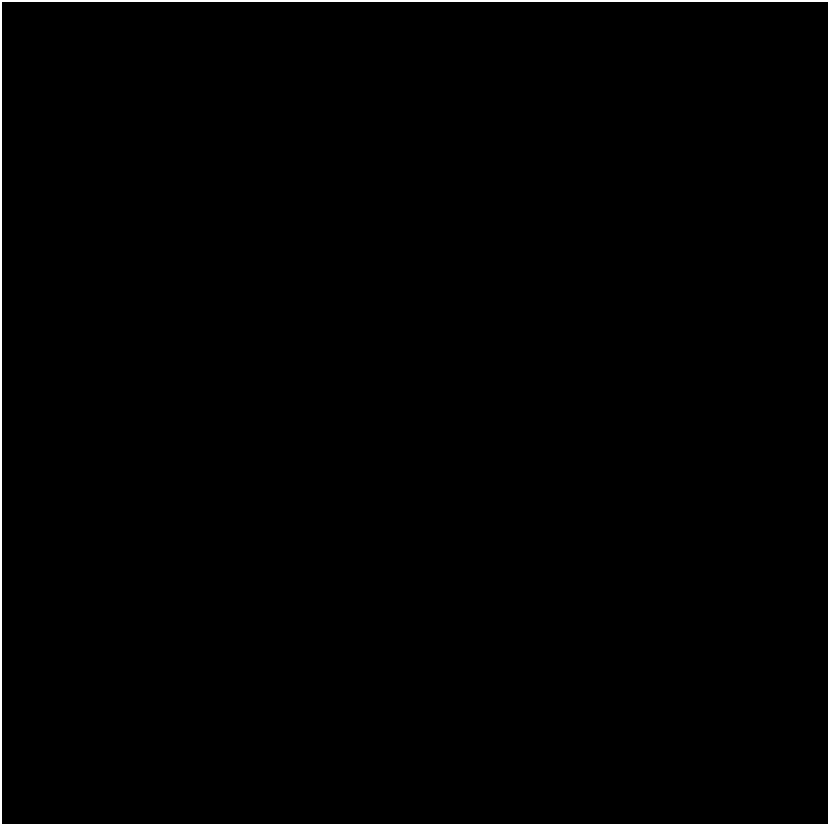
Reasons for this are:

- A report is available to measure rental period which starts from the date of delivery. Cylinders expire after 3 years, based on batch fill date, and are no longer safe for patients or crews to administer following expiry. The cylinders greater than 3 years need returned to BOC. The audit however has not found the majority of these aging cylinders thereby presuming they are not in use but continue to incur rental charges.
- Although cylinders are continuously replenished, we know from the data that the total number of expired and expiring in the next 90 days cylinders fluctuates between 1,700 – 1,800 cylinders. At the last review, 110 of the expired cylinders found as part of the search during the audit had not yet been returned to BOC, with others having already been returned.

4. Audit Results



[Redacted text block]



[REDACTED]

The audit results can be viewed in full in [Appendix C](#).

[REDACTED]

To provide the necessary assurance, stations were asked to submit an MS Form to declare the completion of the phase 3 audit, and to identify any vehicles that had been missed or raise any concerns. Of those declarations received, the audit was completed to a high standard and this was verified by manually checking station data in the BOC web-portal to get a snapshot of cylinder distribution.

Stocking holding of Mountain Rescue Teams and both Community First Responders and BASICS Responders were captured via Microsoft Form and were incorporated into the audit results. This identified 43 expired cylinders with Responders which have requested to be returned to nearest station and 2 expired cylinders with Mountain Rescue Teams.

We are also aware of a shortfall in audit results from:

- EPDD
- ScotSTAR, although losses are understood to be historic
- Up to 360 of the vehicle fleet potentially carrying gases was not scanned

Across all regions there is an average % missing of best case 42% and worst case 72% As described above, a known gap in the audit relates to vehicles with a call sign but which weren't scanned during the audit, this comprises approximately 100 A&E ambulances (including maintenance and operational spares) and 115 PTS vehicles, many of which will also carry gases. This could account for in the region of 600 cylinders.

5. [REDACTED]

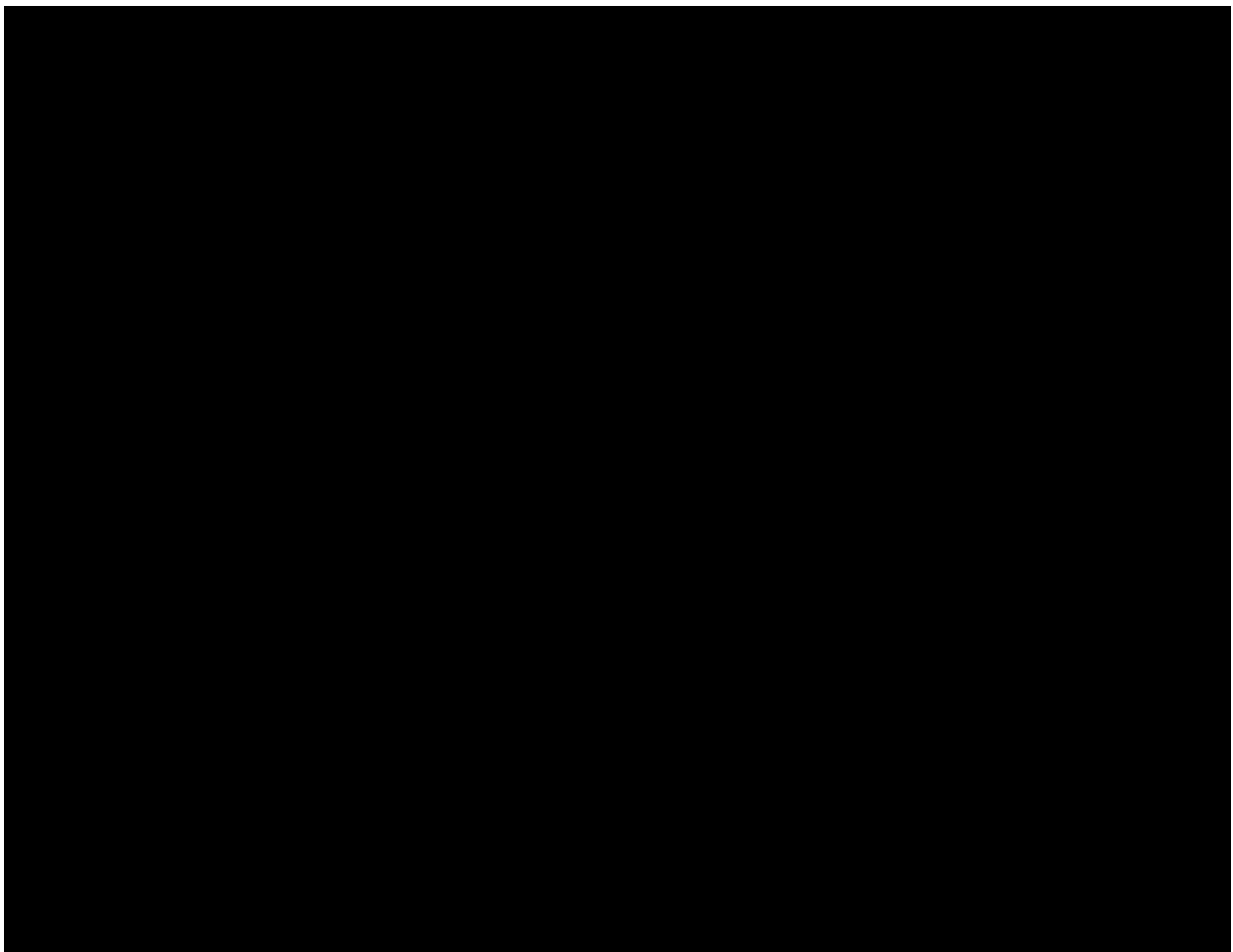
In reviewing the gap in unaccounted for cylinders, these can be categorised into 3 headings.

1. Expired cylinders
2. Cylinders expiring in the next 90 days and
3. Those that have been delivered more recently so we can track effectively where they might be

Expired cylinders from this and previous audits

There are cylinders that we know have expired from data in the BOC system, and have not been scanned as part of the audit. We know because they have expired that they will not be in use. [REDACTED]

In reviewing the time elapsed since these expired this is as follows:



[REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]

[REDACTED]
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[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

The need to enforce the routine scanning to reflect internal cylinder movements and undertaking a further audit, is expected to reduce this worst-case scenario write off.

6. The Rollout Approach

To build upon the understanding from the audit data, it is essential to expedite the introduction of daily scanning by frontline A&E crews. Comprehensive assessment of setup requirements to support rollout is in an advanced state.

This includes compilation of user lists to create approx. 4.6k Accura accounts, build a hierarchical structure (see [Appendix F](#)), establish parent/child vehicle/station relationships, implement the agreed station and vehicle naming convention, and undertake a final review of reporting requirements to accelerate the learning from app usage.

User guidance and comms to utilise the app are in development. Guidance is predicated on maximising self-sufficiency during the rollout, minimising post go-live queries and support needs. The rollout is expected to commence during May and be complete by mid October.

Readiness for the Rollout



There is a dependency on Team Leaders and Area Service Managers to ensure crews scan the cylinders and articulate the importance by conveying consequences of poor cylinder management.

A communication plan led by the clinical team, linked to the clinical needs and obligations of the clinicians is under development with approval anticipated from the Project Board required in May, prior to commencement of rollout.

7. Audit Redo to Improve Accuracy

It is recognised that the significant shortfall in recording of the cylinders needs to be reassessed and verified. A consistent approach, leadership, commitment and prioritisation needs to be enforced. The Project Team is working with the clinical team to also reinforce the need for a further audit and the ongoing scanning as business as usual.

A proposed consistent approach to maximise coverage and yield is as follows:

- Start audit prior to dayshift shift change and continue until after nightshift shift change to catch maximum number of vehicles at station
- Count stock in store when most vehicles are out (since these are static)
- Return to station next day to identify vehicles unavailable on day 1 to bridge the gap
- Go to hospital emergency departments to locate vehicles missed at station
- Only inaccessible vehicles e.g. in workshops for maintenance or bodyshop for repair should be remaining. Check location of these vehicles and confirm schedule for their return.
- Check feasibility to have a colleague scan vehicles at SAS workshops.
- Complete the audit declaration form to confirm results. This provides scope to identify missed vehicles or report any issues prior to official audit end, when the gap can still be bridged.

This robust approach assumes that any remaining truly inaccessible vehicles will be minimised.

[REDACTED]

[REDACTED]

10.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]			
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

11. Future Reporting and Monitoring (BAU)

Once fully operational and handed over to business as usual, there will be a requirement for all A&E ambulance crews to routinely use the app to move cylinders between locations.

Provided this happens, a wealth of data will become available to continuously improve the Service's understanding about gas usage, with scope to change behaviours including ordering frequency, practices of recovering cylinders from hospitals and other emergency services, and a re-evaluation of stock holding on specific vehicle types and stock holding in stores, based on the pending update to medicines management guidance to optimise stock holding.

[REDACTED]

[REDACTED]

[REDACTED]

Once the app is in daily use, confidence should grow that cylinder locations are correctly reflected. It will be possible to track internal moves across the Service and identify crews and vehicles who are routinely using the app. It will be possible, if a little time-consuming, to reverse engineer and identify crews and vehicles that are excluded from the data, despite carrying gases.

If there is an enquiry about a particular cylinder(s) or about usage by particular crews, a rich dataset will be available, provided that internal moves are recorded. This should include moves or exchanges with other emergency services, at hospitals and between the Service, Responders and Mountain Rescue Teams.

By building the relationships between stations, reports will help the Service optimise re-ordering e.g. in Forth Valley all deliveries are to Falkirk which services 5 other stations in the sub-region.

[REDACTED]

[REDACTED]

[REDACTED]

12. Recommendations

[REDACTED]

[REDACTED]

[REDACTED]

Direct ownership by Regional Directors will be critical to ensure that every station has resources allocated from the beginning to the end of the agreed audit period.

[REDACTED]

[REDACTED]

[REDACTED]

It has also been agreed to that there should be a SAS lead for Medical Gases, A postholder is in place and has been tasked with assessing improvements to the management of gas deliveries and returns to evidence the receipt of these and provide updated procedures to BOC to ensure compliance.

More generally, the Gases Clinical Lead will responsible for the evaluation and then implementation of internal control systems within stations, air bases and co-location or home bases to help ensure the prompt return of cylinders potentially via Inphase systems or use of eforms in M365.

In summary therefore the recommendations are:

- √ To progress with the roll out of the BOC app as planned. This is still in discussion with BOC given the need to create accounts etc. If this is not possible then the Medical Gases clinical lead will focus on at pace, developing an internal control process for tracking cylinders. One idea under

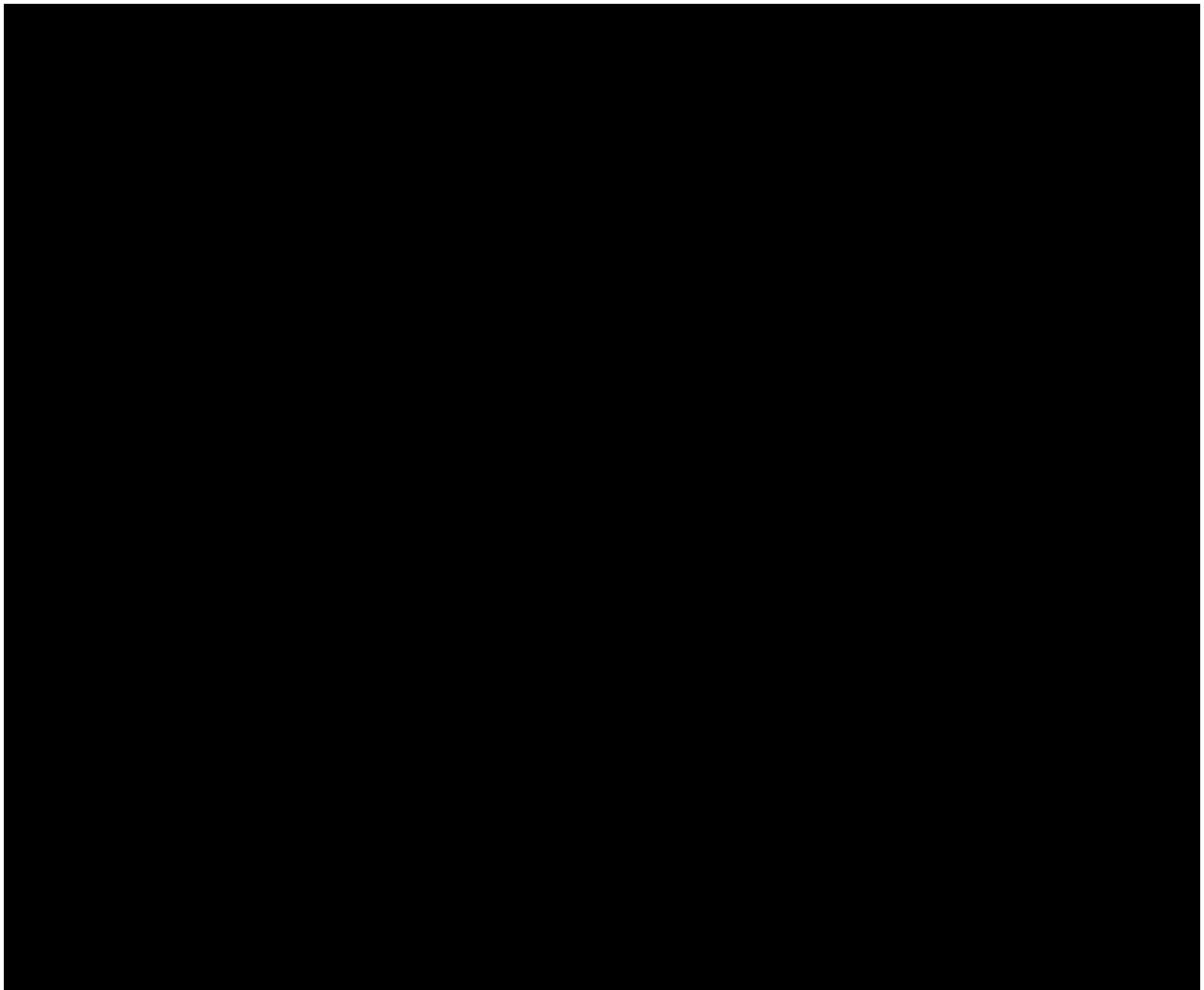
consideration was the use of the new InPhase system or a SAS app developed by the M365 team

- √ [REDACTED]
- √ [REDACTED]
- √ [REDACTED]
- √ Clinical team to issue a communication to staff reinforcing the importance of this tracking of a medical commodity
- √ The agreement on a further audit, supported by the Regional leadership teams
- √ [REDACTED]
- √ Support to the Medical Gas clinical lead and consideration as this work progresses if this requires to be a substantive role (funded by the savings)
- √ Once the app and/or controls are in place a re-baseline of stock will be put in place, led by the clinical need

13. Appendices

[REDACTED]

[REDACTED]



[REDACTED]

[REDACTED]

