Streamlining inpatient ultrasound scanning through Registrar-led protocolling: a four-cycle quality improvement project

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Background

- US is the **second most common imaging modality** in England and provides decisive diagnosis in acute inpatient care;
- **Increasing demand** for US in both IP and OP settings;
- Non-indicated IP US scans **delay other IP US referrals**, and urgent IP US scans **overflow into the OOH service**;
- CUH is a tertiary centre with a 10-room US Department – three lists cover the IP US case load, providing **up to 51 IP slots per day**.

Aims

- Increase proportion of appropriate IP US referrals;
- Improve use of inpatient capacity and reduce the size of the IP US waiting list;
- Reduce delays to diagnosis;
- Reduce OOH US demand due to IP US overflow.

Methods

- Sequential PDSA cycles from June 2025 to June 2026;
- Quantitative and qualitative retrospective baseline evaluation of IP US activity (June 2025), including stakeholder survey with subsequent follow-up;
- Appropriateness of IP US referrals agreed by four independent clinicians based on information provided in the referral and review of clinical notes;
- NICE, iRefer, and BMUS guidelines.

Interventions

1. SpR-led protocolling of all IP US referrals
2. Formalised IP US protocol guidance created & issued
3. Protocolling integrated into existing EHR functionality (Epic) with standardised priority coding
4. Trust-wide communication of IP US referral changes
5. Protocolling slots rescheduled due to insufficient designated time

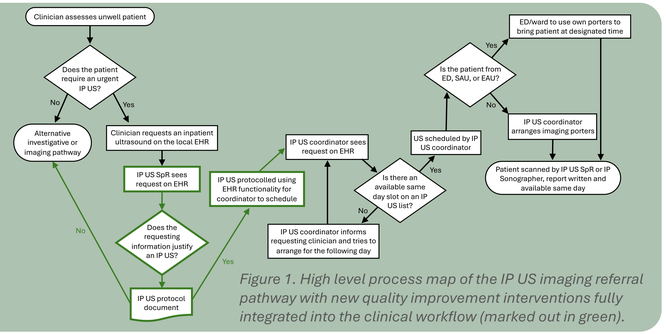


Figure 1. High level process map of the IP US imaging referral pathway with new quality improvement interventions fully integrated into the clinical workflow (marked out in green).

Results

25% of IP US scans were clinically inappropriate

24% of available IP US slots were unused

40% of total IP US capacity not appropriately utilised

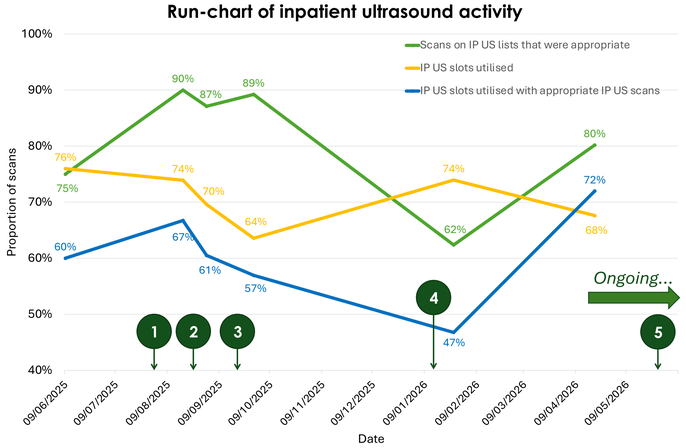


Figure 2. Run-chart of proportions of IP US scans done between June 2025 and June 2026. Proportions of utilised available IP US slots were measured as a potential confounding factor for efficiency, defined as proportion of appropriate IP US scans of total available slots. A fall in scheduled IP US appropriateness after cycle 4 was attributed to redirection of IP US lists after the IP US waiting list was cleared to help clear the OP US waiting list. A subsequent re-evaluation without further intervention in April showed an increase back to 80% (despite a decrease in utilised IP US slots, in yellow).

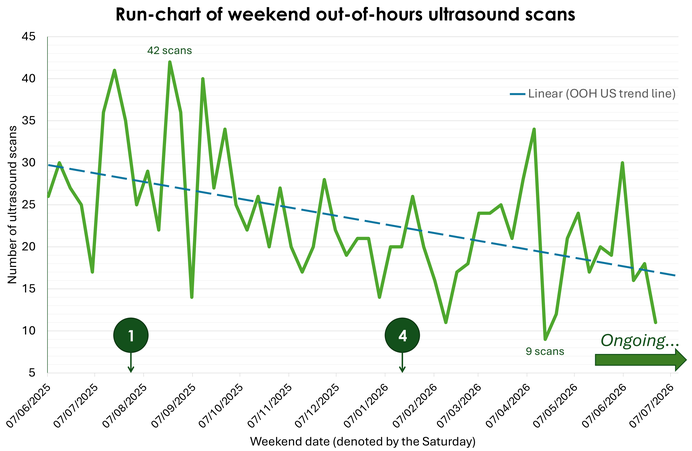


Figure 3. Run-chart showing change in number of urgent IP/ED US scans done during the OOH weekend on call (over a 48-hour period; Saturday 00:00 until Sunday 23:59) from June 2025 to June 2026. Note the first intervention was dated 4th of August 2025. A trend line (dashed blue linear line) demonstrates a consistent decrease in OOH on call ultrasound scanning, from approximately 15 to 8 scans per weekend day.

Clinical stakeholder survey excerpts

Before intervention (August 2025):

*"…**disconnect between the clinical need/urgency**…and those which are actually scheduled…"* – ***Senior SpR***

*"…so often urgent scans are not prioritised and **have to be done out of hours**."* – ***Junior SpR***

*"An accessible list of what we do and do not accept and **a local CUH protocol** [would be helpful]"* – ***Sonographer***

"Rejection of inappropriate scans needs to be an active process…" – ***Junior SpR***

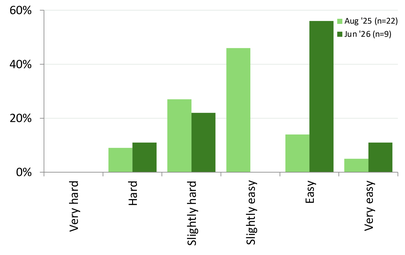
*"**Clear guidance** [is needed] for protocolling staff on which scans are appropriate and how to triage."* – ***Scheduling team***

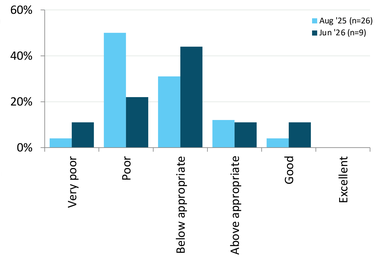
After cycle 4 (June 2026):

*"Overall appropriateness of scans has **improved**…"* – ***Junior SpR***

*"…I would be happy to clear the US protocols if I had **30 mins protected** to do so"* – ***Senior SpR***

*"…I think [protocolling and scanning] for the inpatient SpR **may be unsustainable**"* – ***Junior SpR***





Tables 1 and 2, showing changes in clinical stakeholder response prior to Cycle 1 and after Cycle 4 interventions. There is a clear change from a negative (light colours) to positive (dark colours) skew between the two periods, suggesting (subjective) improved ease in protocolling referrals and improved quality in referrals since initiating our QIP interventions.

Conclusions

- **We introduced**
  - SpR-led IP US protocolling;
  - Utilising existing EHR functionality;
  - Formalising local guidelines.
- **We ensured**
  - Clinical stakeholder **buy-in**;
  - **Regular feedback** to stakeholders on changes and progress.
- **We found**
  - **Improved appropriateness** of IP US referrals;
  - **Reduced OOH US workload** (by approx. 50%) as a result;
  - **Overall improved** US Department efficiency;
  - Multiple **real-life, dynamic changes** related to the running of a clinical service contributed to several confounding results.
- **We plan to**
  - Continue evaluating and improving the IP US service with **sustainability** in mind;
  - **Adapt** our process across to OP US protocolling.

Key: BMUS – British Medical Ultrasound Society; CUH – Cambridge University Hospitals NHS Foundation Trust; EAU – early admission unit (medical); ED – emergency department; EHR – electronic healthcare record system; IP – inpatient; NICE – National Institute for Health and Care Excellence; PDSA – plan, do, study, act; SAU – surgical admissions unit; SpR – Registrar; US – ultrasound

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