

Open Call-for-Ideas

Output Analytics and Surveillance for Inpatient Safety

(Use Case by SGH)

1. Background

Urine output is a critical physiological indicator that provides valuable insights into renal perfusion, fluid balance, haemodynamic stability, and overall patient condition. In acute care settings, particularly among critically ill, post-operative, and high-risk patients, timely and accurate urine output monitoring is essential for early detection of clinical deterioration and supporting informed decision-making. Despite its importance, urine output monitoring remains largely dependent on manual processes, requiring nurses to conduct repeated bedside observations, record measurements, and document findings in the electronic medical record (EPIC), often at hourly intervals. While effective, this approach can be time-intensive, contribute to variations in documentation practices, and limit timely visibility of emerging trends that warrant clinical attention.

2. Challenge Statement

How might we enable automated, reliable, and clinically meaningful urine output monitoring that improves patient safety, enhances nursing workflows, and supports timely clinical decision-making?

3. Current State

Currently, nurses caring for patients requiring close urine output surveillance perform a series of interconnected activities throughout their shifts. These include assessing urinary drainage systems at the bedside, measuring and documenting urine volumes, reviewing trends in relation to the patient's clinical condition, and escalating abnormalities when appropriate. Across multiple patients and care settings, these activities form an important component of ongoing patient surveillance, while presenting opportunities for technology-enabled solutions to enhance efficiency, improve data visibility, and support more proactive clinical decision-making.

4. Desired Future State

We envision a future where urine output monitoring evolves from a largely manual process into an intelligent, connected, and clinically actionable capability. Validated urine output measurements are captured automatically from urinary drainage systems and seamlessly integrated into EPIC, providing accurate, real-time data that supports proactive patient surveillance. Through enhanced trend visualisation and timely alerts, clinicians can recognise significant changes earlier, make more informed decisions, and intervene promptly when needed.

5. Key Design Requirements

To ensure safe and sustainable adoption within the healthcare environment, proposed ideas should be designed with patient safety, usability, and interoperability as core principles. Proposed ideas must operate reliably within existing clinical workflows and support the operational realities of busy inpatient settings.

Proposed ideas should:

- a) Automate urine output measurement and documentation
- b) Integrate with EPIC and existing clinical systems
- c) Enable real-time monitoring and trend analysis
- d) Include configurable alerts and escalation support
- e) Enable remote surveillance of multiple patients
- f) Support manual verification and downtime management processes
- g) Improve readiness for future analytics and predictive insights

The proposed idea should be practical for frontline use and require minimal disruption to established care processes while maintaining appropriate clinical governance and oversight.

6. Expected Outcomes

a) Improved Patient Safety

Earlier visibility of declining urine output and abnormal trends can facilitate prompt clinical review and intervention, supporting more consistent surveillance of high-risk patients.

b) Enhanced Workforce Efficiency

Automation of routine measurement and documentation activities can streamline nursing workflows, enabling clinicians to devote more time to patient assessment, intervention, education, and communication.

c) Better Data Quality and Clinical Decision-Making

Structured, time-stamped data can improve documentation accuracy, completeness, and trend visibility while reducing omissions and transcription errors. This provides clinicians with greater confidence when making patient care decisions.

7. Invitation to Pitch

We welcome ideas from startups, technology providers, healthcare innovators, and multidisciplinary teams that can automate and enhance urine output surveillance. This challenge is intentionally solution-agnostic. We encourage participants to explore innovative ideas and novel approaches that address the clinical need while ensuring safety, usability, and scalability.