

Integrating OMOP data into daily monitoring of Sepsis patients

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Background

Sepsis is a life-threatening condition that demands immediate recognition and intervention. Delays in treatment can lead to severe complications, organ failure, and significantly increase the risk of mortality. Early detection and aggressive management are vital to improving patient outcomes.

The National Institute for Health and Care Excellence¹ (NICE) provides clear guidance on sepsis management. To ensure adherence to this guidance, it became necessary to monitor compliance daily. Historically, clinical staff manually reviewed patient records, a process that was both time-consuming and labour-intensive.

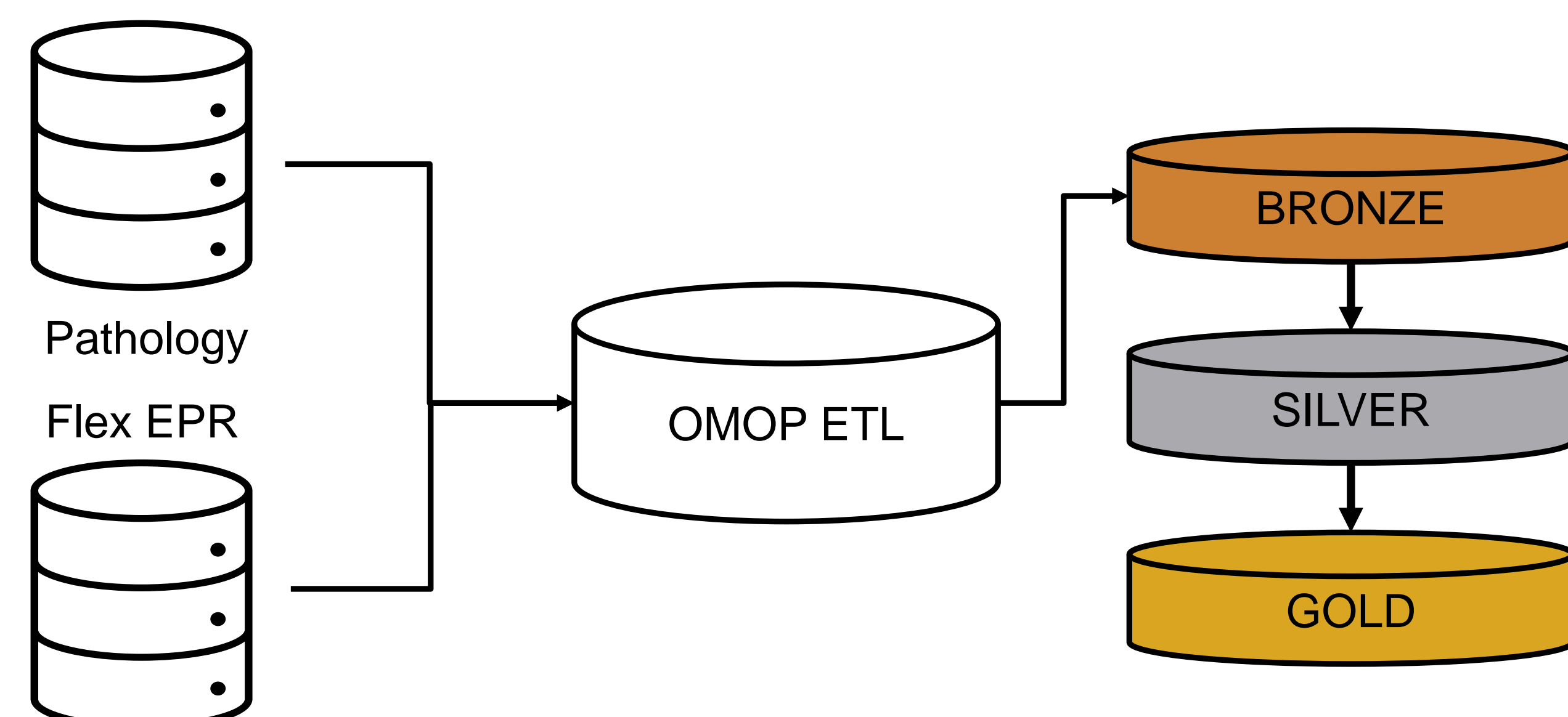
Automating the monitoring of sepsis management poses considerable challenges, especially given the importance of clinical judgment. A multidisciplinary working group established a set of parameters, including National Early Warning Scores (NEWS), prescriptions, drug administration, and blood results, to create a comprehensive dataset for measuring compliance with NICE guidelines. However, data for these parameters is stored across multiple systems, with inconsistent identifiers. Blood results were particularly challenging to access, as they are spread between the SWISSLAB laboratory system and the core Electronic Patient Record (EPR). Retrieving this data took an average of 45 minutes per query due to suboptimal server performance, undermining the reliability of daily monitoring.

Methods

Lactate levels, a key indicator in sepsis management, are measured via two distinct methods: a blood test or a point-of-care (POC) test. The results from these tests are stored in separate systems, while blood culture data is maintained within the Pathology system. All relevant data sources are integrated into the OMOP (Observational Medical Outcomes Partnership) framework.

Concepts for the necessary lactate levels and blood culture specimens were identified within OMOP, using concept IDs 3014111 (lactate levels) and 40486473 (blood cultures). Structured Query Language (SQL) queries were made to extract records from the measurement and specimen tables, while ensuring re-identification of records for analysis.

The OMOP instance at Lancashire Teaching Hospitals (LTHTR) is refreshed each morning through incremental loading and is structured according to a three-layer medallion architecture².

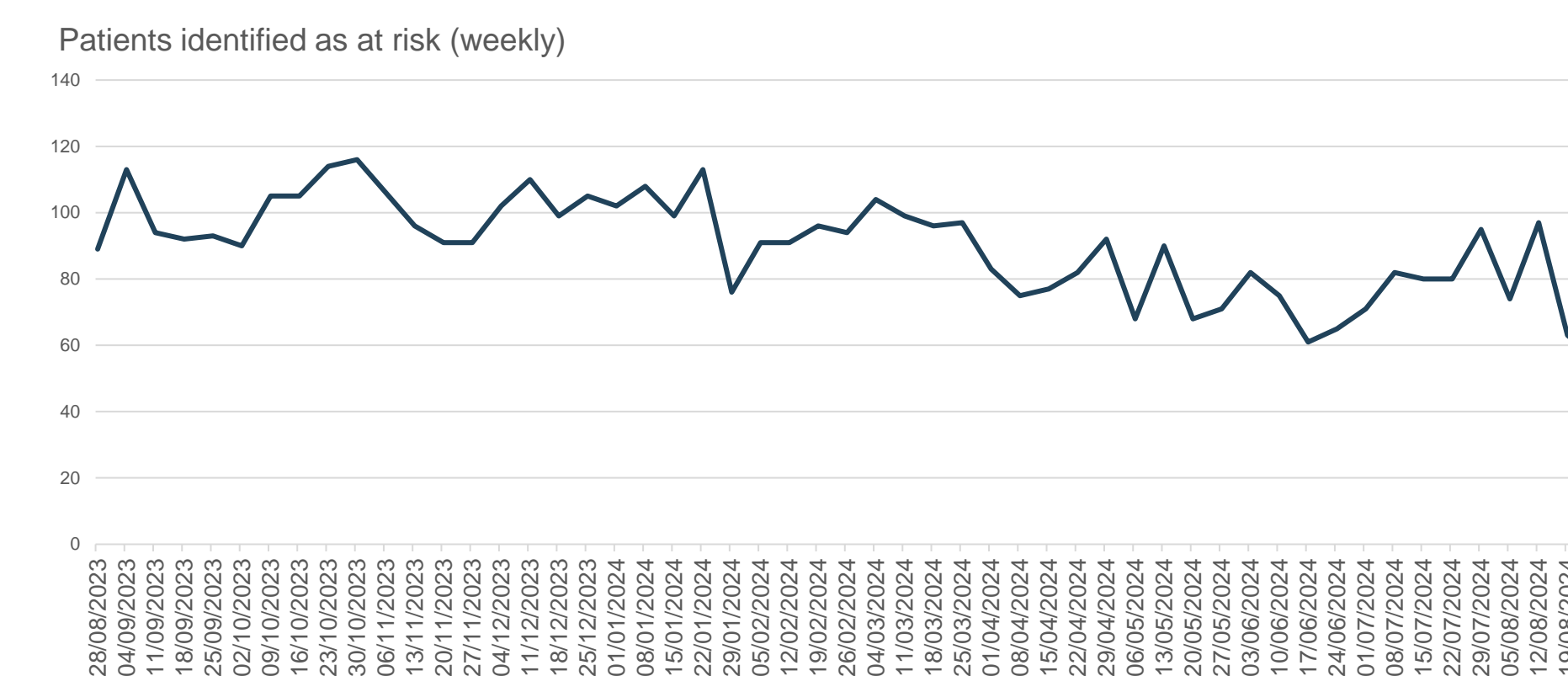


- **Bronze Layer:** Minimally processed data from the source, standardized using OMOP concepts.
- **Silver Layer:** Data ready for operational use, with quality checks applied. Active visits and records with incomplete patient information remain in this layer.
- **Gold Layer:** Fully conformant to OMOP standards, research-ready data. Patients who opted out of data sharing³ are excluded, and all data has undergone verified Extract-Load-Transform (ELT) processes.

Outcomes

The implementation successfully integrated OMOP data into the daily monitoring process through two queries to the OMOP database embedded in a SQL stored procedure. These queries access the necessary lactate levels and blood culture data from the OMOP database via a linked server, allowing seamless automation of data that was previously difficult to obtain in a timely manner. Data for this was taken from the OMOP medallion silver layer.

This automation feeds into a daily dashboard, available to clinical staff via QlikView, which refreshes each morning. The dashboard provides up-to-date patient-level data, enabling clinicians to assess compliance with sepsis management guidelines efficiently. By ensuring that relevant data is readily accessible, the system supports ongoing adherence to the National Institute for Health and Care Excellence (NICE) guidance.



A year's worth of data identified ~4,700 patients who met the specified parameters, averaging 13 new patients per day.

Using OMOP data allowed identification of relevant results in seconds, which is displayed to clinicians, leading to a significant reduction in time taken to identify and manually review patient records.

Conclusions

The integration of daily refreshed OMOP data into the existing reporting pipeline has significantly streamlined the process of monitoring compliance with NICE sepsis management guidelines. This automation removes the need for time-consuming manual reviews by clinical staff and overcomes the limitations of traditional data sources.

The use of multiple OMOP layers, including the operational silver layer, allows for broader data utilisation beyond the standard research scope, supporting operational intelligence and service evaluation. This innovative approach offers a unified view of healthcare data that could enhance clinical decision-making and service monitoring.

Future work could focus on making OMOP the single source for sepsis monitoring. If successful, this model could be shared with other providers, enabling similar automated monitoring solutions across healthcare centers.

References

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3. NHS Data Opt-out: <https://digital.nhs.uk/services/national-data-opt-out>

