cytometry), EGFR levels (ELISA), global proteomic changes (LC-MS/MS), and 5-FU sensitivity (cell viability assays).

5-FU-resistant CRC cell lines (HCT116, Caco2, DLD1) were generated over 6 months. Mass spectrometry-based proteomic analysis was conducted; data-independent acquisition (DIA-MS) was used to retrieve dysregulated protein methyltransferases (PMTs), while data-dependent acquisition (DDA-MS) was used to retrieve lysine and arginine dysregulated methylations. The PMTs and methylation markers extracted were used for building a custom peptide array suitable for high-throughput functional analysis.

The minimal catalytic region of EHMT2 was used in yeast two-hybrid assays to capture relevant interactors. Interactor specificity was evaluated through CPRG β-galactosidase activity and Sanger sequencing, identifying candidate proteins with roles in tumour metabolism and metastatic signalling.

Results:

Pesticide exposure caused non-cytotoxic effects in both normal and cancerous colon cell lines, without observable changes in cell morphology. Exposure to chlorpyrifos and glyphosate disrupted cellular homeostasis, with alterations observed in cell cycle regulation, oxidative stress responses, DNA repair pathways, and chromatin remodelling. The effects of deltamethrin are still under investigation. Over 25 PMTs were identified in each cell line by DIA-MS (mostly downregulated in 5FUR cells), while DDA-MS revealed over 50 dysregulated methylation sites per cell line, and over 200 methylated proteins in total. The upregulated markers identified are now being used to design a custom peptide array, suitable for monitoring changes in methylation following resistance.

EHMT2 interactors included Monoamine Oxidase B and Propionyl CoA Carboxylase Beta, both associated with aggressive CRC phenotypes, pointing to new nodes of methyltransferase-mediated regulation potentially relevant to CRC resistance and progression.

Conclusion:

Our integrated approach connects chronic environmental exposures, methyl-proteome remodelling and methyltransferase network analyses, providing mechanistic insights into CRC progression and 5-FU chemoresistance. This multi-tier investigation lays the groundwork for identifying novel exposure-linked epi-proteomic biomarkers and therapeutic targets, ultimately providing more effective treatment strategies for personalised medicine.

57 - Optimising Emergency Department Services: Evidence-Based Interventions to Reduce Clinical Risk

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Introduction

Overcrowding in hospital emergency departments is one of the most pressing threats to patient safety in acute care settings worldwide. It contributes to delayed assessments, prolonged patient stays, diagnostic bottlenecks, and an increased risk of preventable harm. A structured literature search was conducted to support strategic decision-making.

Methodology

A Critically Appraised Topic was conducted across the Cochrane Database of Systematic Reviews, MEDLINE and Scopus. The review focused on identifying and evaluating high-level evidence from systematic reviews and meta-analyses published between 2015 and 2025. Studies were included if they assessed the effectiveness of interventions aimed at improving service delivery at the emergency department, including patient flow, length of stay, reduction of crowding, and safety-related outcomes. The studies were synthesised to inform evidence-based recommendations.

Results

A total of twelve systematic reviews and meta-analyses met the inclusion criteria. The evidence consistently supported physician-led triage and fast-track systems as impactful interventions, demonstrating reductions in patient length of stay and marked improvements in the proportion of patients leaving before being seen. Point-of-care testing, particularly when embedded within structured triage models, improves diagnostic turnaround, and facilitates earlier decisions regarding patient care. Digital tools, including real-time clinical dashboards, electronic tracking systems, and mobile communication platforms, were associated with improvements in time to patient disposition and enhanced coordination among clinical teams. Workforce-related strategies, such as expanded nursing roles, early involvement of senior clinicians, and the integration of primary care professionals, contributed to more efficient patient streaming and reductions in unnecessary investigations. Transitional care pathways and in-reach palliative care services demonstrated system-wide benefits in patient flow and discharge planning, although the impact varied depending on the specific context and implementation design.

Conclusions

This synthesis demonstrated that high-performing emergency departments do not rely on isolated interventions. Instead, they adopt a systems-level approach that combines clinical redesign, digital innovation, and optimisation of human resources.

Recommendations

For healthcare systems facing capacity pressures, this body of evidence supports the phased adoption of physician-led triage models. Establishing real-time operational monitoring and structured discharge planning processes are additional levers to improve both safety and efficiency. However, the findings should be interpreted considering certain limitations, including reliance on secondary sources with variable methodological quality and limited generalisability to specific healthcare systems.

58 - The Impact of Medication Reconciliation at Transitions of Care on Healthcare Outcomes: An Evidence-Based Approach

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Introduction