OPAT Readmission Risk Models

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How do risk assessment models impact 30-day unplanned hospital readmissions in adult patients receiving outpatient parenteral antimicrobial therapy (OPAT)? A Systematic Review.

BACKGROUND

OPAT offers a safe alternative to hospital care, reducing costs and hospital lengths of stay while increasing patient satisfaction[1]. However, unplanned OPAT readmissions may outweigh these benefits[2]. Predicting and minimizing unplanned OPAT readmissions could significantly improve patient outcomes[3]. Predictive models for unplanned OPAT readmissions can help identify high-risk patients, enabling tailored care and support[4].

METHODS

The primary outcome of interest of this study was to evaluate how effectively OPAT readmission risk models predict 30-day hospital readmissions. The secondary outcome of interest was to identify risk factors associated with readmissions in adults receiving OPAT. A comprehensive search of online databases was conducted without any restrictions on date, country of origin or language, resulting in the inclusion of only three studies[5,6,7].

RESULTS

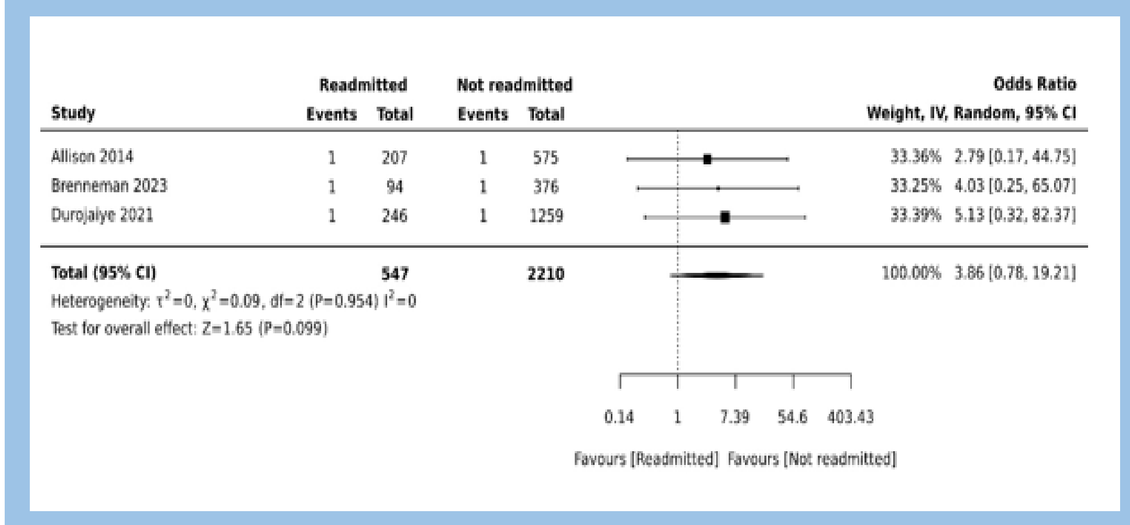
Risk Factors for Unplanned Readmissions

Various risk factors were identified based on the case mix of patients, the structure of the OPAT service, and the methods used to deliver OPAT. However, the review did not definitively identify specific risk factors for readmission. It was found that the use of aminoglycosides and daptomycin was associated with a lower likelihood of readmission. In contrast, all other identified risk factors did not indicate a preference for either readmission or non-readmission.

- Endovascular/Urogenital infections
- Concurrent use of more than one antimicrobial
- History of drug resistant organisms
- Aminoglycoside/Lipopeptide/Glycopeptide use
- Increased age
- Higher Charlson Co-morbidity Index score
- Prior non-OPAT hospitalisation in the previous twelve months

Likelihood of Unplanned OPAT Readmission

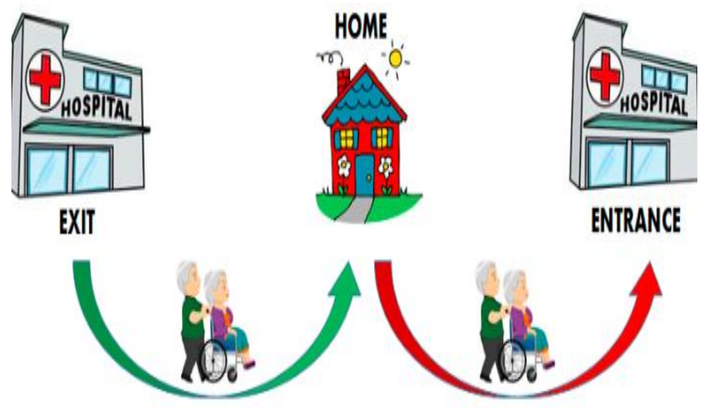
The likelihood of a 30-day unplanned readmission was compared across all studies. The overall results did not favour either outcome (OR 3.86, 95% CI 0.78, 19.21) and were not statistically significant (p=0.099). However, there was no heterogeneity with an i^2 value equal to zero.



Reasons for Unplanned Readmissions

All studies identified the same reasons for readmission with similar incidence rates. Patients could have more than one reason for readmission. The primary indication for readmission across the studies was infection-related.

Reasons for readmission	Allison et al. (2014)	Brenneman et al. (2023)	Durojaiye et al. (2021)
Not related to infection	30%	40%	34%
Worsening/no improvement in existing infection/development of new infection	53.1%	63.8%	51.7%
Adverse drug reaction	14%	18%	8.9%
Vascular access device complication	10%	2%	3.7%
Diarrhoea	1%	N/a	1%
Unknown/other	2%	7.4%	0%



Risk model discrimination

The primary outcome of the review was to measure the impact of OPAT readmission risk models on 30-day hospital readmissions by evaluating their ability to accurately predict readmissions within 30 days.. Allison et al.[5] and Brenneman et al.[6] reported lower c-statistics, indicating poor discriminative ability, while Durojaiye et al.[7] reported a c-statistic of 0.75 when the model was validated on the temporal validation cohort, showing a modest discriminative ability. However, the model had lower diagnostic accuracy when validated in the broader validation group.

CONCLUSION

The limited number of studies included in the review impacted the ability to synthesize the data. The review found that the evidence is inconclusive regarding the validity and transportability of readmission risk models in OPAT, as well as the identification of risk factors for readmission in these patients. The readmission risk models were found to have low discriminative ability in the studies by Allison et al.[5] and Brenneman et al.[6] and modest discriminative ability in the temporal validation cohort in the study by Durojaiye et al[7]. The most common reason for readmissions was infection-related, followed by issues unrelated to the infection, adverse drug events and vascular access device complications. There were few admissions for diarrhoea. The studies identified different risk factors for readmission depending on the patient case mix, the structure of the OPAT service and the methods of OPAT delivery, however, a meta-analysis of these factors did not find that they led to an increased risk of readmissions. This systematic review suggests that further research focussing on the transportability of existing OPAT readmission risk models and developing site-specific models tailored to different settings is needed.

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