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Review Article

Patient outcomes, system challenges and solutions in inter-hospital transfer for acute surgical care – a literature review

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ABSTRACT

Interhospital transfer (IHT) is essential for providing timely access to specialist surgical care, particularly in geographically dispersed health systems yet is consistently associated with increased morbidity, mortality, and healthcare resource use. This review synthesises contemporary evidence on IHT, outlining key challenges and proposed strategies for improvement. A literature search of MEDLINE and PubMed was conducted using predefined search terms, limited to English-language articles published within the past 10 years and involving adults aged >16 years. Relevant studies examining IHT processes, outcomes, delays and mitigation strategies were reviewed and synthesised narratively. IHT frequently occurs due to deficits in local resources, acuity capability, or specialist expertise. Across studies, transferred surgical patients experience longer hospital stays, higher costs, and significantly increased mortality, with up to threefold higher in-hospital mortality compared with directly admitted patients. Major contributors to adverse outcomes include systemic delays, inadequate communication and handover, limited specialist availability in regional hospitals, and logistical constraints. Time-critical subspecialities are particularly vulnerable to transfer-related delays, which strongly predict mortality and cost escalation. Up to 20-30% of transfers may be clinically unnecessary. Proposed mitigation strategies include implementation of standardised transfer pathways, improved communication systems, telemedicine utilisation, and targeted enhancement of regional surgical capacity. IHT remains indispensable for accessing specialist emergency surgical care but is consistently associated with delayed treatment and worse outcomes. Addressing modifiable system factors is essential to improving safety and efficiency. These findings provide essential context for ongoing analyses of IHT practices and associated healthcare costs in regional Australia.

Keywords: Interhospital transfer, Emergency surgery, Healthcare cost

INTRODUCTION

Interhospital transfer (IHT) is an integral component of modern healthcare systems, particularly in geographically expansive regions such as Australia, New Zealand, and the United States, where specialist services are concentrated in urban centres.[1,2] It is the coordinated transportation of a patient between two or more acute care hospitals.[3] It is necessitated in healthcare systems characterised by a mixture of rural and metropolitan facilities, such as those in Australia and New Zealand, where almost a third of the population lives in remote and rural regions.[3,4] The fundamental purpose of IHT is to bridge the gap between patient needs and the resources available at the initial facility.[2]

Transfers are commonly required when appropriate healthcare cannot be delivered in remote locations. The primary drivers for IHT include the lack of appropriate resources at the index hospital, the need for higher acuity of care, or the requirement for complex multidisciplinary specialist care to ensure adequate patient management.[3] Despite its necessity, transferring acutely unwell surgical patients – especially those requiring time-critical subspeciality input such as vascular surgery or urology – introduces significant clinical and logistical risk.

Aim

This literature review aims to synthesize contemporary evidence regarding IHT for emergency surgical care, identifying major challenges and proposed strategies to improve safety and efficiency. This review aims to provide the contextual foundation for a subsequent retrospective cohort analysis investigating the cost of IHT for vascular and urology services at a regional hospital in New South Wales, Australia.

LITERATURE REVIEW

A structured search of MEDLINE and PubMed was conducted using predefined key terms 'interhospital transfer', 'emergency surgery' and 'cost', limited to English-language studies published in the past 10 years involving adults (>16 years). The literature was reviewed and the search yielded inclusion of 14 key studies, consisting of retrospective cohort studies, consensus statement, national audit, surveys and a systematic review and narrative analysis.

RESULTS

Across studies, IHT is consistently associated with poorer patient outcomes and increased strain on healthcare resources.[3,5] Key challenges involve delays in transfer, inconsistent communication, resource and workforce disparities, and variable local capabilities.[3-7] Proposed solutions include implementation of structured referral pathways, improvements in communication and handover, and targeted enhancement of regional surgical capacity.[2,3,5,8-11]

Summary of interhospital transfer in emergency surgery

IHT typically occurs because the referring hospital lacks the necessary resources, acuity capability, or specialist expertise required for definitive management.[3] Increasing subspecialisation in metropolitan centres, combined with resource limitations in regional hospitals, has contributed to rising preoperative transfer rates.[3] While often unavoidable, IHT is strongly linked to adverse outcomes. It is an independent predictor of morbidity and mortality among acute surgical patients.[5,12] Transferred patients experience longer hospital stays, incur greater healthcare costs, and have substantially higher in-hospital mortality.[3] Mortality may be up to three times higher in transferred patients compared with those admitted directly.[3] In Australia, up to 30% of surgical mortality cases involve IHT.[3] Surgical transfers also increase resource utilisation.[9] In emergency general surgery, transfer is associated with prolonged length of stay and increased treatment costs.[5]

Time-critical subspecialities

Specialised surgical emergencies introduce additional risks due to the importance of rapid intervention.

Vascular surgery

Most vascular IHTs involve life- or limb-threatening pathology.[9] For conditions such as ruptured abdominal aortic aneurysm (AAA), transfer-related delays are well-established predictors of mortality.[4]

Urology

In paediatric testicular torsion, transfer almost doubled the median time to surgery (4.5 versus 2.5 hours, p=0.02) and more than doubled average cost ($15,082 USD versus $6,898 USD).[13] In traumatic renal injuries, 11.6% of transfers represented potentially avoidable "secondary over-triage".[14]

Key challenges in interhospital transfer

Delay in transfer

Delay is the strongest contributor to poor outcomes in emergency surgical IHT.[3] Time to definitive care remains unacceptably long in many settings: emergency general surgery patients in rural hospitals waited a median 9.3 hours (IQR 4.6-20.4) between decision to transfer and actual departure; patients requiring vascular intervention, such as acute limb ischemia, faced delays of up to 26 hours; and non-trauma surgical transfers are significantly slower than trauma transfers (median 10.6 versus 5.3 hours, p=0.04), likely due to well-established trauma pathways.[5,6,12]

For acute aortic syndrome (AAS), consensus guidelines recommend: referral within 1 hour of diagnosis, transfer initiation within 2 hours, and arrival at an aortic centre within 4 hours, although this is often unrealistic in large geographical regions.[11]

Systemic and logistical barriers

The most common barrier to timely transfer is lack of bed availability at the receiving centre.[5,6] Distance also contributes: longer travel distances correlate with longer delays.[5] Transport limitations – including weather events and aircraft availability – are recurrently cited in mortality audits.[5] While air transfer saves an average of 30 minutes for distances >50 km, it is significantly more expensive than road transport.[15]

Communication failures and inadequate handover

Poor clinical handover is a major modifiable contributor to delay. Inadequate assessment is associated with markedly increased odds of delay (OR 49.48, 95% CI 32.91-74.38, p<0.0001).[12] Incomplete or poor-quality communication (phone, verbal or written) also predicts delay (OR 6.62, 95% CI 3.70-11.85, p<0.0001).[12] Audits reveal substantial deficiencies is documentation: 42.5% of emergency general surgery IHTs lacked essential clinical information.[12] Multiple sequential transfers (≥3) further

increased the likelihood of delay six-fold (OR 6.30, OR 95% CI 4.32-9.21, p<0.0001).[12]

Workforce and expertise limitations

Subspecialisation has reduced the capacity of rural general surgeons to manage complex emergencies locally. Historically, rural general surgeons performed urgent vascular interventions; however, separation of general and vascular training since 1995 has resulted in lower confidence among early-career rural surgeons.[4] Over three-quarters reported feeling inadequately trained for vascular emergencies.[7] Lack of local specialist coverage contributes to unnecessary transfers – for example, absence of urology on-call accounted for 25% of torsion transfers.[13] Approximately 20% of non-trauma surgical transfers, and 28% of vascular transfers, result in no intervention, suggesting opportunities to reduce avoidable transfers.[2,9]

Proposed strategies to mitigate challenges

The literature highlights three overarching strategies: structured pathways, communication improvements, and strengthening local capabilities.

Standardised pathways and protocols

Structured transfer pathways – mirroring trauma systems – are recommended for non-trauma emergencies.[12] NSW health mandates clear referral and escalation processes for priority conditions, including priority category 1 cases for life or limb-threatening conditions requiring immediate action.[8]

Improved communication and handover

Robust health information exchange systems are essential to ensure complete and accurate clinical data accompany the patient.[3,5] Standardised handover templates and digital referral platforms may reduce variability. Telemedicine provides opportunity for real-time specialist support and may reduce unnecessary transfers, particularly in vascular wound care and low-acuity urological presentations.[2,9]

Enhancing regional capacity

Expanding regional surgical services and improving workforce retention may reduce IHT rates and prevent delayed care.[12] Incorporating specialised roles – such as Urology Nurse Practitioners – has demonstrated success in reducing transfers for conditions like clot retention.[10] For high-acuity conditions, such as acute aortic syndrome, centralisation to high-volume centres improves outcomes: in-hospital mortality for type A aortic dissection decreases with increasing case volume (22% → 17%, p<0.001).[11,16] However, centralisation is only effective when paired with rapid and reliable transfer systems. Escalation processes, such as the NSW Default Adult ICU Bed Procedure, ensure access to critical care is not delayed by capacity limitations.[8]

CONCLUSION

IHT remains essential for delivering specialised emergency surgical care in geographically dispersed health systems. However, transfers are consistently associated with increased morbidity, mortality, delays, and significant resource burden. The literature identifies clear system-level challenges – delays, communication failures, workforce gaps, and resource disparities – that compromise timely access to definitive care. Targeted interventions, including structured referral pathways, improved communication processes, telemedicine integration, and enhanced regional surgical capacity, have the potential to reduce unnecessary transfers and improve outcomes for time-critical surgical patients. These findings contextualise ongoing efforts to evaluate and optimise the cost and efficiency of surgical IHT within regional Australia.

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REFERENCES

1. Royal College of Surgeons. RACS Train for Rural. 2021. Available at: https://www.surgeons.org/-/media/Project/RACS/surgeons-org/files/interest-groups-sections/Rural-Surgery/2-Train-for-Rural.pdf?rev=2e53ad7ecb3e4864be9dcc69e0556bb1&hash=6EF8D4FD8F5C13332C8C625D920E42C6. Accessed on 12 October 2025.
2. Broman KK, Poulose BK, Phillips SE, Ehrenfeld JM, Sharp KW, Pierce RA, et al. Unnecessary Transfers for Acute Surgical Care: Who and Why? Am Surg. 2016;82(8):672-8.
3. Murshed I, Gupta AK, Kovoor JG, Maddern GJ. Surgical inter-hospital transfers: life saver or resource drainer? ANZ J Surg. 2022;92(6):1300-1.
4. Ang ZH, Brown K, Rice M, Fisher D. Role of rural general surgeons in managing vascular surgical emergencies. ANZ J Surg. 2020;90(7-8):1364-8.
5. Young E, Khoo TW, Trochsler MI, Maddern GJ. Factors influencing interhospital transfer delays in emergency general surgery: a systematic review and narrative synthesis. ANZ J Surg. 2022;92(6):1314-21.
6. Dobson H, Ranasinghe WK, Hong MK, Bray LN, Sathveegarajah M, Vally F, et al. Waiting for definitive care: An analysis of elapsed time from decision to surgery or transfer in a rural centre. Aust J Rural Health. 2015;23(3):155-60.
7. Paynter JA, Qin KR, O'Brien A, O'Sullivan BG, Jayasekera H, Brennan J. Rural general surgeon confidence with managing vascular emergencies: A national survey. Aust J Rural Health. 2023;31(5):897-905.

8. NSW Government. Adult Critical and Specialist Care Inter-Hospital Transfer. 2025. Available at: https://www1.health.nsw.gov.au/pds/Pages/doc.aspx?dn=IB2024_013. Accessed on 12 October 2025.
9. Harris SK, Wilson DG, Jung E, Azarbal AF, Landry GJ, Liem TK, et al. Interhospital vascular surgery transfers to a tertiary care hospital. J Vasc Surg. 2018;67(6):1829-33.
10. Willder S, Kelsey E, O'Connor E, Grills R. Expanding urological services into regional Australia and reducing interhospital transfers: how the nurse practitioner can help. ANZ J Surg. 2024;94(6):1076-82.
11. Staniszewska A, Gaba K, Patterson B, Wilson S, Bell R, Bicknell C, et al. Consensus statement on the interhospital transfer of patients with acute aortic syndrome: Traversing Delphi study. Emerg Med J. 2024;41(3):153-61.
12. Young E, Kopunic HS, Trochsler MI, Maddern GJ. Predictors of interhospital transfer delays in acute surgical patient deaths in Australia: a retrospective study. ANZ J Surg. 2022;92(6):1322-31.
13. Clennon EK, Stefanko A, Guerre M, Hecht SL, Austin JC, Seideman CA. The ball's in your court: Trends, causes, outcomes, and costs of patient transfer for pediatric testicular torsion. J Pediatr Urol. 2024;20(5):929-36.
14. Iyer V, Hagedorn JC, Vavilala MS, Rivara FP, Johnsen NV. Resource utilization and secondary overtriage for patients with traumatic renal injuries in a regional trauma system. J Trauma Acute Care Surg. 2022;92(6):1061-5.
15. Lichtenberger PM, Peer MF, Lindtner RA, Schneider F, Wallner B, Wagner M. Helicopter vs. ground-based transfer for emergency interhospital transportation: A time and cost-efficiency analysis across varying transfer distances. Injury. 2025;56(7):112359.
16. Reutersberg B, Salvermoser M, Trenner M, Geisbüsch S, Zimmermann A, Eckstein HH, et al. Hospital Incidence and In-Hospital Mortality of Surgically and Interventionally Treated Aortic Dissections: Secondary Data Analysis of the Nationwide German Diagnosis-Related Group Statistics From 2006 to 2014. J Am Heart Assoc. 2019;8(8):e011402.

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