

recommended as best practice in published treatment protocols for the management of conditions encountered on expeditions.

Methods: Firstly, a mixed methods study approach was used to develop a conceptual model linking injuries and illnesses with the medical resources (equipment and medications) recommended for their management. In the second part of the study, injuries and illnesses reported in four studies from the published literature were analyzed using the conceptual model.

Results: Expected medical resources for the injury and illness burden were compared to the medical resources included in published equipment and medication lists. It was found that medical resources taken on expeditions were both significantly under-equipped ($p < 0.01$) compared with the list of provisions recommended by the treatment protocols, but also included a range of resources that were not indicated as part of best practice.

Discussion: These findings suggest that unnecessary over-provisioning and under-provisioning risks are being assumed on expeditions. Further research supporting the development of a medical provision recommender system may provide a more evidence-informed method of matching medical resource requirements to anticipated injury and illness profiles on expeditions.

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Evidence for Residual Immunity to Smallpox After Vaccination

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Introduction: Smallpox has been eradicated, but advances in synthetic biology have increased the risk of its re-emergence. Residual immunity in individuals who were previously vaccinated may mitigate the impact of an outbreak, but there is a high degree of uncertainty regarding the duration and degree of residual immunity.

Methods: A systematic literature review using the PRISMA criteria was conducted to quantify the duration and extent of residual immunity to smallpox after vaccination. 29 papers related to quantifying residual immunity to smallpox after vaccination were identified.

Results: Duration of protection of >20 years was consistently shown in the 16 retrospective cross-sectional studies, while the lowest estimated duration of protection was 11.7 years among the modeling studies. Childhood vaccination conferred longer duration of protection than vaccination in adulthood. Multiple vaccinations did not appear to improve immunity. Most studies suggest a longer duration of residual immunity (at least 20 years) than assumed in smallpox guidelines. Estimates from modeling studies were less but still greater than the 3–10 years suggested by the WHO Committee on International Quarantine or US CDC guidelines. These recommendations were probably based on observations and studies conducted

while smallpox was endemic. The cut-off values for pre-existing antibody levels of $>1:20$ and $>1:32$ reported during the period of endemic smallpox circulation may not be relevant to the contemporary population but have been used as a threshold for identifying people with residual immunity in post-eradication era studies.

Discussion: Of the total antibodies produced in response to smallpox vaccination, neutralizing antibodies have shown to contribute significantly to immunological memory. Although the mechanism of immunological memory and boosting is unclear, revaccination is likely to result in a more robust response. There is a need to improve the evidence base for estimates on residual immunity to better inform planning and preparedness for re-emergent smallpox.

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An Evaluation of the Self-Reported Knowledge Base of Disaster Management Core Competencies of Australian Paramedics

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Introduction: Evidence-based training and curriculum are seen as vital in order to be successful in preparing paramedics for an effective disaster response. The creation of broadly recognized standard core competencies to support the development of disaster response education and training courses for general health care providers and specific health care professionals will help to ensure that medical personnel are truly prepared to care for victims of mass casualty events.

Aim: To identify current Australian operational paramedic's specific disaster management education and knowledge as it relates to disaster management core competencies identified throughout the literature and the frequency of measures/techniques which these paramedics use to maintain competency and currency.

Methods: Paramedics from all states of Australia were invited to complete an anonymous online survey. Two professional bodies distributed the survey via social media and a major ambulance service was surveyed via email.

Results: The study population includes 130 respondents who self-identified as a currently practicing Australian paramedic. Paramedics from all states except South Australia responded, with the majority coming from Queensland Ambulance Service ($N = 81\%$). In terms of experience, 81.54% of respondents report being qualified for greater than 5 years. Initial analysis shows that despite the extensive experience of the practitioners surveyed when asked to rate from high to low their level of knowledge of specific disaster management core competencies a number of gaps exist.

Discussion: Core competencies are a defined level of expertise that is essential or fundamental to a particular job, and serve to form the foundation of education, training, and practice for operational service delivery. While more research is needed, these results may help inform industry, government, and education providers to better understand and to more efficiently