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BRIEF REPORT

Vaccine cold chain in remote environments: culturally appropriate training opportunities, an evaluation

Suzanne Belton, PhD[1], Rosalie Schultz, PhD[2], Tobias Speare, MPH[3,*]

[1] Menzies School of Health Research, Casuarina, Australia
[2] Flinders University College of Medicine and Public Health, Alice Springs, Australia
[3] Flinders University College of Medicine and Public Health, Rural and Remote Health, Alice Springs, Australia

Abstract

Vaccines are temperature-sensitive, and they may lose effectiveness without correct storage. Research in remote Australia raised questions regarding the integrity of the vaccine cold chain to Aboriginal communities and prompted the development of a video resource, Vaccine Story, to raise awareness of maintaining the cold chain. This study describes the development and evaluation of the Vaccine Story video. Local engagement helped to refine and produce the video. An online anonymous survey tested the appropriateness and effectiveness of the Vaccine Story video to enhance knowledge and awareness of risks to the vaccine cold chain and the potential implementation of the Vaccine Story video. Diverse health professionals and other staff (n = 83) completed the survey. Responses highlighted a lack of training around the packing and transport of vaccines, particularly for non-clinical support staff. Respondents stated the health messaging in the Vaccine Story video was effective. Over half of respondents (52%) recommend the use of the video as a training tool. The Vaccine Story video addresses some concerns regarding vaccine transportation and storage in remote Aboriginal communities through strengthening understanding of the importance of cold chain.

Keywords: immunisation, quality control, professional development, cold chain, survey, Indigenous health.

INTRODUCTION

Vaccines are sensitive biological products that require transport and storage in a controlled environment from manufacture to administration. This is known as vaccine cold chain. When vaccines are exposed to temperatures outside of the recommended range, known as a cold chain breach, they may become less effective or destroyed.[1] Known cold chain breaches are estimated to cost the Australian health system over $5 million in replacement vaccines per year.[2] This is especially relevant in remote Australia, where vast distances, sparse populations, and workforce limitations pose significant risks to the vaccine cold chain.[3,4]

Despite the National Immunisation Program, Australia continues to experience Vaccine Preventable Diseases (VPD), particularly amongst Aboriginal and Torres Strait Islander peoples and in remote locations.[5] Aboriginal and Torres Strait Islander peoples have very high rates of vaccination and yet experience 4.1 times the rate of burden of disease due to VPDs compared to non-Indigenous Australians.[6] Unknown breaches in the vaccine cold chain may result in the administration of vaccines that cannot elicit an immune response and therefore leave the individual and community at risk of VPDs.

Research in Central Australia highlighted questions regarding the integrity of the vaccine cold chain to remote Aboriginal communities.[7] A pilot quality assurance audit of the vaccine cold chain from Alice Springs Hospital to remote communities, involving 31 cold chain monitors attached to individual vaccines, showed cold chain breaches with every vaccine, primarily during transportation to remote communities. All the vaccines in the pilot, except one where the vaccine froze, were regarded as being safe and effective as per Centres for Disease Control and Prevention recommendations.[7] However, the research highlighted significant risks to the vaccine cold chain and the effectiveness of the National Immunisation Program associated with non-clinical untrained staff being responsible for cold chain

*Address for correspondence: Tobias Speare, Flinders University College of Medicine and Public Health, Rural and Remote Health, Alice Springs, Northern Territory, 0871, Australia.
E-mail: tobias.speare@flinders.edu.au

management. National vaccine management guidelines emphasise the importance of ensuring all people involved in the vaccine cold chain are appropriately educated and trained "so that they understand the importance of effective vaccine management" and "to ensure that the vaccines remain effective and potent".[1] In response to these concerns a 7-min video, Vaccine Story, was produced with the aim of raising awareness of threats to the cold chain. This report describes development and evaluation of the Vaccine Story video.

METHOD

Development of the Film

Vaccine Story is a short film that depicts a vaccine's journey from supply centre to administration in a remote Aboriginal community in a novel, engaging, and culturally appropriate manner. The video is aimed at anyone involved in the process of transporting vaccines to remote communities, including people without a medical or technical background. The storyline was developed through a collaborative partnership between an Aboriginal Elder, a linguist, health professionals, and a film producer. A baseline narrative was developed with expert technical input of health professionals detailing how vaccines work, the logistics of ordering and transportation of vaccines to remote communities, and major challenges of vaccine cold chain in remote Australia. The film producer and a pharmacist then worked with an Aboriginal Elder and a linguist to ensure the language and messaging of the narrative were clear and appropriate for Aboriginal people in Central Australia.[8] Filming was undertaken around Alice Springs and Central Australia, with a local Aboriginal woman as the narrator. The Vaccine Story video was uploaded to Vimeo (Vimeo.com, Inc, New York, NY, USA) a free online streaming service, and promoted through personal and professional networks and social media.

Evaluation of the Film

An online, anonymous survey, conducted between November and December 2020, gathered feedback, experiences and opinions from experts, clinical and non-clinical health staff, and educators on the content and messaging of the Vaccine Story video and how best to distribute and use the film (Table 1). The survey was distributed nationally through Primary Health Networks, professional associations, and personal networks.

RESULTS AND DISCUSSION

Participants

Eighty-three people from a variety of health professions and non-clinical roles across Australia and overseas responded to the survey (Table 2). Respondents identified as multiple health professions and roles, including nurses, midwifes, and managers. Nurses and midwives comprised the largest group of respondents (59%). Most responses were received from people working in the Northern Territory (57%). Two respondents (2%) identified as Aboriginal people. Forty-six (57%) respondents had a specialised interest in immunisations.

Survey Results

The Vaccine Story video achieved an overall rating of 3.3 out of 5 stars. The main message that vaccines are fragile and need care during transportation was well understood (85%). Other major messages received included 'vaccines should be handled carefully by everyone' (99%), 'vaccines need temperature monitoring' (96%), 'vaccines have to travel in the esky' (92%), and 'vaccines can get too cold' (75%). Forty percent of respondents felt that the length of the film was too long.

Most respondents (63%) acknowledged that their organisation did not have induction or training on transporting vaccines for staff such as drivers, air crew, and reception staff or they responded they did not know if training was available. Thirty-seven (45%) respondents stated that they had not had any training or could not recall it. A third of respondents (28%) would like more training on vaccine packing and transport for remote destinations. Half of the respondents (52%) agreed that this film should be used for training purposes in their organisation. Forty percent were neutral on this topic and only 8% disagreed. One person commented that they had seen staff unsatisfactorily pack vaccines for transport.

Respondents stated that the film was informative and easy to listen to, but half felt there were some inaccuracies, and that it was not visually appealing or culturally appropriate, although this was not stated by any of the Indigenous respondents. The inaccuracies related to the inclusion of temperature monitoring devices, specifics around how to pack an esky, and information sources, including the hard copy of the *Australian Immunisation Handbook*.[9] Some comments included:

> *There have been changes with the yellow cards, no longer used, and different gauges are being used to monitor the temperature inside the eskies now but everything else remains the same.*

Table 1 Vaccine story online survey

Question	Response
How do you rate the film?	Poor (1 star) – Excellent (5 stars)
How do you rate the length of the film?	Too long (0) – Too short (100)
Was this film . . .? (tick as many boxes as you wish)	• Informative • Easy to listen to • Accurate • Visually appealing • Culturally appropriate • Other (please specify)
What were the main messages from the Vaccine Story video? (tick as many boxes as you wish)	• Vaccines need humidity monitoring • Vaccines are easy to transport • Vaccines can get too cold • Vaccines have to travel in the esky • Vaccines need temperature monitoring • Vaccines should be carefully handled by everyone
Have you received training on vaccine packing and transport?	• Yes • No • I cannot recall
Would you like more training on vaccine packing and transport for remote destinations?	• Yes • No
Does your organisation have induction or training on transporting vaccines for staff such as drivers, air crew, and reception staff?	• Yes • No • I do not know
How much do you agree with this statement: 'My organisation should use this film for training purposes'	• Agree • Neither agree nor disagree • Disagree
Please tell us a bit about yourself. What is your role in the health workforce?	• Aboriginal and Torres Strait Islander health practitioner • Teacher or trainer for health workers • Aboriginal and Torres Strait Islander community health worker • Midwife • Doctor • Manager or logistics officer • Pharmacist • Other (please specify) • Nurse
Where do you work?	• Australian Capital Territory • New South Wales • Northern Territory • Queensland • South Australia • Tasmania • Victoria • Western Australia • International
Are you a specialist in immunisation either in training or delivering vaccinations?	• Yes • No
Do you identify as:	• Aboriginal • Torres Strait Islander • Aboriginal and Torres Strait Islander • Non-Indigenous
Any other comments?	Free text

Table 2 Participant demographics (83 respondents)

Profession	
Nurse	52 (54%)
Other health practitioner: dentist, pharmacy technician, paramedic, safety and quality officer	15 (16%)
Pharmacist	8 (8%)
Manager or logistics officer	7 (7%)
Doctor	6 (6%)
Midwife	5 (5%)
Aboriginal and Torres Strait Islander health practitioner or community worker	2 (2%)
Teacher or trainer for health workforce	1 (1%)
Location	
Northern Territory	47 (57%)
Queensland	10 (12%)
Victoria	9 (11%)
South Australia	5 (6%)
Western Australia	5 (6%)
New South Wales	4 (5%)
International	2 (2%)
Unknown	1 (1%)
Identify as Aboriginal and/or Torres Strait Islander	
Aboriginal	2 (2%)
Torres Strait Islander	0
Non-Indigenous	80 (97%)
Unknown	1 (1%)

There was imagery of the Australian Immunisation Handbook in hard copy. I suggest that be edited and replaced with image of online handbook which is up to date. We have all been told to dispose of old hard copy handbooks.

The demonstration how to pack the vaccines is incorrect. Target audience seems a little muddled, was difficult to ascertain who it was targeted to.

A bit slow for the first half about the packaging and transport. What I thought was more important/more difficult for target group to understand was the second part.

CONCLUSION

The Vaccine Story video has the potential to improve cold chain maintenance, thereby reducing cold chain breaches, vaccine wastage, and loss of effectiveness, particularly for remote health services in Aboriginal communities. It is accessible via a free streaming service, Vimeo, and may be incorporated into professional training opportunities.

The video is directed at improvements in the health system, a social determinant of health, and supports services, such as vaccine transportation. It specifically addresses staff who may be excluded from recommended training on the vaccine cold chain. The one-off film production arrangement did not allow for further developments of the film, but minor inaccuracies such as the change in cold chain monitoring cards and use of printed versions of the *Australian Immunisation Handbook* reflect rapid changes in the vaccination environment and the need for flexibility in the production of training resources. The principles of handling vaccines remain unchanged.

A wide range of health providers gave positive reviews. The short video could be used to improve skills impacting on quality assurance in vaccination rollouts and scale-ups. Further work could develop the film for healthcare consumers, particularly as vaccinations are at the forefront of many consumers' minds during the COVID-19 pandemic.

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CONFLICTS OF INTEREST STATEMENT

Suzanne Belton was funded by the Central Australian Rural Practitioners Association to complete the evaluation of the Vaccine Story video resource. The NT PHN provided financial support from the Commonwealth of Australia. There are no other conflicts of interest to declare.

AUTHORSHIP STATEMENT

All listed authors comply with the *Journal's* authorship policy.

ETHICS STATEMENT

Ethics approval was gained from the Menzies School of Health Research Human Ethics Committee (20–3807) and the Central Australian Human Ethics Committee (17–2869) in 2020. The evaluation was considered low risk to all participants.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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