The Virtual Rural Generalist Service: a hybrid virtual model of care designed to improve health access and outcomes in rural and remote communities

It is well known that rural and remote communities globally experience inequities in both health outcomes and access to health provision.[1] In Australia, despite a range of initiatives to address the shortfall for doctors in rural and remote areas, there remain substantial gaps in access to doctors in many rural communities.[2,3] Telehealth is a means to manage this gap; however, few models have been developed to deal with workforce challenges for small rural hospitals and fewer have been evaluated through the lens of the Quadruple Aim: improved health outcomes that matter to patients, improved experiences of receiving and providing care, and improving health care costs.[4] This article introduces the *MJA* supplement on the Virtual Rural Generalist Service (VRGS), which is a model of care designed to provide medical support to rural hospitals where there is limited onsite medical staff or where there are no local doctors available. This perspective provides the background for four articles evaluating the VRGS.

Context

Western NSW Local Health District (WNSWLHD) is a vast health district in the state of New South Wales, Australia. It covers some of the state's most vulnerable communities across $246\,676\,km^2$ and is home to a population of about 279 000 people, of whom 14% identify as First Nations peoples.[5] Of the 38 health facilities within the WNSWLHD footprint, six are classified as "inner regional", 14 are classified as "outer regional", and the remainder are either "remote" or "very remote", and no local government area is classified as a metropolitan area, according to the Australian Statistical Geography Standard – Remoteness Areas.[6] WNSWLHD is primarily responsible for the acute and emergency services across this region, operating 38 inpatient facilities, including three rural referral hospitals, four procedural hospitals, six community hospitals, and 25 multipurpose hospitals.[5]

Like many rural and remote regions across Australia, and internationally, workforce access in western NSW remains a challenge.[3,7] This is particularly true for rural general practitioners, who provide primary care and are also the main medical workforce for 35 of the region's 38 acute care services. Medical workforce has faced increasing strain over the past five to ten years, with the Western NSW Primary Health Network predicting that 41 of the region's 49 communities will be without a general practitioner by the end of the decade.[3] Consequently, WNSWLHD became increasingly reliant on contracted short term medical officers, with many towns reliant on a locum medical model sometimes having no consistency in visiting medical officers. Even where general practitioner visiting medical officers were available, doctors in small communities were under severe strain, given the demands of providing care 24 hours, seven days a week, increasing administrative demands, credentialing barriers, and balancing challenges of professional, sociocultural and geographic isolation.[3]

In 2008, a group of general practitioner visiting medical officers worked with the then Local Area Health Service (now WNSWLHD) to create a Remote Medical Consultation Service (RMCS). The RMCS primarily provided telephone-based ad hoc consultations between general practitioners and local nursing staff across community hospitals and multipurpose services when there was no local medical coverage. RMCS functioned with one doctor rostered over 24 hours in a limited digital health environment, using a paper-based workflow for note taking, prescribing and other clinical requirements. These workflows and rostering, including telephone communication, continued over 11 years, despite substantial increasing demand on the service, implementation of electronic medical records (EMRs), and significant investment by WNSWLHD in telehealth mobile carts in all its rural and remote health facilities.

Creation of the Virtual Rural Generalist Service

In 2019, noting the shortfalls of the RMCS model, WNSWLHD undertook a process to evolve the service. This process designed and implemented a novel hybrid virtual model of care that met the Institute for Healthcare Improvement's Quadruple Aim[4] and modern clinical governance standards. An agile project methodology ensured that the project met changing demands, integrated continuous quality improvement, and was able to quickly adapt to arising challenges.[8-11] The service was co-designed with new and existing clinicians, and a lean working group was established to consult on and implement the new service model. The model was built on the dimensions described below.

Patient-centred care

Recognising that patient-centred care is an integral aspect in delivering safe, sustainable quality care,[12-14] the Virtual Rural Generalist Service (VRGS) transitioned from the RMCS transactional clinician-to-clinician service to a holistic clinician-to-patient service integrating with local clinical staff. This was enabled using two-way audio-visual communication through a purpose-designed mobile telehealth cart. These carts allowed VRGS doctors to more effectively

Shannon Nott[1]
Georgia Wingfield[1]
Amelia Haigh[1]
Georgina M Luscombe[2,3] ⓘ
Anna E Thompson[2,3]
Emily Saurman[2,3]
Tim Shaw[2]
Amy Von Huben[2]
Kirsten Howard[2]
Andrew Wilson[2] ⓘ

1 Western NSW Local Health District, Dubbo, NSW.
2 University of Sydney, Sydney, NSW.
3 School of Rural Health, University of Sydney, Orange, NSW.

a.wilson@sydney.edu.au

interact with patients and their families and ensuring clinicians consider the individual needs of the patient when deciding on clinical management.

Acknowledging many rural patients' preference to remain in community, the VRGS model aimed to promote care close to home, allowing VRGS doctors the ability to consult into both rural and remote hospital sites and to admit patients locally. The service integrates all aspects of rural care including emergency care, acute and subacute inpatient management, ambulatory care, and hospital in the home settings, and providing aged care support to rural hospitals and multipurpose service sites without a local general practitioner or when they may not be available. The VRGS conducts daily virtual ward rounds, family meetings, and case conferencing to improve patient experience and ensure patients can be managed safely in their communities. The VRGS works synergistically with vCARE (Virtual Coordination Access Referral and Escalation), an emergency, specialist-led virtual service primarily supporting management, advice, and/or transfer logistics of critically unwell patients across the region.[15]

Rural proofing

The rural context and being responsive to local health and workforce needs were critical to the main purpose of the VRGS: to support communities without a local doctor and to help local general practitioners requesting additional help. Central to the establishment of the model was the design as a support service, not a replacement service for local medical staff. It has been deployed flexibly over time, depending on the workforce needs of each community. Following its launch, the VRGS was integrated as an after-hours service, supporting local general practitioners to maintain a work–life balance by covering leave and filling gaps in rosters. In some communities without doctors, the VRGS became the stabilising medical model until medical staff were employed locally or brought in as locums. In communities where there has been a stable and sustainable medical workforce, the service has not been required.

The importance of understanding the geographic, social, cultural and local contexts that interplay with the provision of health care in rural environments was a key priority when creating the VRGS.[16,17] To address this, and recognising the broad scope of the service across emergency, acute, outpatient and residential aged care, the target profile for recruiting VRGS doctors was based on the definition of a "rural generalist" as described in the Collingrove agreement:[18]

> …a medical practitioner who is trained to meet the specific current and future health care needs of Australian rural and remote communities, in a sustainable and cost-effective way, by providing both comprehensive general practice and emergency care and required components of other medical specialist care in hospital and community settings as part of a rural healthcare team.

This understanding of rural and remote context is critical to the success of the VRGS. Emphasis has been placed on employing rural generalists who understand rural communities and investing in these doctors to get to know the local region. Each new doctor to the service undertakes three days of tailored VRGS and local health district training to understand local communities as well as workflows and service guidelines. This is complemented by in-person quality improvement workshops in the region twice a year to allow rural hospital visits, team building with local nursing staff, and undertaking additional training. All doctors commit to a minimum of 25% face-to-face time in WNSWLHD allowing in-person support for the communities they cover virtually.

Ensuring safety and quality

At the time of design and implementation of the VRGS before the coronavirus disease 2019 (COVID-19) pandemic, it was acknowledged that, in the right context, telehealth could be equally or even more effective than usual care.[19] However, most studies focused on the non-acute or post-acute environment, highlighting the importance of building in strong safety and quality processes for the VRGS.

Investment in VRGS doctors is an important aspect of the service; specifically, onboarding for doctors has focused on three main areas: (i) virtual care workflows, systems, and use; (ii) region-specific training to rural and remote context and referral networks; and (iii) clinical and technical skills required for virtual care. Continuous team training was integrated into the service, including peer review and simulation. Monthly morbidity and mortality meetings were developed in line with the Clinical Excellence Commission's guidelines.[20] These meetings involved comprehensive case discussions and sharing of key learnings and supported service improvement. Monthly team meetings were also established to streamline communication, discuss risks, and address clinical or logistic concerns held by VRGS clinicians. Bi-annual, in-person team meetings focused on training, incident management and team building.

Monitoring hospital and service-level data has been an integral part of the VRGS model. Increased monitoring and surveillance of rural hospital outcomes within 12–18 months of VRGS implementation was undertaken internally by the WNSWLHD Health Intelligence Unit and a consultant reviewed outcomes independently within the first year. This intelligence supported the service to ensure patients received safe and appropriate care.

One risk identified in the development of the service was that VRGS doctors would be reliant on local nursing staff to assist with and support examinations. It was acknowledged that there was substantial variability in the comfort and competence of nursing staff in undertaking clinical examination. This risk is also applicable to the in-person general practitioner visiting medical officer environment, where local doctors may not be onsite in hospital, requiring nursing staff to undertake initial assessments. This was addressed through the development of a rural

generalist nurse education team to deliver tailor-made examination and assessment modules for rural nurses. A suite of educational resources and videos are available for nursing staff to supplement in-person training.[21] VRGS doctors are also trained to supervise and support nursing staff undertaking specific examinations over video, working together as a team.

Leadership and governance

Clinical leadership improves the performance of health teams and supports transformational change within the health system.[22-24] This is particularly important in the digital and virtual care environment where there may be significant change management required and where team members may be geographically dispersed and working with new clinical workflows.[25] The design of VRGS built on this knowledge, specifically in ensuring accessible and responsible team leadership to drive team cohesion, high quality standards, and a culture of continuous improvement. This included building senior clinician leadership within the service and linking the service directly to WNSWLHD executives through an operational executive sponsor.

Leadership structures within the VRGS were based on the NSW Health Leadership and Management Framework,[26] which focuses on engaging the team to drive outcomes, future-proofing the service, and modelling expected behaviours to drive service performance. In early and ongoing feedback of the service, this leadership approach was key to the early success of the model.

Service resilience

Resilient Health Care (RHC) is a safety approach that uses understanding of the clinical interface (patient–clinician, clinician–clinician), systems thinking, and success factors to drive optimal outcomes in response to varying conditions.[27-29] RHC within any given health service is built by integrating flexibility, adaptability and proactiveness to maintain service performance and optimise safety.[30] The VRGS model uses an RHC approach to maintain safety. It achieves this through proactively integrating a continuous learning environment, but also predicting demands that may be placed on the service.

VRGS administrative staff monitor and predict service demand by time of day, time of week and time of year to identify high risk scenarios when the service may be overloaded, to scale up staffing (increase shifts) or to adjust shift times to meet peak periods. Staffing availability was also documented so that additional service capacity could be brought in at short notice for unexpected periods of high demand. This predictive rostering is a continuous learning process whereby predicted service demand is compared with actual service demand to refine forecasting methodology. Service resilience was also addressed by integrating a "follow the sun" model of rostering where Australian-trained and registered rural generalists working overseas were able to be integrated into the roster to support overnight care while being fully alert and awake for their shift.

A continuous learning culture enabled medical staff to highlight system opportunities for improvement, but also recognise key components of the service needed to maintain success. This was built into clinical (morbidity and mortality meetings) and operational (team meetings) components of the service. This adaptive learning process allowed the service to be rapidly and safely implemented within the WNSWLHD region. This aspect of the service was also key to rapid and widespread scaling of the service within its first four months of launching during the COVID-19 pandemic and subsequent responses thereafter (see section below). Responsive adaptability has remained a strength of the service as the VRGS continues to adapt into new geographic locations beyond Western NSW.

Digital maturity

WNSWLHD has a high level of digital maturity, which was leveraged to its full potential by the VRGS. Central to this is the comprehensive EMR system, which VRGS clinicians use to order, document and view patient notes, pathology and imaging in real time from anywhere in the world. This also serves as a tool to improve communication with in-person staff. Electronic medication charting is facilitated through the EMR, allowing doctors to seamlessly order medication or intravenous fluids and undertake medication reconciliation. Discharge summaries can be sent digitally to the patient's treating general practitioner. Nursing staff at the bedside can order VRGS consultations and VRGS doctors can request consults from other in-person or virtual teams, such as pharmacy or palliative care. This feature of requesting consultations allows VRGS doctors to prioritise their workloads, although feedback from the team suggests the EMR processes could be improved to better manage system navigation and patient expectations.

Clinically, the service uses a range of bedside adjuncts to support assessment and communication with patients. Two-way audiovisual mobile telehealth carts were deployed before the creation of the VRGS and are the primary way the service communicates with patients and nursing staff. These carts also have high definition digital otoscopes, dental cameras, and wound assessment cameras to support diagnosis. One-way audiovisual overbed cameras in the emergency department are also used for more urgent patient reviews. Electronic transmission of electrocardiograms also occurs.

Although telephone supports intra-VRGS communication, the bulk of communication occurs through a secure chat platform, allowing clinicians to have conversations with colleagues and leverage the knowledge of the team to support care. This same function allows cross-team communication with other virtual services in WNSWLHD.

Impact of the COVID-19 pandemic on the VRGS

The VRGS launched two months before the COVID-19 pandemic was announced in Australia. During the pandemic, the VRGS was used to provide

consistent and flexible medical support to numerous communities across WNSWLHD. Given the reliance of the WNSWLHD on a locum workforce, many of whom reside interstate and were unable to travel due to border restrictions, the VRGS was instrumental in stabilising the medical workforce. The VRGS provided consistency of medical care in rural and remote communities where there would have been significant service gaps due to rapid and often unpredictable border closures between Australian states and territories. Due to the inbuilt resilience of the model and its virtual delivery components, the VRGS rapidly adapted to need, sometimes within hours. The VRGS proactively increased shifts early in the COVID-19 pandemic, anticipating increased pressure on the service due to staff furlough, fatigue, or concern regarding treating patients with COVID-19.

The first case of COVID-19 in Western NSW was identified on 10 August 2021. By 12 August, the VRGS had expanded to roster the WNSWLHD COVID Care in the Community (CCIC) — a virtual service specifically servicing patients with COVID-19 in their homes. The VRGS continued to staff and assist the CCIC until it could recruit enough staff to maintain its own roster.

This supplement

This *MJA* supplement provides an additional four articles reporting a mixed methods evaluation of the VRGS against the Quadruple Aim[4] of values-based health care, specifically, (i) health outcomes that matter to patients;[31] (ii) experiences of providing care;[32] (iii) experiences of receiving care;[33] and (iv) effectiveness and efficiency of care.[34] The evaluation drew upon the experiences of patients, carers, clinicians, and health managers and administrators, in conjunction with linked service usage (administrative data) and health outcomes data. As a contrast, an additional two articles in this supplement discuss other virtual models of care supporting health care delivery in rural and remote contexts.[35,36]

Conclusion

In the context of rural workforce shortages, the VRGS has an important role in providing continuous medical coverage to complement the local visiting medical officer workforce in rural and remote hospitals. The service fills medical roster gaps, making rural medical and nursing positions more attractive and sustainable, while also being acceptable to patients and carers as providing good quality medical care that can meet many of their needs. The service is recognised locally to increase access to a doctor and provide equivalent medical care to that of traditional medical models (ie, general practitioner visiting medical officer). It is also a cost-effective solution that is acceptable to manage patients in rural community hospitals and multipurpose services. Further investment is needed to train and resource local nurses who play an integral role in providing virtual medical care, in addition to investment in data capture to ensure administrative

datasets can capture VRGS encounters to transparently demonstrate cost and time savings with comparable benefits to in-person services over time.

Collectively, the evaluation articles reported in this supplement show that the VRGS promises to be an economically viable solution to attract, retain and sustain existing medical care, and may be applicable in other rural and remote areas in Australia and internationally.

1 Australian Institute for Health and Welfare. Rural and remote health [website]. Canberra: AIHW, 2024. https://www.aihw.gov.au/reports/rural-remote-australians/rural-and-remote-health (viewed Sept 2024).

2 Australian Government Department of Health and Aged Care. National Medical Workforce Strategy 2021–2031. Canberra: Commonwealth of Australia, 2021. https://www.health.gov.au/resources/publications/national-medical-workforce-strategy-2021-2031 (viewed Sept 2024).

3 Western New South Wales Primary Health Network. Securing the future of primary health care in small towns in Western NSW. Dubbo: Western NSW PHN, 2019. https://www.wnswphn.org.au/uploads/documents/corporate%20documents/Securing%20the%20future%20of%20Primary%20Health%20Care%20Services%20in%20Small%20Towns%20in%20Western%20NSW.pdf (viewed Sept 2024).

4 Sikka R, Morath JM, Leape, L. The quadruple aim: care, health, cost and meaning in work. *BMJ Qual Saf* 2015; 24: 608-610.

5 Western New South Wales Local Health District. Western NSW Local Health District Clinical Services Framework 2020–2025. Dubbo: Western NSW LHD, 2020. https://www.nsw.gov.au/sites/default/files/2023-01/WNSWLHD-clinical-services-framework-2020-2025.pdf (viewed Sept 2024).

6 Australian Bureau of Statistics. Australian Statistical Geography Standard (ASGS): volume 5 — remoteness structure [Cat No. 1270.0.55.005]. Canberra: ABS, 2016. https://www.abs.gov.au/ausstats/abs@.nsf/mf/1270.0.55.005 (viewed Oct 2024).

7 Russell D, Mathew S, Fitts M, et al. Interventions for health workforce retention in rural and remote areas: a systematic review. *Hum Resourc Health* 2021; 19: 103.

8 Wang MC, Hyun JK, Harrison MI, et al. Redesigning health systems for quality: Lessons from emerging practices. *Jt Comm J Qual Patient Saf* 2006; 32: 599-611.

9 Goodison R, Borycki EM, Kushniruk AW. Use of agile project methodology in health care IT implementations: a scoping review. *Stud Health Technol Inform* 2019; 257: 140-145.

10 Dendere R, Janda M, Sullivan C. Are we doing it right? We need to evaluate the current approaches for implementation of digital health systems. *Aust Health Rev* 2021; 45: 778-781.

11 Teisberg E, Wallace S, O'Hara S. Defining and implementing value-based health care: a strategic framework. *Acad Med* 2020; 95: 682-685.

12 Australian Commission on Safety and Quality in Health Care. Patient-centred care: Improving quality and safety through partnerships with patients and consumers. Sydney: ACSQHC, 2011. https://www.safetyandquality.gov.au/publications-and-resources/resource-library/patient-centred-care-improving-quality-and-safety-through-partnerships-patients-and-consumers (viewed Oct 2024).

13 Park M, Giap TTT, Lee M, et al. Patient- and family-centered care interventions for improving the quality of health care: a review of systematic reviews. *Int J Nurs Stud* 2018; 87: 69-83.

14 Janerka C, Leslie GD, Gill FJ. Development of patient-centred care in acute hospital settings: a meta-narrative review. *Int J Nurs Stud* 2023; 140: 104465.

15 Parks J, Hunter A, Taylor A, et al. Design, development and implementation of the virtual, coordination, access, referral and escalation service in western New South Wales. *Aust J Rural Health* 2021; 29: 794-800.

16 Bourke L, Humphreys JS, Wakerman J, Taylor J. Understanding rural and remote health: a framework for analysis in Australia. *Health Place* 2012;18: 496-503.

17 Kelly SE. Bioethics and rural health: theorizing place, space, and subjects. *Soc Sci Med* 2003; 56: 2277-2288.

18 Australian College of Rural and Remote Medicine. The Collingrove Agreement. *ACRRM*, 2018. https://www.acrrm.org.au/rsrc/docum ents/misc/the-collingrove-agreement.pdf (viewed Sept 2024).

19 Snoswell CL, Chelberg G, De Guzman KR, et al. The clinical effectiveness of telehealth: a systematic review of meta-analyses from 2010 to 2019. *J Telemed Telecare* 2023; 29: 669-684.

20 Clinical Excellence Commission. Guidelines for conducting and reporting morbidity and mortality/clinical review meetings. Sydney: CEC, 2020. https://www.cec.health.nsw.gov.au/__data/ assets/pdf_file/0003/602697/Guidelines-for-Conducting-and-Reporting-Morbidity-and-Mortality.pdf (viewed Oct 2024).

21 WNSWLHD. Rural Generalist nurse patient assessment demonstrations. Sydney: Western NSW Local Health District, 2021. https://www.youtube.com/watch?v=oB0iDTRO_1g&t=66s (viewed Nov 2024).

22 Ham C. Improving the performance of health services: the role of clinical leadership. *Lancet* 2003; 361: 1978-1980.

23 Elliott IC, Sinclair C, Hesselgraves H. Leadership of integrated health and social care services. *Scottish Affairs* 2020; 29: 198-222.

24 Laukka E, Pölkki T, Kanste O. Leadership in the context of digital health services: a concept analysis. *J Nurs Manag* 2022; 30: 2763-2780.

25 Broderick A, Lindeman D. Scaling telehealth programs: lessons from early adopters. Case studies in telehealth adopters. Commonwealth Fund, 2013. https://www.commonwealthfund. org/sites/default/files/documents/___media_files_publications_ case_study_2013_jan_1654_broderick_telehealth_adoption_ synthesis.pdf (viewed Oct 2024).

26 Health Education and Training Institute. NSW Health Leadership and Management Framework. Sydney: HETI, 2020. https://www. heti.nsw.gov.au/education-and-training/our-focus-areas/leade rship-and-management/nsw-health-leadership-framework (viewed Oct 2024).

27 Hollnagel E, Braithwaite J, Wears RL. Delivering resilient health care. Abingdon: Routledge, 2019.

28 Iflaifel M, Lim RH, Ryan K, Crowley C. Resilient health care: a systematic review of conceptualisations, study methods and factors that develop resilience. *BMC Health Serv Res* 2020; 20: 324.

29 Kruk ME, Myers M, Varpilah ST, Dahn BT. What is a resilient health system? *Lessons from Ebola. Lancet* 2015; 385: 1910-1912.

30 Woods DD. Four concepts for resilience and the implications for the future of resilience engineering. *Reliab Eng Syst Saf* 2015; 141: 5-9.

31 Luscombe GM, Wilson A, Ampt AJ, et al. Health service access and quality of care provided by the Western NSW Local Health District Virtual Rural Generalist Service: a retrospective analysis of linked administrative data. *Med J Aust* 2024; 221 (Suppl): S8-S15.

32 Thompson AE, Saurman E, Nott S, et al. Clinician experiences of a hybrid virtual medical service supporting rural and remote hospitals: a qualitative study. *Med J Aust* 2024; 221 (Suppl): S16-S21.

33 Thompson AE, Shaw T, Nott S, et al. Patient and carer experiences of hospital-based hybrid virtual medical care: a qualitative study. *Med J Aust* 2024; 221 (Suppl): S22-S27.

34 Von Huben A, Thompson AE, Wilson A, et al. An economic evaluation of the Virtual Rural Generalist Service versus usual care in Western New South Wales Local Health District. *Med J Aust* 2024; 221 (Suppl): S28-S36.

35 Newton N, Shah K, Shaw M, et al. Barriers, facilitators and next steps for sustaining and scaling virtual hospital services in Australia: a qualitative descriptive study. *Med J Aust* 2024; 221 (Suppl): S37-S48.

36 Shah K, Newton N, Charlston E, et al. Defining a core set of research and development priorities for virtual care in the post-pandemic environment: a call to action. *Med J Aust* 2024; 221 (Suppl): S49-S56. ■