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An Australian Government Initiative

Co-designing a Paediatric Virtual Urgent Care Service

Project Report

July 2022

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Lead organisation

Health Services & Economics Group, Murdoch Children's Research Institute

Partners

North Western Melbourne Primary Health Network

The Royal Children's Hospital

Western Health – Joan Kirner Hospital

Werribee Mercy Hospital

Funding

North Western Melbourne Primary Health Network

Project team

Name	Role	Organisation
Prof. Harriet Hiscock	Unit Head, Specialist Paediatrician Group Leader Professorial Fellow	Health Services Research Unit, RCH Health Services & Economics Group, Murdoch Children's Research Institute Department of Paediatrics, The University of Melbourne
Sonia Khano	Research Assistant	Health Services & Economics Group, Murdoch Children's Research Institute
Jane Le	Research Assistant	Health Services & Economics Group, Murdoch Children's Research Institute
Dr. Joanna Lawrence	Consultant paediatrician	The Royal Children's Hospital
Prof. Kim Dalziel	Unit Head	Health Economics Unit, The University of Melbourne Health Services & Economics Group, Murdoch Children's Research Institute
Jane Carolan	Research Assistant	Health Services Research Unit, RCH Health Services & Economics Group, Murdoch Children's Research Institute

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- **Northern Health representatives** for their insights on establishing Victoria's first virtual urgent care service
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Prof. Harriet Hiscock
Health Services and Economics Group
E: harriet.hiscock@rch.org.au

Murdoch Children's Research Institute

The Royal Children's Hospital
50 Flemington Road
Parkville, Victoria, 3052 Australia

www.mcri.edu.au

Executive Summary

Virtual urgent care, the provision of urgent medical advice via video consultation, offers a promising solution to address the growing demand on hospital emergency departments (ED). Around the world, healthcare systems have pivoted to virtual models in an attempt to divert patient load from physical hospitals into the more expandable virtual space. The potential benefits are:

- Patient-centred care – more accessible, less family disruption
- Reduced crowding of physical EDs
- Efficient for consumers – less travel time and wait times
- Efficient for clinicians – quicker consultations, reduced time sourcing rooms, donning & doffing PPE
- Less environmental pollution through reduced travel, PPE waste.

Despite the promise of a virtual care solution, questions remain: *What does the ideal virtual urgent care service look like? To what extent would such a service divert patients from the physical ED? Does a virtual service increase the scope of patients seen in hospital services, inadvertently diverting from primary care?*

The primary deliverable from the NWPHN funding was a set of three co-design sessions to design the optimal model of paediatric virtual urgent care. These sessions were conducted between March and June 2022, and involved key stakeholders including consumers, general practitioners (GPs), emergency physicians and paediatricians. During this time, the Victorian Virtual ED (VVED), based at the Northern Hospital, was funded by the state government of Victoria to expand state-wide. To avoid duplication, an early collaboration was formed with the VVED with an understanding that the outputs of the co-design sessions would inform the future development of the paediatric arm of the VVED. The existing model in use by the VVED was therefore used as a base to build and improve upon.

The key recommendations from the co-design sessions are:

- Incorporate an online triage tool to enable scale and ensure system sustainability
- Ensure a diverse workforce with a focus on building paediatric capacity amongst GPs
- Collaborate and leverage existing government-funded services to avoid duplication and inefficiencies in the Victorian healthcare system. This includes progressing towards a digital front door which will enable patients to easily navigate to the most appropriate service.
- Develop technology to enable a seamless experience for consumers, recognising consumer preferences for visibility of wait time and a ‘tell-once’ policy
- Consider and measure implications on workforce shortage elsewhere.

A hybrid triage model: online tool (to scale) and nursing triage (to ensure accessibility):
The incorporation of a digital triage tool will enable care at scale for those that are health and digital literate. This recommendation follows the experiences of Sick Kids Toronto, Canada who successfully implemented an online triage tool for their virtual urgent care service. The tool guides consumers towards self-care, primary care, or a virtual review. However, the need to have an equivalent service to avoid further exacerbation of the health divide was seen as imperative and hence the triage nurse role was considered still necessary.

A digital front door providing a user-friendly overview of available services, kids health fact sheets and the online triage tool could be developed with time. This could be a first point of call for any parent wanting further health advice, with the online triage tool linking to fact sheets and directing parents to the most appropriate government-funded service.

Role of GPs in a paediatric virtual urgent care service:
Given most patients presenting to paediatric emergency services are triaged as category 4 or 5 (considered low acuity), GPs were considered the most appropriate workforce to provide virtual care advice. This recommendation was tempered by acknowledging current pressures on primary care services, as well as a reported current lack of expertise and confidence in paediatric medicine. The latter led to a suggestion to develop a Community of Practice for GPs to upskill them in acute and semi-acute paediatric care. In this virtual urgent care service model, GPs would be the primary workforce supported by paediatricians and paediatric emergency physicians, enabling capacity building amongst GP colleagues. This idea was met with great favour at the GP Advisory Group for the VVED who recognised the lack of supported paediatric exposure in GP training as a substantial issue. GPs reported that this service offers a great opportunity to provide more paediatric training in a supportive environment. A diverse workforce also ensures staffing demands are spread across disciplines rather than relying on a single workforce.

Collaborating with and leveraging existing government-funded services:
A comprehensive map of all existing government-funded services was developed as a set of referral pathways that a paediatric virtual urgent care service could use to direct families away from physical EDs. The current VVED model uses in-house nurse triage, duplicating triage provided by the government funded Healthdirect Australia's (HDA) Nurse-On-Call (NoC) service in Victoria. Therefore, the possibility of the state government service, NoC, replacing the in-house nurse triage was proposed. Current data suggest that NoC directs 27% (or 2860 children per month in Victoria)

of paediatric callers to an ED. This presents an exciting opportunity to divert a large volume of paediatric patients from a physical ED to a virtual service. Additionally, measuring the rate of diversion from a physical to a virtual service would become possible. This will allow a definitive answer to the key concern raised by the co-design team, i.e. the risk of scope creep.

Evaluation

We engaged with the HDA NoC team to establish their appetite in taking part in an evaluation of paediatric patients attending their service being directed to a virtual ED, if appropriate. We propose conducting a randomised control trial (RCT) - the gold standard of clinical evidence – to measure the impact of a virtual ED in diverting paediatric care away from a physical ED. Linked data will enable us to measure health service utilisation and the associated costs.

Preliminary discussions with the Royal Children's Hospital Human Ethics Committee (HREC) suggest the RCT will be feasible if we seek and secure waivers of consent to randomise patients and to receive linked data. We have also held discussions with the Murdoch Children's Research Institute's Clinical Epidemiology and Biostatistics Unit (CEBU) to establish the required sample size for the RCT. Using the most conservative estimates a total sample size of 1038 is required. This volume of patients can be achieved in one month (and three months longer if focusing solely on paediatric patients in the NWM PHN catchment area).

Linking these outputs to the existing VVED service:

Dr Joanna Lawrence has been invited to Chair the Paediatric Advisory Group for the VVED. Outcomes of the co-design process have been shared with the Advisory Group, and endorsement of these to inform future development of the paediatric arm of the VVED achieved.

Next steps:

Based on these findings, next steps could include:

A) Develop workflow for pilot

- Review technical workflow for NoC and VVED to streamline information flow and transition of patients between the 2 services in the most efficient manner.

B) Progression of evaluation:

- Confirmation with NoC regarding their willingness to participate in the RCT and provide patient identifiers to the data custodians to enable data linkage.

- Development of the research protocol with submission to RCH HREC for ethics approval of an RCT with linked healthcare data and waivers of consent.
- Source funding to deliver the RCT (research coordinator, data governance fees etc)

C) Recruitment and workforce development

- Conduct a GP workshop to discuss best workforce design to optimise capacity building
- Develop a paediatric acute care training package for GPs working in the VVED workforce
- Survey existing staff members to understand impact on workforce depletion

D) Continued input into the VVED

- Ongoing participation and leadership of the Paediatric Advisory Working Group

E) Development of an online triage tool

- Collaboration with VVED and Healthdirect to develop an online triage tool

Background

Across the developed world, Emergency Departments (ED) are facing increasing demands on paediatric emergency services. From 2012-2019, the north and west of Melbourne saw an 8.9% increase in birth rates with 2020 data revealing a state-wide increase of 5.7% for Victoria and 13% in the state's western health services[1]. Further, there has been an increase in the prevalence of chronic paediatric illness including mental health disorders[2]. Expanding physical EDs offers a potentially finite solution to meet this increasing demand. Instead, hospitals around the world are looking at virtual solutions to avoid over-crowding of ED waiting rooms. Virtual solutions can improve the experience of care for families with reduced travel and waiting time. Virtual solutions also offer substantial benefits to hospitals with less environmental and financial waste. Particularly throughout the pandemic, virtual care avoids the need for Personal Protective Equipment (PPE), and staff save time that would otherwise be spent sourcing a physical room and donning and doffing PPE.

Internationally, Toronto's Sick Kids hospital launched a virtual tool to triage children presenting to their virtual ED into community care, urgent care, specialist care or self-care, supported by appropriate parent-facing child health information[3]. For those children that require urgent care, a virtual triage service directs them to the most appropriate care at the most appropriate time. Closer to home, the Northern Hospital established a virtual ED for children and adults which commenced October 2020. Results show high levels of parent satisfaction and approximately 80% of patients being managed without physically attending an ED (although no data on their healthcare journey post attending the virtual service has been linked to date). Those that do attend in person, attend at the most appropriate time to receive the care required. It is unclear (in part due to fluctuations in ED presentations to due COVID-19 restrictions), whether this virtual ED model diverts children away from hospital care.

Since the conception of this co-design project, the Northern Health virtual ED received $21m of funding from the Victorian Department of Health (DH) to expand its service state-wide, becoming the Victorian Virtual Emergency Department (VVED). As such, this co-design project adapted its objective to inform the development of a paediatric virtual care model of care that will be incorporated into the existing VVED model. This co-design project was established in partnership with NWMPHN, Royal Children's Hospital (RCH), Western Health - Joan Kirner Women's and Children's Hospital, and Werribee Mercy and key stakeholders including: VVED representatives; hospital ED physicians, paediatricians; GPs; families, and Victorian DH. This report describes the co-design process including delivery of three co-design consultation sessions with stakeholders; research and

stakeholder engagement activities, recommendations on the model of care to be piloted; and an evaluation and health economic plan.

Aim and key objectives

- inform the development of an integrated virtual urgent paediatric care model with the view to **inform the state-wide VVED model**, funded by the Victorian Department of Health (DH)
- explore the **suitability, feasibility**, and **service model options** for providing virtual urgent triage and consultation service to paediatric patients
- analyse and **report co-consultation findings**
- **recommend a model to be piloted** across the North-Western region
- develop an **evaluation plan** (including health economics evaluation plan) to assess the pilot model.

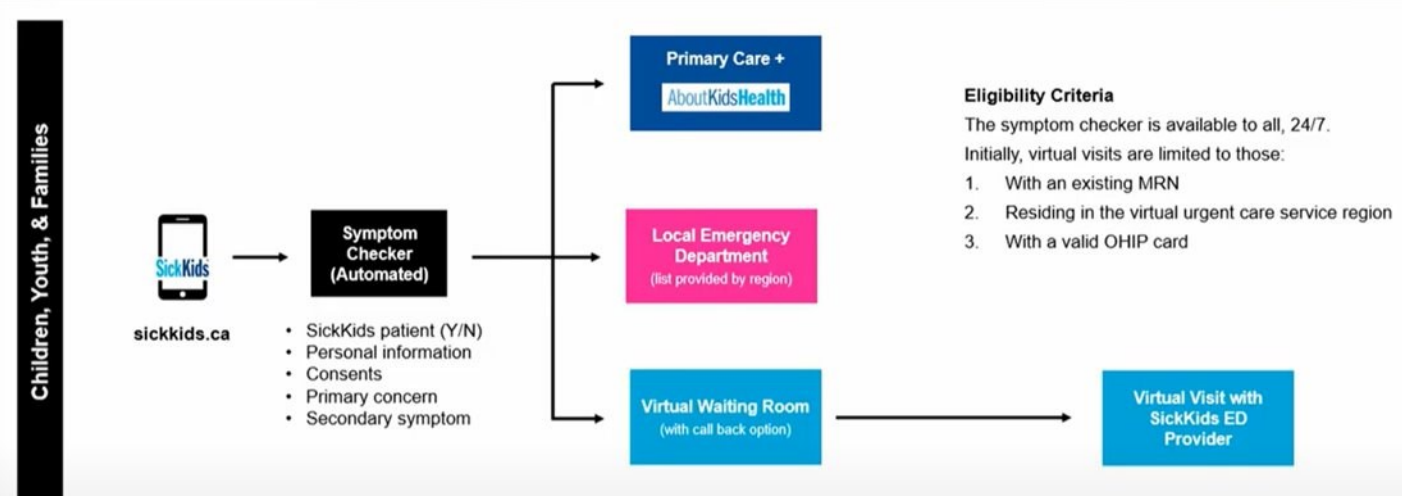
Existing Virtual Urgent Care Services

SickKids Virtual Urgent Care Services (SVUCS)

https://www.sickkids.ca/en/emergency/virtual-urgent-care/

In Toronto, the *SickKids* hospital launched a virtual urgent care service in 2021 (funded by Ontario Health), giving paediatric patients and families the option to seek urgent care from home. The service is available 8:30am – 11:30pm, 7 days a week and is staffed by ED physicians and ED physician assistants. Eligibility is limited to paediatric patients (0-18 years) who have previously received care at the *SickKids* Hospital, live in the service area of Southern Ontario and hold a valid OHIP health card. The service is accessed via an automated self-triage online tool (symptom checker), providing users with reliable health education resources and appropriately redirecting patients to primary care or the physical hospital emergency department (see Figure 1). If eligible, patients are directed to the SickKids virtual urgent care service where they are seen by an emergency department (ED) physician. The service platform was developed by Andor Health and data management and visualisation by Microsoft PowerBI.

Figure 1. SickKids Virtual Urgent Care patient journey



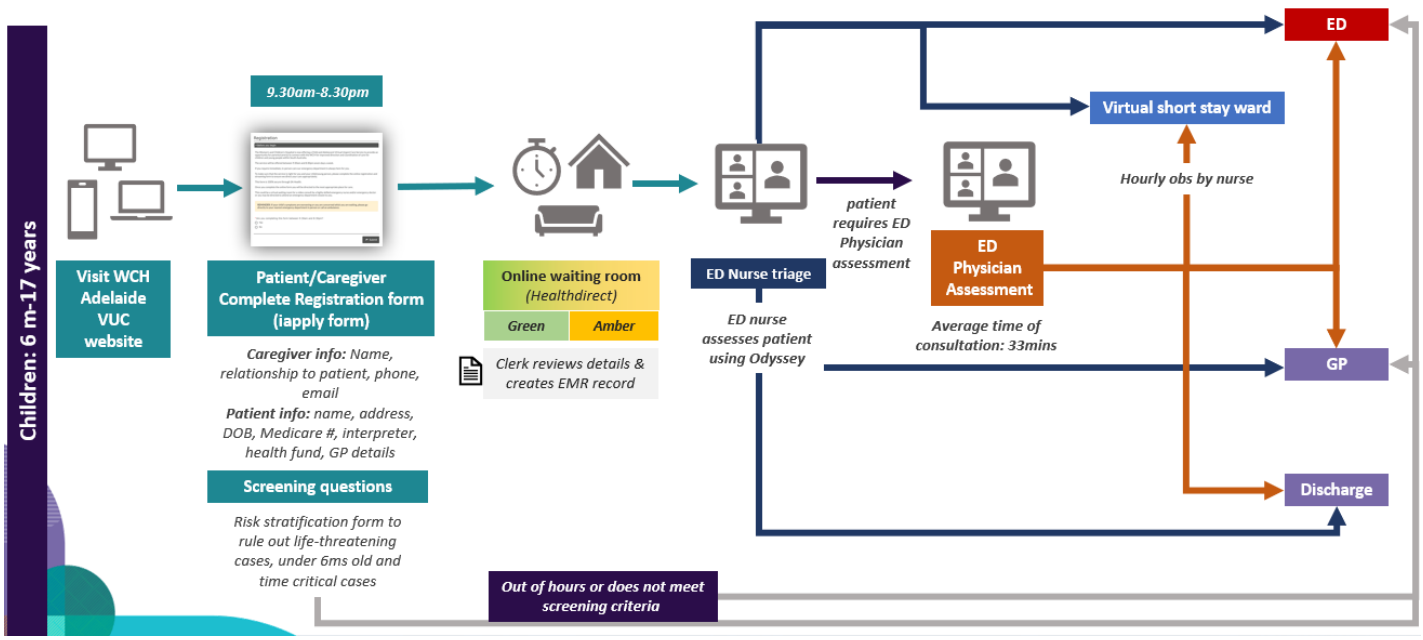
Child and Adolescent Virtual Urgent Care Service (CAVUCS)

https://www.wch.sa.gov.au/patients-visitors/emergencies/virtual-urgent-care

The Women's and Children's Hospital in Adelaide, South Australia (SA) launched the first Australian virtual care service for children in August 2021, funded by the South Australian government. The Child and Adolescent virtual urgent care service (CAVUCS) offers children and young people aged 6 months to 17 years with non-life-threatening conditions access to virtual expert medical advice from qualified nurse and emergency doctors from their home. Partnered with SA Ambulance Service (SAAS), CAVUCS is available 9:30am – 8:30pm, 7 days a week to paediatric patients living withing the Adelaide Metropolitan area and SAAS clinicians (see Figure 2).

Eligible patients self-register online using a risk stratification questionnaire, automatically directing patients into green or amber virtual waiting rooms (depending on the severity and urgency of their condition) to be initially assessed by the emergency nurse. SAAS clinicians and time sensitive presenting conditions are directed to the amber virtual waiting room, with SAAS clinicians further transferred to be seen by an emergency physician. The nurse triage model is supported by *Odyssey* Software – a validated clinical decision assessment tool, ensuring consistency of healthcare advice.

Figure 2: CAVUCS patient journey



Victorian Virtual Emergency Department (VVED)

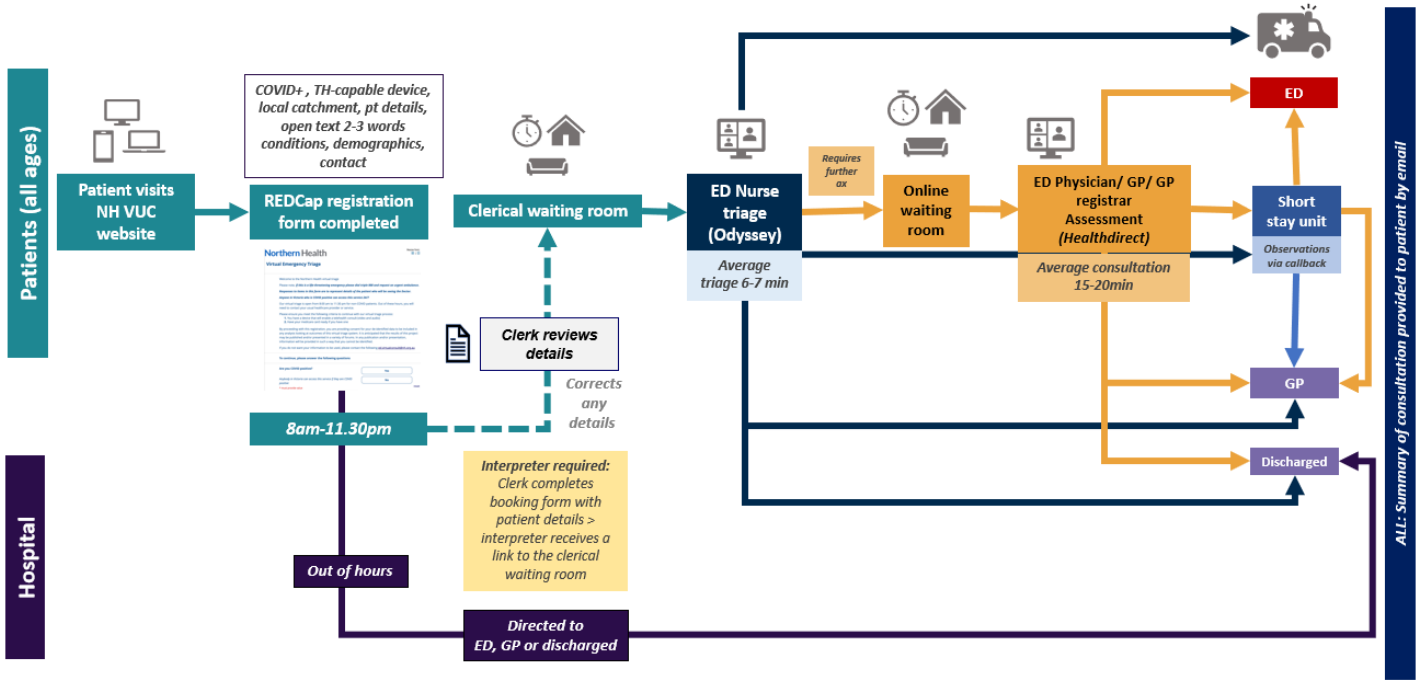
https://www.nh.org.au/virtual-emergency-department/

In 2020, in response to an increasing emergency department demand, the Northern Hospital established the first Victorian virtual emergency department (ED) model available to children and adults and GPs within the local Northern Health catchment area. This model pivoted to support the pandemic with addressing issues of physical distancing in ED waiting rooms and providing an alternative for patients with non-life-threatening emergencies. Staffed by Emergency Medicine Physicians, Paediatric Emergency Medicine Physicians (PEM), and trained General Practitioners (GP) / GP registrars, the Northern Health (NH) virtual service is available between 8am–11.30pm, 7 days a week to all patients, and 24 hours, 7 days a week to COVID-19 positive patients. While all doctors are skilled to manage all conditions, PEMs preferentially assess paediatric patients while GPs/registrars manage all other conditions, including COVID positive patients. The NH virtual service partnered with Ambulance Victoria (AV), allowing paramedics to connect virtually with an ED physician from the patient's location to receive emergency medical advice.

By April 2022, the NH service was funded by the Victorian Government Department of Health to expand state-wide in stages, becoming the Victorian Virtual Emergency Department (VVED). The expansion comes off the back of powerful results showing 80% of self-presenting patients discharged from a virtual appointment, and 85% of ambulance patients avoiding a trip to a physical ED. Currently, the service is available to designated metro and regional areas of Northern Health, except for ambulance clinicians and COVID-19 positive patients who can access the virtual service from anywhere in Victoria.

Self-presenting eligible patients complete a registration form online, available in 22 different languages, and are streamlined to a virtual appointment with a nurse triage (using Odyssey Software) via video telehealth (Healthdirect video call)- see figure 3. Patients requiring further assessment are transferred to the waiting room to be assessed by an ED physician or GP, with virtual consultations typically lasting 15-20 minutes. Patients that require hourly observations (e.g., head injury), are transferred to the virtual Short Stay Unit (SSU) to be monitored via phone call. Discharged patients are provided with an electronic summary of their consultation and next steps, including GP follow up if necessary.

Figure 3: Northern Health Virtual ED patient journey



Delivery of co-design sessions

Twenty-eight members participated in the co-design process: Project team (6), NWMPHN representatives (2), RCH representatives (6), Joan Kirner Hospital representatives (2), Werribee Mercy hospital representatives (4), Northern Health representatives (2), Community-based GPs (2), Community paediatrician (1), and Consumers/parents of children (3).

A total of three 2-hour co-design sessions were held on Microsoft Teams between February and May 2022, led by facilitators Dr Joanna Lawrence and Prof. Harriet Hiscock. Each of those sessions were voice recorded, used *Mentimeter* interactive polls and breakout rooms to facilitate discussion and feedback. Co-design session 3 was held in-person at the NWMPHN offices in Parkville, Victoria, with some members participating online. Following each session, the PowerPoint slide deck and feedback results were shared with the co-design members via email.

The shared ideas, risks, opportunities, and design themes identified by the co-design group are detailed below.

Note: Mentimeter interactive polls were anonymous therefore all quotes highlighted in this report are unidentified comments from co-design members.

Co-design 1 - Review

This session focused on reviewing existing virtual models and considerations in developing a sustainable paediatric virtual care service.

A thorough literature review of national and international existing virtual care services and project meetings was undertaken prior to this session.

Co-design 2 - Refine

This session focused on feedback of the proposed working model resulting from session 1, defining the scope of the model and follow-up care for children out of the service.

Co-design 3 Consolidate

During this session, consumer workshop feedback was presented and a proposed pilot model. Co-design participants considered the feasibility of the pilot model and evaluation outcomes.

Co-design 1

Session 1 of the co-design process (February 2022) focused on reviewing existing virtual care models - their similarities and differences (highlighted in Section 1), the aspects of the models most favoured (e.g using a nurse-led triage or a self-triage tool), and considerations for building a sustainable virtual urgent care model. One week prior to this session, background information (existing virtual models, aims and objectives of the project) was provided to co-design participants via email. Co-design participant attendance of session 2 is listed in Appendix A.

For detailed PowerPoint slide deck of session 1 content and group feedback, please see appendix B.

Key themes:

- Favoured aspects of existing models
    - Patient-centred focus: easy to use, able to receive care at home, accessible
    - Efficiency: avoid hospital presentations, supports AV staff to avoid hospital trips
    - Safety: nurse triage & pathway for ambulance services
    - Collaboration: working in mixed skill groups, upskilling primary care providers in paediatric ED cases

> *"I think it has capacity to build confidence in GP and consistency of care by keeping patients with their GPs"*

> *"I like the auto triage – need to make sure this is safe but will be more cost effective as you don't have a nurse triage"*

- Biggest opportunities for improvement
    - Scalability through automated triage tools
    - Centralised & integrated systems – state-wide, not site based
    - Capacity building – empowering & building confidence of GPs
    - Access to paediatric specialists to avoid unnecessary onwards referral

> *"Having a good assessment by a paediatric trained nurse virtually. Many ED nurses are generalists and struggle with paeds"*

> *"Virtual teams who work shorter hours and involvement of local GPs for lower cost and system integration"*

- Areas identified warranting further consideration
    - Barriers to families – digital literacy, non-English speaking patients
    - Consumer/family perspectives – patient review and feedback
    - GP perspectives– gauge GP interest in virtual urgent care
    - Integrating with existing health pathways: i.e., Mental Health
    - Health economics – costs of the model, cost per patient

> *"GP interest in being involved in a virtual urgent care service – what would make it attractive to GPs?"*

- Model considerations - entry into the model, triage service
    - Hybrid model – simple, multiple entry points – automated online self-triage and nurse-led triage (cater to non-English speaking)
    - Patient criteria – age limits, sub-safety clauses (e.g under 3 months must be seen in time), need for interpreters using video for non-English speaking families
    - Wait time transparency – real-time wait durations/queue number for patients
    - Disclaimer – life-threatening conditions are highlighted to visit physical ED
    - Do not replicate ED – model does not replicate ED but offer a virtual solution for non/semi-urgent cases

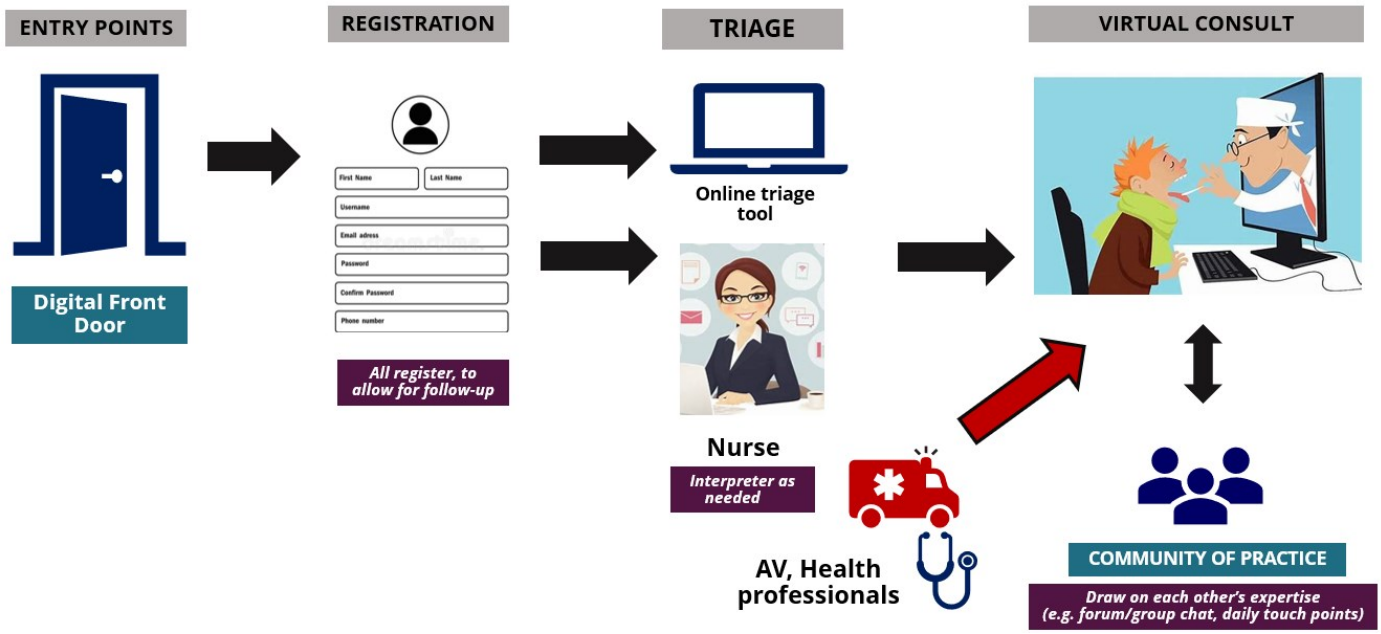
- Workforce required
    - Diverse workforce – Multidisciplinary workforce of GPs, paediatricians, PEMs, nurses, and mental health practitioners all working to peak scope of practice
    - Staffing – permanent working contracts to ensure consistency, on-site and remote
    - Training – develop online paediatric care training modules for GPs (and nurses), supported by paediatricians

Co-design 2 Overview

Session 2 of the co-design process (March 2022) focused on presenting the working model of a paediatric virtual urgent care service (Figure 4) based on the consensus from session 1; clarifying the scope of the model; and follow-up/pathways of care from the model. Co-design participant attendance of session 2 is listed in Appendix A.

For detailed PowerPoint slide deck of session 2 content and feedback, please see Appendix C.

Figure 4: Working model of a paediatric virtual care service



"Looks great. I was worried it would be overwhelmed by families who should be seeing their GP instead, but I think you have put in steps to help prevent this".

"Particularly like giving a wait time for nurse triage. Perhaps priority for nurse triage could be given to CALD families".

Key themes

Defining scope

- Any illness or condition that does not require immediate/life-threatening care
- Conditions such as: burns, first-aid, head injuries, infection, respiratory/asthma, hydration concerns
- Building the model from a consumer perspective
- Ensure families do not bypass seeing their GP- preventing families from overuse of this model in lieu of seeing their GP
- Using an online triage to assist families to determine what needs immediate care

Streamlining follow-up care

- Provide thorough discharge summary of virtual consultation for follow-up and include standard disclaimer of any worsening of condition to present to nearest ED
- Auto generated child health resources and factsheets that can be emailed/SMS to families
- Patient directed follow-up – patients to be responsible for follow-up with their regular GP – admin clerk could assist families if needed
- Directing mental health patients to the most appropriate service/hotline – build in mental health resource pool, including wait times to access the services if possible

Consumer perspective

Co-design members highlighted the importance of obtaining consumer perspectives and feedback of the working model and suggested the following themed questions to ask consumers:

- Health-seeking behaviours and factors that influence their healthcare decisions
- Using existing health services and resources
- First aid experience/training
- Experience of GP care
- Experience with virtual services/telehealth appointments

Consensus achieved

- The model should take a role in directing families towards the right care at the right time and right place in a sustainable, efficient, and scalable manner
- Triage model should be a combination of:
    - Automated online triage tool to allow scalability
    - Nurse-led triage for those with low digital literacy/ from culturally and linguistically diverse backgrounds (CALD)
- This service cannot cater for true life-threatening emergencies – these need to be directed away from the model, nor should it cater for primary care conditions.
- Transparency regarding wait times - patients should be seen in order of arrival with a clear expected wait time.
- Diverse workforce with permanent staffing preferred to allow a broader workforce to employ from, greater skill acquisition/ expertise development and allow practitioners to work to peak scope.

Patient self-management - accessible health information and existing services

Co-design participants raised that prior to seeing a clinician, families should have access to relevant health information for self-management and be made aware of existing services available that could be appropriate for their child's needs.

Having this information upfront, prior to using the virtual urgent care service, may divert a proportion of patients, to self-management or to utilise an alternative health service they may have not previously considered.

As such, the project team researched government-funded existing health services available for Victorian children. Importantly, these resources and services are free or bulk-billed, and address the wide variety of low acuity conditions that present to hospital EDs (Appendix D):

- Self-management health information – Kids Health Information (factsheets, videos, podcasts), RCH, Raising Children's Network (parenting website & app), KidSafe (road & car injuries, burns, falls, poisonings)
- Phone hotlines for immediate health professional advice – Nurse-On-Call (NoC), Healthdirect afterhours GP helpline, Victorian Poisons Information Centre, Breastfeeding helpline
- Healthdirect Australia (HDA) Symptom Checker
- Healthdirect Australia Service Finder
- Supercare Pharmacies – open 24/7, nurse onsite 6-10pm for wound care, rashes, hay fever, insect bites, minor burns, cuts, bruises)
- GP Respiratory clinics – state-wide, free, afterhours, in-person respiratory assessment and support
- Mental Health Services – Kids Helpline, CAREinMIND 24/7 counselling, HeadtoHealth, Orygen, Reach Out, CAMHS Child and Adolescent Mental Health Services, Psychiatric Triage, Suicide call back service & online chat, Headspace, Lifeline, Youth Beyond Blue, Black Dog Institute
- Afterhours GP clinics
- Afterhours GP telehealth or in-person visits – bulk-billed for Medicare or DVA card holders, 13SICK, DoctorDoctor, InstantConsult, DoctorAI

The project team proposed the above resources and services would be featured on the website entry point of the working virtual care model. This was incorporated into a patient journey map and presented to caregivers in a consumer workshop (see Consumer workshop).

Automated online triage tools

A key feature favoured by co-design participants in existing virtual care services, was the ability for patients and their caregivers to self-input their symptoms and receive health information and a recommendation on course of action, prior to being seen by a clinician. As such, the project team engaged with SickKids virtual urgent care services (SVUCS) and Healthdirect Australia (HDA) to further understand the symptom checkers.

With SVUCS, we sought to understand how they developed their symptom checker as a triage tool prior to entry into the virtual care service, their learnings and costs involved.

HDA has an existing online symptom checker, developed in collaboration with the UK National Health Service (NHS) and an Australian Clinical Panel including GPs and other medical specialists. As this is already an Australia-specific, government endorsed tool, we sought to understand how the symptom checker may be integrated with and used as an entry point for this virtual care service (see Healthdirect Australia Collaboration).

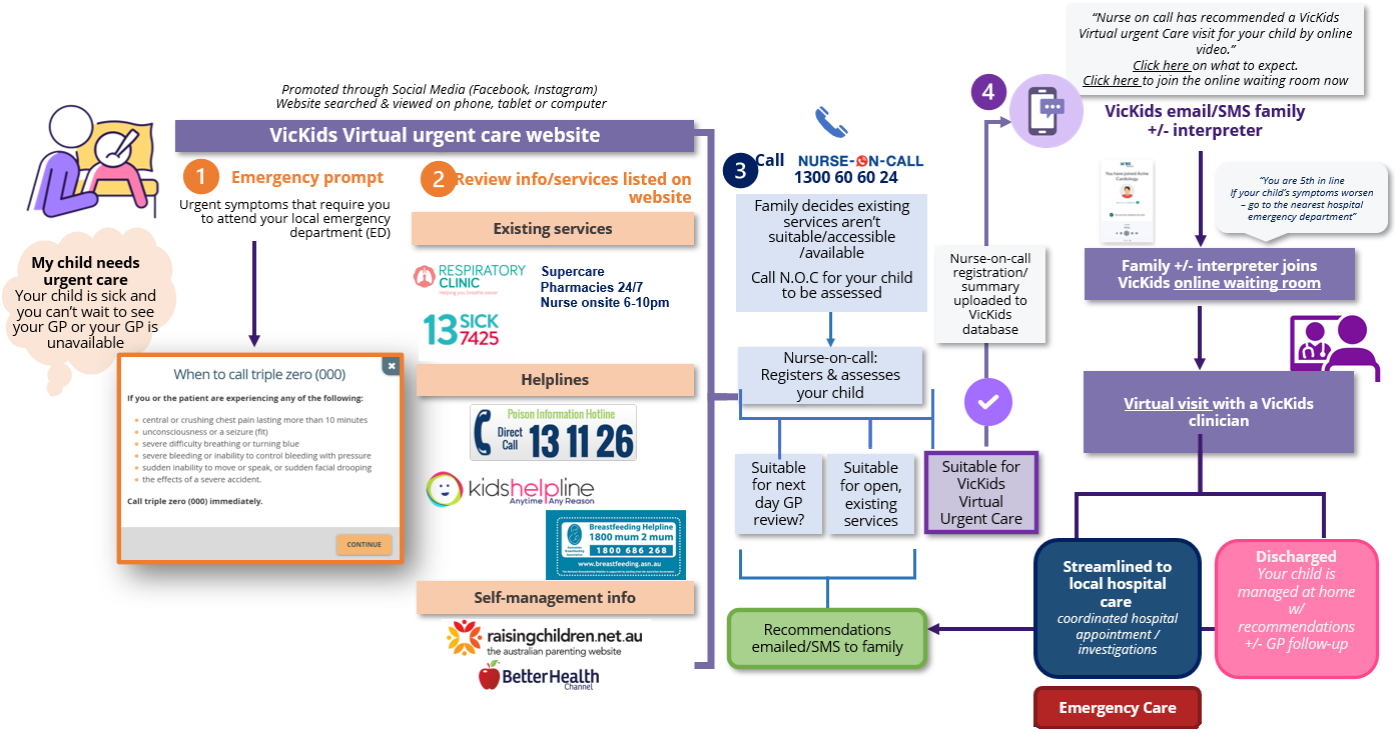
Consumer Workshop

In response to consumer-focused questions suggested in co-design session 2, a one-hour consumer workshop was held in April 2022 between the project team and 6 parents (1 father, 5 mothers) of children who have previously attended the emergency department (ED) at one or more of the partner hospitals (Royal Children's Hospital, Werribee Mercy, Western Health – Joan Kirner Hospital) within the past year. *For detailed PowerPoint slide deck of workshop content and group feedback, please see Appendix E.*

Parents were presented with a patient journey of the working model (Figure 5) and provided the following feedback and suggestions:

- A 'tell-once' policy: minimise the need for families to repeat their child's information and condition between NoC, registration (administration clerk) and virtual care service clinician(s)
- Provide progress 'live updates' on change in progress in the queue whilst in the waiting room e.g. 'You have moved up in the queue and are 4th in line to be seen by a doctor'. Minimise the number of steps required to reach a virtual consultation
- Ensure families have multiple entry point options e.g. entering through the website or calling NoC directly
- Be accessible for non-English speaking and diverse background families

Figure 5: Patient journey of working model



Consumer workshop findings:

Based on the consumer-focused questions recommended by the co-design group in session 2, the following information was provided by parents in the consumer workshop.

Table 1: consumer experience data collection

Experience of health care services	
Does your child have a **regular GP?** What is your **average wait time** to see a GP?'	○ Most have a regular GP ○ To make an appointment – 2 weeks (regular GP), 3-4 hours (any GP) ○ In clinic wait time 20-30 mins ○ Priority list e.g., asthma can be seen right away ○ 13SICK – home doctor waiting times: 2-4 hours
What do you know about **existing health services** for your child?	○ Nurse-On-Call ○ Maternal Child Health nurse
What **resources do you use** to help you decide where to go for care?	○ Google search ○ Facebook ○ RCH website
Choosing the right care	
Are you trained in **First aid?**	○ 2 out of 6 were trained in First aid
What would **make you go to Emergency Department (ED)** rather than a GP?	○ Parental instinct/ listening to 'inner voice'/ feeling worried and can't wait ○ Child sick after hours or family GP unavailable ○ Google to see if symptom can be serious ○ A face-to-face exam was required (during COVID, GP clinic was by telehealth only) *N.B Most parents struggled to know when it was appropriate to attend the ED and would rather be cautious*
What **information would you need** to help you choose the right place to receive care for your child?	○ Reviews of existing services ○ Parent testimonies
Virtual care experience	
Have you used a **virtual service/video appointment** before?	○ Parent 1 used a private online GP – unable to leave the house with the 3 children. Commented it was expensive, however received a great service with video call and received prescription via text ○ Most have never used a video appointment
What clinician do you **expect to see** for a virtual service for your child?	○ No preference – anyone that can help
Time of day – **what time** of day/evening do you feel support is most needed?	○ Afterhours when I can't see a GP ○ Day and night particularly for reassurance

Co-design 3

Session 3 of the co-design process focused on presenting the consumer workshop feedback and proposed pilot model based on the general consensus from previous sessions. The aim of this session was to consider the collaboration with Healthdirect (HDA) and how this proposed model could be embedded within the existing VVED service. The team also discussed the pilot model's eligibility, aims and objectives, and evaluation outcomes. One week prior to this session, co-design participants were provided the session agenda slides by email. Co-design participant attendance of session 2 is listed in Appendix A.

For detailed PowerPoint slide deck of session 3 content and feedback, please see Appendix F.

Key Themes

The co-design group favoured leveraging existing services like NoC to feed into the model to measure a true diversion from physical ED. The following considerations of the pilot model and potential impacts were highlighted:

Pilot model considerations

- Funding: Paying GPs and specialists hourly rates instead of Medicare billing
- Loss of workforce in physical ED/primary care settings
    - Contracts that include a combination of on-site and virtual care work
    - May benefit clinicians who are on maternity leave/working towards retirement
    - May create working balance between on-site and virtual care delivery

Evaluation considerations

- Randomised exactly where we want to make the change – at the point of NoC directing patients to physical ED
- Measure workforce impact - survey GPs working in the model for at least 6 months-
    - Change in usual practice
    - Change in FTE across virtual vs physical practice
    - Confidence/competence in managing paediatric conditions e.g injuries vs illnesses
- Measure patient healthcare use via data linkage

Supplementary stakeholder engagement and activities

The following describes the supplementary activities undertaken by the project team that has informed the co-design session content and discussions leading to the proposed pilot model.

On-site visit with Northern Health Victorian Virtual Emergency Department (VVED)

The project team scheduled an on-site visit of the Northern Hospital's VVED service, meeting with Dr Loren Sher (VVED Clinical Director and co-design participant). The visit included a walk-through of the back-end processes involved in virtual consultations with patients, including:

- Administrative clerk duties (receiving patient registrations, addressing missing data fields, use of electronic medical record (EMR), monitoring virtual waiting rooms, scheduling on-demand interpreting service)
- Nurse triage (viewing and collecting patients from the online waiting room, verifying patient identification, and demonstration of the Odyssey clinical decision software with mock paediatric cases)

Interpreting services research

A meeting with the Royal Children's Hospital (RCH) interpreting service team, led by Cate Harris, was scheduled to collate useful information regarding the interpreting service processes involved in paediatric appointments, and lessons learnt

The following considerations for use of interpreting services for families were highlighted by this meeting:

- Some families speak multiple languages – ensuring families are asked all languages that are spoken to avoid unnecessary waiting for less common languages e.g., family may speak both Syrian, AND Arabic. Waiting time for Arabic interpreter may be shorter as it is a more common language.
- Some families may prefer to use telephone over Video telehealth:
    - Technology limited (no PC/laptop, mobile phone only or older phone/non smart phone)
    - Low technical literacy
    - High mobile data consumption – some families have low internet data
- Interpreters may have a conflict of interest with the patient - more common in small communities (i.e., know family personally).
- Some languages have a low number of interpreters available in Victoria and may need to connect you with one interstate. (e.g., the Samoan community has less than 3 interpreters nation-wide).

- The Victorian government have a list of accredited interpreting service providers that hospitals can use, with standard fees.
- Auslan interpreting (Expressions Australia or Language Loop) – some families have preferred interpreters/providers due to established rapport/relationship & awareness of family history. Appointments can take up to 2 weeks to organise in advance.

The top 10 common languages using interpreting services at the RCH are:

RCH Top 10 languages
Arabic
Vietnamese
Mandarin
Assyrian
Dari
Somali
Turkish
Persian
Dinka
Oromo

Hospital Executive meeting

The project team met with partner organisations (RCH, Western Health- Joan Kirner, and Werribee Mercy, and Northern Health) in May 2022 following the Victoria Government's decision to fund the state-wide expansion of the Northern Health (NH) virtual ED service. VVED Clinical director and co-design participant, Dr Loren Sher, presented how the NH virtual ED service will be delivered state-wide, becoming the Victoria Virtual Emergency Department (VVED). As a result of this expansion, the project team and hospital partners discussed the value in continuing to build a standalone paediatric virtual urgent care at each of the three partner hospitals.

The following limitations were highlighted:

- Separate services can cause confusion to consumers
- Limited staffing of ED physicians per hospital
- IT systems would take substantial time to be implemented
- Decentralised model – can lead to less collaboration between hospitals

As a result of the above limitations, and with the support of the clinical director of the VVED model,

the team decided to instead shift the aim of the co-design to improve the *paediatric* arm of the VVED mode. Thus, our question became: *How can we develop a robust evaluation of the VVED and avoid scope creep?* – a risk highlighted by our co-design participants during the sessions.

Healthdirect Australia Collaboration

Healthdirect Australia (HDA) is a federally funded national public health information service providing access to health advice for Australians. HDA offers health (conditions, symptoms, procedures, life stages) and medicine information and the following services:

- Healthdirect online symptom checker
    - https://www.healthdirect.gov.au/symptom-checker/tool/basic-details
- Healthdirect hotline – known as Nurse-On-Call (NoC) in Victoria
  https://www.health.gov.au/contacts/healthdirect-hotline
- Afterhours GP helpline
    - https://www.healthdirect.gov.au/after-hours-gp-helpline
- Healthdirect service finder (National Health Services Directory)
    - https://www.healthdirect.gov.au/australian-health-services

The aim of the initial meeting with HDA was to share the work we were undertaking to design a paediatric virtual urgent care service and understand opportunities on how the symptom checker may be integrated with and used as a triage tool within it. In this discussion, HDA shared they were in the process of procuring a new clinical decision support system that will be used by the registered nurses helping patients through NoC and the symptom checker. The HDA team discussed they are seeking to help manage demands on the health system by identifying and collaborating with more services that NoC can recommend to callers, including this virtual care service. Work is underway to develop the new contact centre and technical platform, to be completed by late 2022.

Since then, the project team met with the HDA Portfolio Service Director and team to discuss options for paediatric callers that are usually recommended to go to the ED, that could feed into current state-wide VVED model, in a trial. In Victoria, NoC takes 11,000 calls from caregivers of children aged 0-18 years, with 76% between the hours of 3-11pm. Importantly, 27% of these children are directed to attend their local hospital's ED.

Key recommendations

1. Pilot study

The co-design group proposes to value-add to existing paediatric arm of the state-wide Victorian Virtual Emergency Department (VVED) with a robust evaluation and primary care focus. Leveraging from the existing service of Nurse-On-Call (NoC), we propose a pilot study that diverts paediatric patients who are directed to attend a physical emergency department (ED) to be streamlined to the VVED service. As such, we propose to conduct a randomised-controlled trial (RCT) of NoC paediatric patients (0-18 years) who are directed to attend a physical ED to be randomly allocated to receive one of two outcomes: (1) directed to attend a physical ED, or (2) directed to the existing VVED service to be seen virtually.

2. GP workforce capacity building

The Paediatric VVED was seen as an opportunity to service low acuity patients with primary care whilst building GP capacity in paediatric expertise. Further work is required to understand the best workforce design to meet the needs of participating GPs, and to understand the impact of the virtual service on workforce depletion elsewhere.

Conduct a GP workshop

- Engaging with a broad group of GPs will inform the design of a workforce plan that will meet the needs of GP colleagues and best enable capacity building. Topics to be discussed will include staffing logistics (rotations from engaged practices versus ongoing contracts) and core education requirements/topics and how best to deliver them (e.g., Community of Practice, Project ECHO, asynchronous learning etc).

Survey existing VVED staff to understand impact of workforce depletion elsewhere

- Impact on GP workforce could be measured by surveying existing VVED employees to measure change in full time equivalent (FTE) staffing needs, change in usual practice, and confidence in managing paediatric patients.

3. Online self-triage tool

The role for a scalable tool to enable self-triage into the right care setting at the right time is recognised as a core component that will enable sustainability of the model moving forward. Our exploratory work with Healthdirect suggests that collaborating and leveraging their clinical decision support and online tool is the most cost-effective option. Healthdirect have engaged a new clinical decision support system that will be incorporated into nursing phone algorithms by November 2022,

and later developed into an online triage tool. We will continue to collaborate with Healthdirect to ensure their tool is paediatric appropriate and directs patients into the VVED when appropriate.

Proposed pilot study evaluation plan

Background

Nurse-On-Call (NoC) are a government funded service offering Victorians free health advice, over the phone, 24 hours, 7 days a week. While an audit in 2008 found NoC to be a safe and effective with high patient satisfaction[4], we could find no recent evaluations of the NoC model. The 2008 audit found that only 68% of callers (children and adults) followed NoC health advice (e.g. attend physical ED, attend GP within 1-3 days). Current data suggest 11,000 Victorian paediatric patients (0-18 years) access the service monthly, with 27% directed to a physical emergency department (ED). This contrasts to Victorian Virtual Emergency Department (VVED) data where 80% of paediatric patients are managed at home and 20% referred to hospital services.

If we could provide more virtual assessment and medical advice prior to referring to an ED, there is a significant opportunity to prevent physical presentations to hospital, whilst ensuring children receive the care they require.

This RCT will examine the impact of the VVED as an interim step between NoC recommending presentation at a physical ED and the patient presenting. We expect that there will be a significant decrease in the number of children required to attend physical EDs.

Aims

We aim to measure:

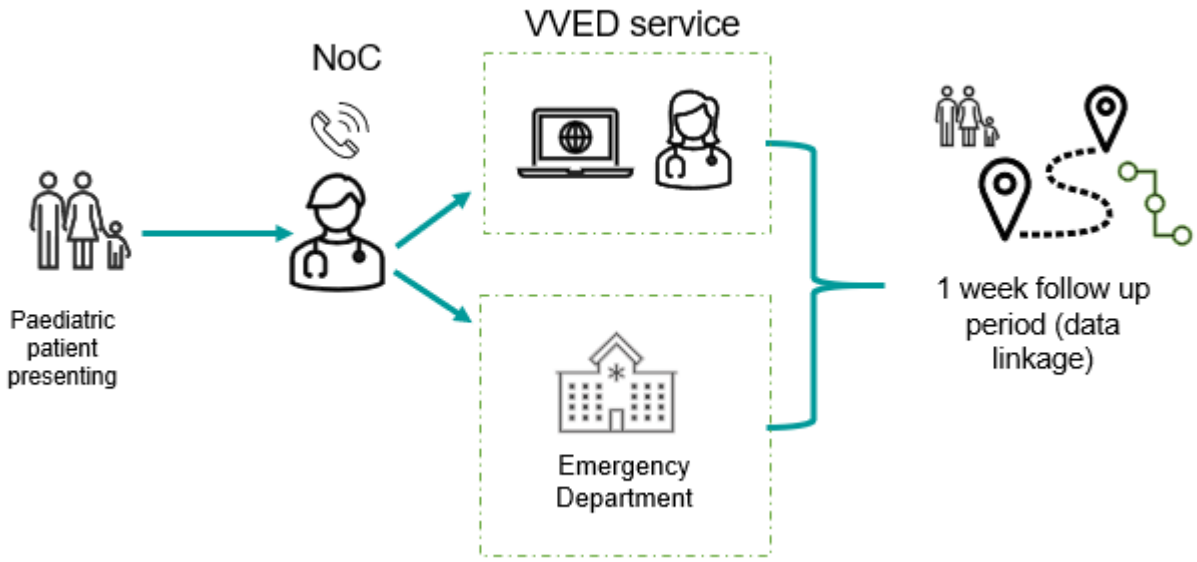
- Impact of the VVED on the proportion of children presenting to a physical ED
- Impact on physical ED presentation numbers over time
- Patient healthcare journeys (hospital EDs or admissions, GP care etc) in the 7 days post contacting NoC.

Methods:

Paediatric patients who contact NoC and are directed to attend an ED will be randomised to either being recommended to attend a physical ED or the VVED (see Figure 6). Identifying variables (child name, date of birth) will be provided to data custodians who will link the child to the Medicare Benefits

Schedule (MBS) and to the Victorian Emergency Minimum Dataset (VEMD) and the Victorian Admitted Episodes Dataset (VAED) and return deidentified data to the research team.

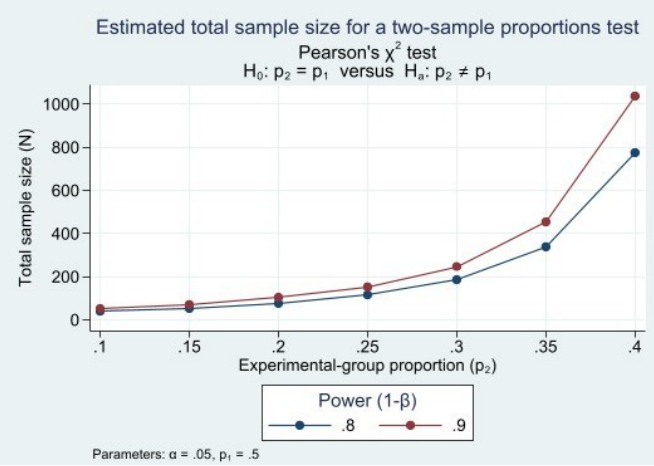
Figure 6: proposed pilot study overview



Study duration: The Clinical Epidemiology and Biostatistics Unit (CEBU), at Murdoch Children's Research Institute, has conducted a sample size calculation to inform the duration of the pilot study (see Figure 7). difference. In order to detect a minimum 10% reduction in physical ED utilisation with the VVED model, an estimated sample size of 1038 paediatric patients (519 in each group) is required for the RCT. This equates to a minimum volume of 3,844 callers to NoC, based on the referral rate of 27% to ED. This volume of patients can easily be achieved based on the average rate of 11,000 paediatric (0-18 years) callers to NoC per month in Victoria.

If we restrict the pilot study to paediatric patients of the NWMPHN catchment area, the sample size can be achieved within two months.

Figure 7: proposed pilot study sample size



Ethics considerations: A meeting with the Royal Children's Hospital (RCH) Ethics team was held to discuss consent requirements of the pilot study, acknowledging that this may be a major limitation of the study design if individual consent is required. Whilst NoC have an appetite to collaborate, their service demand does not allow time for individual consent to be obtained. A Waiver of Consent would likely be appropriate for participation in the RCT given that VVED is now an acceptable care delivery model available to consumers, and the volume of paediatric patients (100 per day) makes individual consent impractical. A Waiver of Consent was also considered likely appropriate for data linkage, with the NoC team providing data directly to CVDL (for VAED and VEMD data linkage) and the Australian Institute of Health and Welfare (for MBS data linkage) and deidentified linked data being returned to the research team. Given this protects the privacy of participants, a waiver would be appropriate. However, this is advice only at this stage and the proposal will need to be considered in full by the RCH Human Ethics Committee.

Resources required: Clinical staffing for this RCT will be provided by the VVED service. GPs wanting experience in paediatrics will be specifically recruited as will paediatricians and paediatric emergency physicians. Additional staffing to conduct the research include a research assistant (0.4 FTE for 6 months), a data analyst (0.4 FTE for 4 months) and funding for the data custodians to perform the data linkage. Health economics assistance will be offered in-kind.

Health Economics Plan

Objectives

To inform a cost-consequence analysis, the economic evaluation intends to capture the following:

- Direct health care costs of the virtual urgent care pilot study as Fig. 8
- Consequences of healthcare management (1-week time horizon) as Fig. 8

By undertaking a cost consequence analysis, the objective is to inform the financial viability of the virtual urgent care model both in Victoria, and potentially, its scalability for a national program.

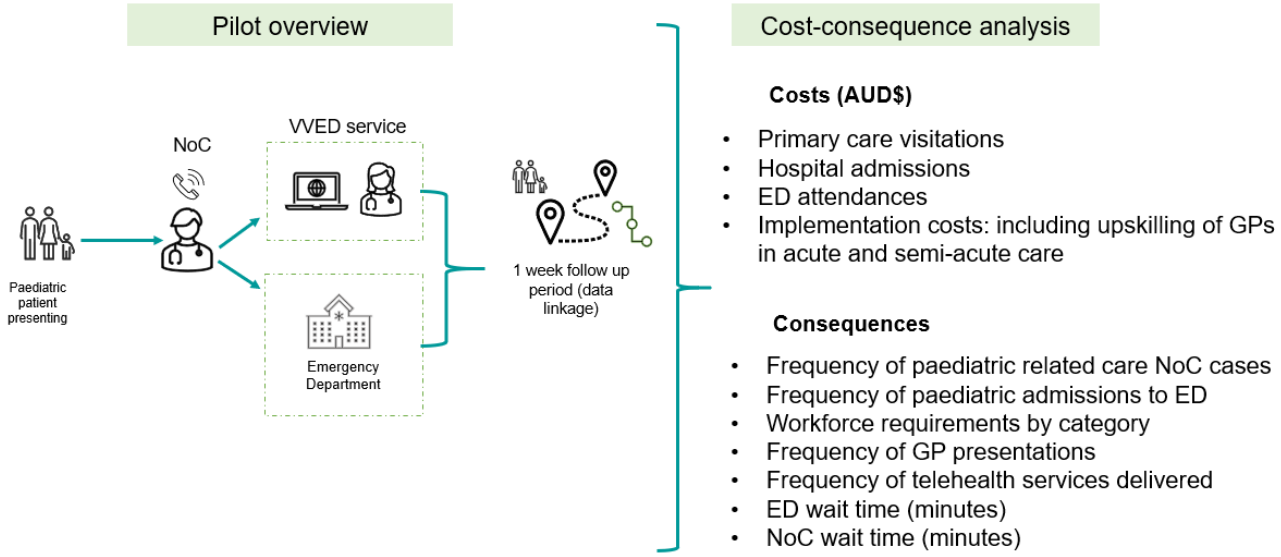
Hypotheses

1. Introduction of a virtual urgent care pilot study will reduce paediatric (physical) emergency department referral by Nurse-On-Call (NoC). This is expected to reflect improved allocative efficiency- aligning the right type of health care to paediatric patients in a timely manner.
2. In terms of costs, due to an expected reduction in NoC referrals to emergency departments, the government spending emergency care diagnosis group reimbursement to emergency departments) will reduce.

Trial population

Paediatric population within the state of Victoria catchment zone (identified through their post code), presenting to NoC, aged between 0-18 years during the trial period.

Figure 8 Pilot schematic



Intervention and comparators

The pilot will follow the path of paediatric patients who are eligible to be directed to a physical ED based on NoC clinical algorithm: patients will be randomised and directed to either a physical ED (control group) or the virtual ED (intervention).

Using linked data from the Centre for Victorian Data Linkage (CVDL) which captures presentations to Victorian emergency departments and hospital admissions together with Medicare data from the Australian Institute for Health and Welfare which captures data from the MBS (e.g. GP visits), costs and consequence data related directly with medical care will be collected. Unit prices will be determined for health care resources/attendances and multiplied by frequency at a patient level.

Trial design

Randomised Controlled Trial (RCT) study design, following the paediatric patient journey from their initial contact with Nurse-on-Call for clinical care and follow up for a 7-day period (to assess acute care healthcare use). In parallel with implementing the trial, health economic data will be collected in terms of the cost associated with upskilling GPs in acute and semi-acute paediatric care.

Trial start and end date

It is anticipated the trial will start when ethics approval has been obtained and funding secured. Paediatric patients would be recruited and randomised over 1-2 months. Data linkage can take longer, and timelines are dependent on data custodians. Once linked data are received by the research team, data analysis, interpretation and reporting would take 4-6 months.

Statistical software use for Health Economics analysis

Analyses will be completed in R version 4.1.2.

Costs of this co-design project

Expenditure report

The expenditure report contains *Table 2* Co-designing a virtual urgent paediatric care model as funded by NWMPHN. Costs displayed with (-) signify costs that came in under the estimated budget as outlined in the business cases to NWMPHN.

Table 2: Co-designing a virtual urgent paediatric care – NWMPHN fund

	Estimated budget	Actual costs	Variation	Comment
Salaries and on-costs	*$65,688*	*$65,688*	$0	
Research Coordinator (RCH, 0.6 FTE)	$41,355	$41,355	$0	
Data Analyst (RCH, 0.3 FTE)	$17,723	$17,724	$0	
Paediatrician consultant (RCH, 0.1 FTE)	$6,610	$6,610	$0	
Health Economist (RCH, 0.2 FTE)	$0	$0	$0	*$13,219 in-kind by Health Services and Economics group, MCRI*
Co-design attendance	*$8,839*	*$5,150*	*-$3,689*	
2 GPs – 4 co-design sessions	$2,320	$1,740	-$580	*3 co-design sessions, surplus funds from 4th co-design session*
2 General Paediatricians – 4 co-design sessions	$2390	$897	-$1,493	*1 paediatrician attended and surplus funds from 4th co-design session*
2 Allied Health/Mental Health practitioners	$779	$0	-$779	*No mental health practitioner attendees*
2 ED Paediatricians/Staff- 4 co-design sessions	$2390	$1793	-$597	*3 co-design session held therefore, surplus funds from 4th co-design session*
Hospital Executives/Head of Paediatrics – 4 co-design sessions	$0	$0	0	*In-kind*
2 Consumers- 4 co-design sessions	$960	$720	-$240	
Administrative	*$1,200*	*$225*	*-$975*	
Room hire	$0	$0	$0	*Room hire, in-kind from NWMPHN*
Catering	$1,200	$225	-$975	*Catering funds used only for session 3. Co-design session 1 and 2 were held online*
Other expenses		$300	+$300	
Consumer workshop 5 consumers attended 1-hour online workshop	$0	$300	+$300	*Surplus funds used to conduct an additional consumer workshop*
TOTAL	**$75,728**	**$71,364**	**-$4,364**	

References

1. https://www.abs.gov.au/statistics/people/population/births-australia/latest-release
2. Hiscock H, Neely RJ, Lei S, Freed G. Paediatric mental and physical health presentations to emergency departments, Victoria, 2008-15. MJA 2018;208(8):343-8.
3. Rosenfield, D., Lim, R., & Tse, S. (2021). Implementing virtual care in the emergency department: building on the paediatric experience during COVID-19. CJEM, 23(1), 15–18. https://doi.org/10.1007/s43678-020-00026-2
4. https://www.parliament.vic.gov.au/papers/govpub/VPARL2006-10No367.pdf

Appendices

Appendix A: Co-design attendance list

Appendix B: Co-design session 1

Appendix C: Co-design session 2

Appendix D: Victorian health information and services for children

Appendix E: Consumer workshop

Appendix F: Co-design session 3