BMJ Open

Providing Enhanced Access to Child Health Services (PEACH) at Sydney Children's Hospital Network: a study protocol

Karen Zwi,[1,2] Safa Majidi,[1] Jahidur Rahman Khan ,[2] Anna van Beek,[1] Anna Kearns,[1] Rezwanul Rana,[3] Ashlie Nobilo,[2] Barb Vernon,[4] Michael Hodgins ,[2] Seaneen Wallace,[5] Nan Hu,[2] Raghu Lingam[2]

To cite: Zwi K, Majidi S, Khan JR, *et al*. Providing Enhanced Access to Child Health Services (PEACH) at Sydney Children's Hospital Network: a study protocol. *BMJ Open* 2025;**15**:e086107. doi:10.1136/bmjopen-2024-086107

► Prepublication history for this paper is available online. To view these files, please visit the journal online (https://doi.org/10.1136/bmjopen-2024-086107).

Received 06 March 2024
Accepted 28 February 2025

[1]Sydney Children's Hospitals Network Randwick, Randwick, New South Wales, Australia
[2]School of Clinical Medicine, University of New South Wales, Sydney, New South Wales, Australia
[3]Macquarie University, Sydney, New South Wales, Australia
[4]Women's & Children's Healthcare Australasia, Braddon, Australian Capital Territory, Australia
[5]Diversity Health, Sydney Children's Hospitals Network, Randwick, New South Wales, Australia

Correspondence to
Dr Karen Zwi;
karen.zwi@health.nsw.gov.au

ABSTRACT

Introduction Children and young people (CYP) from priority populations in Australia have inequities in accessing healthcare, health outcomes and opportunities to lead healthy lives. Priority populations include CYP who are Aboriginal and/or Torres Strait Islander, culturally and linguistically diverse (born in a country where English is not an official language and/or speak a language other than English at home), with experience of being a refugee or asylum seeker, living in out-of-home care or with a disability. Providing Enhanced Access to Child Health Services (PEACH) is an organisation-wide quality improvement project that aims to achieve equivalent health outcomes in CYP from priority populations compared with their non-priority population peers.

Methods and analysis PEACH creates an equity-focused learning health system using electronic medical record (eMR) patient data and qualitative methodology exploring staff and service user experiences. Five priority population advisory groups, consisting of staff and priority population service users, guide the research at the Sydney Children's Hospitals Network (SCHN), Australia's largest tertiary paediatric health service. Interviews, surveys and co-design workshops with service users (CYP and/or their parent/carer) and staff describe existing health inequities and inform the design and implementation of interventions to improve identification, provision of earlier and supported access to services and effect cultural change. The impact of PEACH on reducing inequity in care and outcomes will be measured by comparing data during and after implementation (2020–2027) with baseline data before implementation (2015–2019) and with national controls, controlling for potential confounding factors. Health access and outcome measures, including emergency and preventable hospitalisations, critical care admission, discharge against medical advice, readmission and extended length of stay, will be analysed and drawn into dashboards, driving continuous learning and improvement.

Ethics and dissemination The SCHN Human Research Ethics Committee (2022/ETH00145) and Aboriginal Health and Medical Research Council (1920/22) have granted ethics approval. Research findings will be shared with service users, staff advisory groups and the wider children's healthcare sector through presentations, conferences and peer-reviewed journals.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ Identification of priority populations may be incomplete and therefore the inequity gap may be reduced (as some priority populations will be in the non-priority group).
- ⇒ Identification of priority populations is likely to improve over the course of this equity work, and thus trends over time may be imprecise.
- ⇒ The study site is a large paediatric tertiary network, and thus service use data may not be generalisable to other settings.

BACKGROUND

Health inequities in childhood have lifelong impacts and present a profound challenge to optimal health and development.[1] Defined as differences between social groups 'which are unnecessary, avoidable, unfair and unjust,'[2] inequity is not inevitable.[3] Health inequity is a consequence of people's daily opportunities to lead healthy lives, shaped by the inequitable distribution of power, income and resources; it results in reduced life expectancy, suboptimal health and well-being and poorer quality of life.[1 4 5] The search for strategies to reduce inequity in child health should be a priority, and studying the implementation of interventions to address inequity is imperative to promote future health and functioning.

The literature on inequity provides limited guidance on effective systematic interventions. Nonetheless, there is an emerging evidence base of successful approaches, including authentic engagement of community and other stakeholders in service design and delivery, taking a proactive and focused approach to promoting disparity reduction and developing a culturally competent workforce that enhances trust and engagement.[4]

Improving geographic access to health interventions, especially rural primary care services and subsidising healthcare to ensure universal coverage is considered critical in promoting health, managing chronic diseases, reducing inappropriate hospital presentations and shifting care from crisis-oriented to continuous care.[4 6 7] Of prime importance is monitoring inequities and the development of accountability at organisational, national and international levels towards inequity reduction.[7–9] For Aboriginal and/or Torres Strait Islander (hereafter referred to as Indigenous) populations, community-controlled and managed services, community outreach, Indigenous health staff employment and trauma-informed services play an important role in improving health outcomes.[6 10 11]

Sydney Children's Hospitals Network (SCHN), Australia's largest child and adolescent tertiary health service, provides care to medically and psychosocially complex paediatric populations, including children and young people (CYP) who are Indigenous, culturally and linguistically diverse (CALD), asylum seekers or refugees, in out-of-home care (OOHC) and living with disability—populations which frequently overlap. Classified as 'priority populations,' these CYP experience significant barriers to accessing healthcare and have suboptimal health outcomes.[12–14] Their health disparities have been documented locally and internationally.[15]

Indigenous CYP have higher emergency presentation, admission, potentially preventable hospitalisation, discharge against medical advice (DAMA), in-hospital mortality rates and longer lengths of stay than their non-Indigenous peers.[16–20] Ongoing systemic racism, barriers to accessing primary and tertiary care and culturally inadequate service provision are all contributing factors to health inequities for Indigenous Australians.[21] Internationally, a meta-analysis of high-income settings showed CYP reported as Black or African American were more likely to use Emergency Department (ED), Indigenous CYP were more likely to leave before completion of care and non-English-speaking CYP had longer lengths of stay and more frequent hospital admissions.[15] ED utilisation was predicted by public insurance, low income, neighbourhood disadvantage and ED proximity, presenting an opportunity to address these driving factors.[15]

While CYP from CALD backgrounds are at greater risk of DAMA, chronic diseases and other health outcomes compared with their non-CALD peers, their patterns of access to services and health outcomes are more heterogeneous.[22 23] It is expected that some CALD populations, such as skilled migrants, have similar outcomes to their

Table 1 Summary of PEACH aims

Aims	Objectives
Collect baseline data and analysis	Collect baseline data on inequity in access and health outcomes for included priority populations. ► Obtain and review available data to establish baseline data for measures related to access and health outcomes for CYP from priority populations. ► Analyse and compare data between and among priority and non-priority populations to identify inequity in access and health outcomes for CYP from priority populations.
Explore and co-design access initiatives	Work with CYP, their carers and SCHN staff to: ► Explore the patient and/or carer experience of accessing SCHN services. ► Explore SCHN staff experience of providing health services to CYP priority populations. Co-design with CYP and their parents/carers, together with SCHN staff and key stakeholders, the opportunities to improve: ► Identification of CYP from priority populations at the time of referral to SCHN services. ► Display of CYP identified as priority populations within the eMR. ► Provision of prioritised access to SCHN services for CYP from priority populations. ► Provision of supported access to SCHN services for CYP from priority populations. Use PDSA cycles to plan, implement, analyse and measure the impact of PEACH quality improvement initiatives
Evaluate compared with baseline and control data	Evaluate compared with baseline data after PEACH implementation. Re-analysis of data on inequity in access and health outcomes for priority populations to assess the impact of PEACH as compared with the baseline and control CHA data.
Sustainability and scalability	To understand the barriers and facilitators to implementation and cultural change associated with PEACH, and the acceptability, appropriateness, fidelity, coverage and sustainability of PEACH.
Cost-effectiveness	Evaluate the cost-effectiveness of PEACH by investigating variations in SCHN costs between priority and non-priority populations, estimating the cost of health inequity at SCHN and the potential cost savings in reducing inequity.

CHA, Children's Healthcare Australasia; CYP, children and young people; eMR, electronic medical record; PDSA, Plan Do Study Act; PEACH, Providing Enhanced Access to Child Health Services; SCHN, Sydney Children's Hospitals Network.

resident populations, whereas those seeking asylum or refugee status are more likely to experience difficulties accessing healthcare, inequitable health outcomes and suboptimal care continuity.[24 25] Specifically, CYP from refugee backgrounds experience elevated non-communicable diseases, neurodevelopmental conditions, ED presentation and hospital admission rates and suboptimal access to screening.[26–28]

CYP with disabilities are more likely to have comorbid health needs and use more healthcare than their peers.[29–31] CYP with intellectual disability are more likely to present to ED, be hospitalised, readmitted and stay longer than those without.[9 32 33] ED presentations involving CYP with physical disabilities (eg, cerebral palsy) have a greater proportion triaged as urgent, arriving by ambulance and necessitating hospital admission.[34 35]

Three per cent of Australian CYP live in OOHC with child protection services. Despite experiencing poorer physical, developmental and emotional health outcomes compared with their peers,[36 37] they are less likely to receive regular health screening.[38 39] Systemic issues impede access for children in OOHC, including carer-reported difficulties navigating a complex health system, long waiting lists and lack of prioritisation.[40–42] Furthermore, the under-identification of OOHC CYP in healthcare data systems limits the ability to develop targeted solutions to reduce inequity. Given the over-representation of Indigenous CYP in OOHC services in Australia, cumulative effects of adverse health outcomes are likely.[43]

Despite these notable disparities in health outcomes between CYP from priority and non-priority population groups, limited system-wide health interventions are in operation to address this. The Providing Enhanced Access to Child Health Services (PEACH) initiative is an organisation-wide, innovative quality improvement project that involves identifying service users from the above five priority populations and establishing earlier, supported and integrated access to services while fostering equity-focused cultural change within the organisation. Key components include co-design at every research stage by priority population service users and advisory groups. Potential interventions include altering the routine electronic medical record (eMR) to capture and 'flag' priority population status with real-time electronic equity dashboards to measure progress; reorientating service delivery towards prioritisation and enhanced access interventions, including automated linkage of patients with relevant support workers (such as Aboriginal health or disability workers); a range of department-level quality improvement projects to address inequity and staff development and engaging and training key clinical champions up to the most senior decision-making level within SCHN to embed organisational commitment.

The study aims to design, deliver and evaluate the effectiveness of PEACH interventions. This includes an impact, implementation and cost-effectiveness evaluation, as well as measuring the extent to which PEACH has changed culture within SCHN. The long-term aim is to develop a health equity implementation and measurement framework that is sustainable and scalable to other health settings, resulting in equitable health outcomes in CYP from priority populations compared with their non-priority population peers.

The study aims to (table 1):

1. Quantify the extent of inequity in CYP from the selected priority populations compared with their non-priority peers across a suite of access and outcome measures at baseline, the time period before PEACH commenced (2015–2019).
2. Co-design and assess implementation, with priority population service users, advisory groups and staff clinical champions, of interventions that address healthcare access and inequity (qualitative methodology).
3. Evaluate the impact of the co-designed PEACH interventions compared with standard care. This includes quantitative measurement of inequity over the period PEACH is implemented (2020–2027) as compared

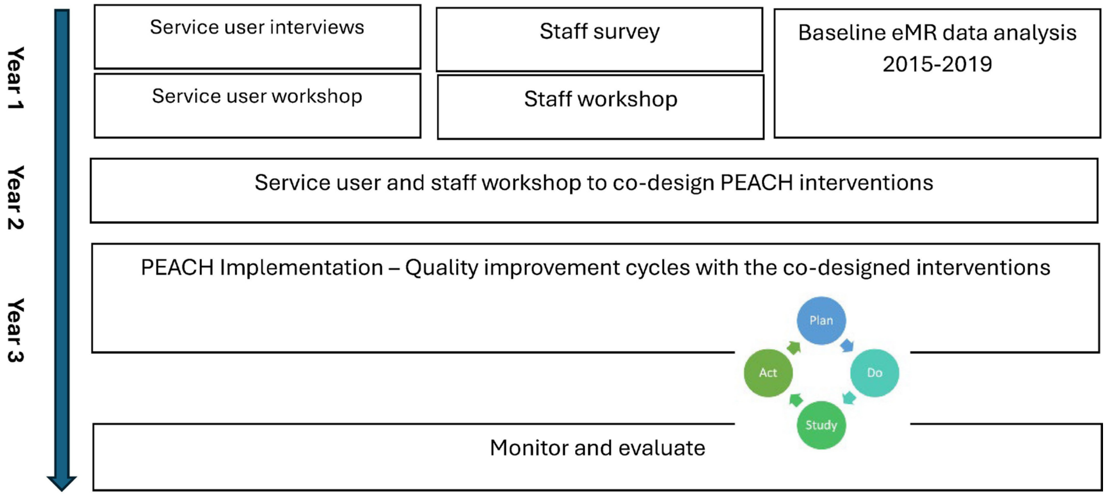

Figure 1 A schematic timeline of the study. eMR, electronic medical record; PEACH, Providing Enhanced Access to Child Health Services.

with the baseline historical controls, as well as comparison with national controls.

4. Explore potential sustainability and scaling up of PEACH to other settings, including rural and urban.
5. Evaluate the cost-effectiveness of PEACH by investigating variations in SCHN costs between priority and non-priority populations.

METHODS AND ANALYSIS

This project uses a comprehensive mixed-methods approach, involving analysing eMR to assess the impact on access and equity measures (quantitative methods), and conducting surveys, semistructured interviews, co-design workshops and ethnography to gain an understanding of the barriers and facilitators of PEACH implementation (qualitative methods). A schematic timeline is presented in figure 1.

Study population

Parents, carers and CYP under the age of 18 years who use SCHN services are eligible for this study. CYP are classified as a priority population within the eMR as follows: (1) Indigenous, if they self-identified as being of Aboriginal and/or Torres Strait Islander origin; (2) CALD, if born in a country where English is not an official language or preferred language was 'non-English'; (3) living in OOHC, foster care or 'looked after' children; (4) CYP with experience of being a refugee or asylum seeker identified through attendance at dedicated refugee clinics and (5) living with a disability defined by approval for Australia's National Disability Insurance Scheme (NDIS). The NDIS, introduced in Australia in July 2016, offers financial support to eligible individuals with 'significant and permanent' disabilities or those requiring early intervention to purchase the supports identified in their individualised plan; not all CYP with disabilities are included in the NDIS.[44,45] A logic model outlining the structure and intended outcomes of the PEACH programme is presented in figure 2.

Quantitative data and analysis

This study uses de-identified, routinely collected administrative data (ie, eMR) of ED attendances and in-patient admissions by CYP at SCHN. It assesses inequity in health access and outcomes between priority and non-priority CYP and compares them before and after PEACH implementation. The study also compares outcomes for patients from priority populations in the PEACH cohort

Program aim: To improve the health access and health outcomes of children and young people from priority populations at SCHN				
Inputs	**Activities**	**Outputs**	**Short term outcomes***	**Long-term outcomes***
Workforce: • PEACH project staff • Clinical Champions • Advisory groups Funding: • Research funding • In kind implementation support from SCHN Resources: • Workshop resources • Consumer engagement vouchers • Dashboard and IT development support Evidence: • Literature review of best practice clinical care for each priority population	To quantify the extent of inequity: • Baseline analysis of SCHN eMR data 2015-2019 • Equity Dashboard development • Comparison data analysis with hospital and national controls (2020-2027) • Economic analysis To understand the experience of inequity: • Priority population service user interviews • Co-design workshops: priority population service user workshop for each population group; then staff workshops and finally combined (staff and service user) workshop for each priority population group • SCHN staff survey Addressing identification: • Altering referral processes to increase identification of priority populations Addressing enhanced access: • Prioritisation on long waitlists • Linkage with support workers (e.g. Aboriginal, Disability, OOHC workers) Addressing culture change and sustainability: • Creation and functioning of Clinical Champions and Advisory groups • Activities to identify barriers and facilitators	• Quantification of the extent of inequity • Understanding of the priority population experience • Documentation of current processes relating to prioritisation and enhanced care at SCHN • Areas for each priority population that need to be addressed (challenges, adverse experiences) from the service user perspective • Areas from the SCHN staff perspective for each priority population • Co-designed interventions (at least 3 for each priority population and 15 in total)- these become the **PEACH implementation initiatives** • Understanding of culture change and sustainability factors	Increased staff awareness of health equity Creation of priority populations alert tile and Equity Dashboard in eMR Improved identification at SCHN Reduction of waiting times on waitlist Improved linkage with support workers Documented evidence for acceptability, appropriateness, fidelity, coverage and sustainability of PEACH	A reduction in identified PEACH equity measures: • Incomplete ED attendance • Did Not Stay/Did Not Attend/Left at Own Risk • Extended length of stay in ED • High priority triage category • Admission to critical care ward • Admission to ward • Potentially preventable hospitalisations • Chronic condition admissions • Extended length of stay • Discharge against medical advice • Unplanned hospital readmission • In-hospital mortality** Knowledge advancement: Evidence in reducing inequity and equity-related hospital Clinical improvement: Improve patient outcomes and care experiences Community benefits: A more equitable society improves mental and physical health as well as quality of life Legislation and Policy: Evidence of effectiveness may drive relevant legal change and Ministry of Health policy

Figure 2 Logic model for the PEACH project. *A key component of PEACH is the co-designed interventions generated from the co-design workshops. The above programme logic includes anticipated outcomes that we expect the co-designed interventions will address, but these may vary depending on the outcome of the co-design workshops. **These involve small numbers and are unlikely to demonstrate change during the course of this study. ED, Emergency Department; eMR, electronic medical record; OOHC, out-of-home care; PEACH, Providing Enhanced Access to Child Health Services and SCHN, Sydney Children's Hospitals Network; IT, Information Technology.

to those in the national control cohort, based on data collected from Children's Healthcare Australasia (CHA), a national benchmarking collaboration.

This research employs descriptive statistics to describe the distribution of variables under consideration, including priority population status, sociodemographic factors, health access and outcomes, and hospital costs. We employ graphs to illustrate the distribution of health access and outcomes, as well as hospital costs, among priority and non-priority population groups, as well as trends over time. Using generalised estimating equations and multilevel regression models, this research estimates associations between priority population status and outcome measures (ie, health access, health outcomes and hospital costs) considering patient-level clustering of repeated hospital presentations. These analyses adjust for sociodemographic factors (such as gender, age, residential area, socioeconomic status and remoteness) and clinical features. Depending on the type of outcome measure (eg, binary, count or continuous), this research employs modified Poisson, negative binomial, logistic and gamma regression analyses within a clustered data analysis framework. This research assesses the interaction effects of priority population status and remoteness on each outcome measure to check the effect modifier role of remoteness. Additionally, we conduct cumulative risk analyses to assess outcomes for CYP in more than one priority population.

Impact evaluation

We use regression analyses to evaluate the effectiveness of PEACH, comparing health access and outcomes between patients from priority and non-priority populations at SCHN, before and after PEACH, and comparing them with the national control cohort. This study analyses time (before or after PEACH) as an effect modifier (interaction term) to examine if PEACH changes the gap between priority and non-priority populations.

Measures of access include Did Not Attend and DAMA rates; health outcomes include chronic condition hospitalisation, readmission, potentially preventable and severe hospitalisations, extended length of stay and in-hospital deaths (table 2).

Cost-effectiveness analysis

The cost-effectiveness analysis ascertains the economic viability of additional investment for PEACH interventions. The cost of inequity to the health system and whether PEACH implementation improves health equity for priority populations are calculated using inequality indices (eg, concentration index and GINI coefficient). The distributional effects of PEACH implementation at SCHN based on equity-relevant variables (eg, the severity of illness and sociodemographic factors) are examined using distributional cost-effectiveness analysis.

Table 2 Key measures for health access and outcomes

Measures	Indicators/outcomes
Health access	▶ Proportion of incomplete ED attendances; Did Not Wait/left at own risk/DNA. ▶ Proportion of DAMA.
Health outcomes: mortality, illness severity and preventable presentations	▶ Proportion of in-hospital deaths. ▶ Proportion of severe presentations: – Urgent (triage category 1 and 2) ED presentations*. – Admission and ED length of stay>median (days). – Ward and intensive care admissions. – Readmission within 28 days*. ▶ Proportion of PPHs.

*New South Wales Ministry of Health reportable benchmark data.
DAMA, discharge against medical advice; DNA, did not attend; ED, Emergency Department; PPH, potentially preventable hospitalisation.

Population size

Preliminary baseline hospital presentation data at SCHN shows over 700 000 presentations (in-patient admissions or ED attendances) between 2015 and 2019. Approximately 33% of these presentations involve CYP from priority populations (6% of CYP identified as Indigenous, 27% as CALD, 7.4% with disabilities, 0.7% with experience of being a refugee or asylum-seeker and 0.03% in OOHC). This provides sufficient statistical power to detect even small changes in reducing inequity in outcomes between priority and non-priority populations.

Qualitative data and analysis

Intervention co-design

The co-design of PEACH interventions is guided by an adapted version of the Experience-Based Co-design (EBCD) methodology.[46] Qualitative data with at least 50 service user interviews, 300 staff surveys and 15 co-design workshops (three with each priority population) will capture current experiences and explore, refine and prioritise key challenges and solutions relating to identification, enhanced care and health outcomes (table 3). Staff experienced in providing care to priority population CYP will self-nominate; service users will be invited through QR-coded posters distributed through SCHN facilities, particularly in specialty clinics for priority populations and existing SCHN consumer consultation forums. The interviews involve a purposive sample of approximately 10 parents/carers and CYP from each priority population and use a specifically designed semistructured format. CYP will be specifically invited to participate, as well as their parent/carer. Age-appropriate, creative and flexible approaches such as the expression of their experiences and suggestions through photography, visual and performance arts will be used to encourage their active engagement.[47] Easy-to-read, age-appropriate and translated patient information sheets and informed consent forms are provided. Participants can use verbal communication

Table 3 Qualitative research measures

Performance measure	Target audience	Qualitative instrument	Issues to be explored
1-on-1 interviews	SCHN service users	Semistructured interview designed for CYP from priority populations	Short interview, administered in person or via videoconference. Interviews are conducted with eligible CYP SCHN service users and/or their nominated parent/guardian. Interviews will cover the service user's personal journey with SCHN and explore the positive and negative aspects of their care, the barriers they faced, their challenges in accessing care and invite their ideas for change.
Survey	Staff of SCHN	Survey developed specifically for this purpose	SCHN staff are invited to participate in an online survey to understand if and how their clinic/department currently identifies and enhances access for/prioritises priority populations. The survey questionnaire monitors the impact of these changes on SCHN staff experiences, as well as their perceptions and confidence to identify and prioritise CYP from priority populations.
CYP co-design workshops	SCHN service users	Non-standardised questions developed specifically for this purpose	Co-design workshops of CYP and family service users from each particular priority population are invited to co-design initiatives for prioritised and supported access.
SCHN staff co-design workshop	Staff of SCHN	Non-standardised questions developed specifically for this purpose	Clinical staff from departments across SCHN are invited to participate in workshops to co-design enhanced access for each particular priority population.
Joint CYP and Staff Co-design workshops	SCHN service users and SCHN staff	Non-standardised questions developed specifically for this purpose	Staff and service users from each particular priority population are brought together to review videos from interviews, identify gaps and develop and monitor improvement ideas to be implemented and evaluated.

CYP, children and young people; SCHN, Sydney Children's Hospitals Network.

and/or other participatory methods (augmentative and/or alternative communication methods) depending on their needs.

Interviews are audio-recorded, transcribed verbatim and analysed thematically using Braun and Clarke's approach.[48] The analysis involves three stages: (1) preparation, where researchers immerse themselves in the data for sense-making; (2) organisation, where coding, categorisation and grouping of data are performed to develop key categories and (3) results, where the key categories are described. Workshop data are documented using EBCD methods, and key themes and topics inform the ongoing PEACH work.

Implementation evaluation

A mixed methods implementation evaluation is undertaken to assess the barriers, facilitators, sustainability and upscaling of PEACH through interviews and co-design workshops guided by the Consolidated Framework for Implementation Research, which enables researchers to understand and verify 'what works' and 'why' across various contexts.[48 49] Semistructured interviews are conducted with a targeted group of at least 50 SCHN service users exposed to PEACH interventions and 50 SCHN staff and service leaders, including hospital executive staff and Ministry of Health policymakers. The Acceptability of Intervention Measure, Intervention Appropriateness Measure, Feasibility of Intervention Measure[50] and Normalization Measure Development (NoMAD) tool (a measure of adoption)[51 52] measure the sustainability, acceptability, feasibility and appropriateness of changed work practices at SCHN. The measurement of coverage and fidelity involves evaluating the utilisation of technological solutions at SCHN, waitlist times for patients from priority populations and linking patients with support workers.

Ethnography will reveal barriers to and enablers of cultural change and how staff manage the cultural change associated with PEACH implementation. Ethnography is a powerful method of investigating cultural barriers to change in highly institutionalised settings such as hospitals.[53] Compared with most qualitative methodologies, which often focus on 'what people say,' ethnography captures 'what people do.'[54] This focus on behaviours is useful when studying resistance to a change that challenges established cultural norms, such as prioritising some patients compared with others, which may contradict the professional ethos of an equal duty of care for each patient.[55–58] Ethnographic methods include staff shadowing, observation of tasks and decision-making at team intake, as well as planning meetings to observe and inductively reveal conditions that facilitate or hinder PEACH implementation and cultural change.[59]

Patient and public involvement

Service user interviews and co-design are central to PEACH. Advisory groups for each priority population provide ongoing guidance to the research team and ensure the study is patient-centred; they comprise priority population service users, SCHN staff with lived experience and clinicians with expertise in providing care for each priority population. Service users are included in the project steering committee, reimbursed for time spent on project activities and provided with capacity-building opportunities.

ETHICS AND DISSEMINATION

Ethical approval was obtained from the SCHN Human Research Ethics Committee (2022/ETH00145) and the Aboriginal Health and Medical Research Council (AHMRC 1920/22). Informed consent is sought for interviews from a parent/carer and child (if able to provide assent). Individual patients or their families are not identifiable in any publications.

Research findings will be disseminated to ethics and funding agencies, SCHN executive decision-makers, advisory and consumer groups and departments across SCHN. Results will be shared with New South Wales Health, nationally through CHA, and the Australian agency implementing a single digital medical record and other relevant organisations. Findings will be presented at national and international conferences and published in open-access, peer-reviewed journals.

DISCUSSION

This study addresses the critical issue of health inequity in CYP from priority populations. It provides evidence on the quantification of inequity, the impact of enhanced and prioritised access to health services and the enablers and barriers involved in organisation-wide cultural change. It also presents the usefulness of routine electronic equity indicators and dashboards while monitoring closely whether progress towards equitable health outcomes is being achieved. This is the basis of a hospital-based learning health system, which could be transferable to other children's healthcare services and settings.

PEACH builds on emerging evidence regarding equity interventions while introducing equity data monitoring systems, organisational accountability and driving culture change. The evidence gained from PEACH has the potential to change how care is delivered to children from priority populations and how we invest in equity to alter care expenditure. This programme of research is the first of its type internationally. The involvement of state and national partner organisations capable of implementing policy and service delivery changes facilitates the implementation and translation of successful components of PEACH into state and national policy and clinical practice. To assist with large-scale roll-out, which has the potential to improve system effectiveness, we intend to co-design a PEACH sustainability framework for other major hospitals nationally. Effective interventions can ultimately be scaled up internationally in future research.

The processes and methods used in PEACH amplify the perspectives of CYP from priority populations in describing their healthcare experiences and in co-designing and evaluating solutions. The co-design nature and ongoing involvement of service users in advisory groups will ensure that patient-centred solutions are prioritised and refined in implementation and that the needs of service users are at the forefront. Working with CYP and/or their carers from populations traditionally less empowered in authentic co-design within a large institution is in itself an important learning experience. Documenting the role of service user and staff engagement in cultural change and evaluating its impact and effectiveness is of relevance to all healthcare organisations as the consumer voice becomes increasingly valued.

Limitations anticipated in this study include under-identification of priority populations status, an incomplete picture of CYP with disabilities given our definition as NDIS recipients and challenges relating to engagement with priority populations due to language, communication and cultural barriers. Analysis of mortality as a critical health outcome will be limited by sample size.

Challenges in equity research are the long-term timeframe required to assess the impact on inequity reduction and the complex issues of attribution to health-related interventions in the context of broader societal effects.[8 60] Intervention studies such as PEACH, with consistent criteria for classifying both target groups and interventions and consideration of multiple synergistic effects, are required to evaluate their impact on health disparities.[4 7]

Contributors KZ led the conceptualisation and implementation of the study and edited the study manuscript. SM contributed to the conceptualisation, application of ethics, writing and editing. AvB, SW and AK have contributed to the conceptualisation, implementation, conducting of workshops, writing and editing. JRK and NH have contributed to the development of quantitative methods and JRK prepared the initial draft of the manuscript. MH and AN have contributed to developing qualitative methods of the study's design. RR has contributed to the development of economic analysis. BV has contributed to the critical review of the manuscript. RL has contributed to the conceptualisation and critical review of the manuscript. All authors have read and approved the final version. KZ is the guarantor and accepts full responsibility for the finished work and the conduct of the study, has access to the data and controls the decision to publish.

Funding This project is funded through the NSW Ministry of Health Paediatric Priority Funding Grant (2021-2024) and the Luminesce Alliance (2023-2027).

Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, conduct, reporting or dissemination plans of this research.

Patient consent for publication Not applicable.

Provenance and peer review Not commissioned; externally peer reviewed.

ORCID iDs

Jahidur Rahman Khan http://orcid.org/0000-0002-3029-6303

Michael Hodgins http://orcid.org/0000-0001-9177-3428

REFERENCES

1 Spencer N, Raman S, O'Hare B, *et al*. Addressing inequities in child health and development: towards social justice. *BMJ Paediatr Open* 2019;3:e000503.

2 Whitehead M. The concepts and principles of equity and health. *Int J Health Serv* 1992;22:429–45.

3 Rust G, Levine RS, Fry-Johnson Y, *et al*. Paths to success: optimal and equitable health outcomes for all. *J Health Care Poor Underserved* 2012;23:7–19.

4 Welch V, Dewidar O, Tanjong Ghogomu E, *et al*. How effects on health equity are assessed in systematic reviews of interventions. *Cochrane Database Syst Rev* 2022;1:MR000028.

5 Commission on Social Determinants of Health. Closing the gap in a generation: health equity through action on the social determinants of health: Final Report of the Commission on Social Determinants of Health. 2008.

6 Campbell MA, Hunt J, Scrimgeour DJ, *et al*. Contribution of Aboriginal Community-Controlled Health Services to improving Aboriginal health: an evidence review. *Aust Health Rev* 2018;42:218–26.

7 Brown AF, Ma GX, Miranda J, *et al*. Structural Interventions to Reduce and Eliminate Health Disparities. *Am J Public Health* 2019;109:S72–8.

8 Kahn RS, Cheng TL, Mitchell MJ. A Framework for Pursuing Child Health Equity in Pediatric Practice. *Pediatr Clin North Am* 2023;70:629–38.

9 Mimmo L, Harrison R, Travaglia J, *et al*. Inequities in quality and safety outcomes for hospitalized children with intellectual disability. *Dev Med Child Neurol* 2022;64:314–22.

10 Morris PS. Randomised controlled trials addressing Australian aboriginal health needs: a systematic review of the literature. *J Paediatr Child Health* 1999;35:130–5.

11 Mackean T, Withall E, Dwyer J, *et al*. Role of Aboriginal Health Workers and Liaison Officers in quality care in the Australian acute care setting: a systematic review. *Aust Health Rev* 2020;44:427–33.

12 The Sydney Children's Hospitals Network. The Sydney Children's Hospitals Network Strategic Plan 2012–2016. 2011.

13 Elliot C, Mcullagh C, Brydon M, *et al*. Developing key performance indicators for a tertiary children's hospital network. *Aust Health Rev* 2018;42:491–500.

14 Joshua P, Zwi K, Moran P, *et al*. Prioritizing vulnerable children: why should we address inequity? *Child Care Health Dev* 2015;41:818–26.

15 Amjad S, Tromburg C, Adesunkanmi M, *et al*. Social Determinants of Health and Pediatric Emergency Department Outcomes: A Systematic Review and Meta-Analysis of Observational Studies. *Ann Emerg Med* 2024;83:291–313.

16 Singer R, Zwi K, Menzies R. Predictors of In-Hospital Mortality in Aboriginal Children Admitted to a Tertiary Paediatric Hospital. *Int J Environ Res Public Health* 2019;16:1893.

17 Carville KS, Lehmann D, Hall G, *et al*. Infection is the major component of the disease burden in aboriginal and non-aboriginal Australian children: a population-based study. *Pediatr Infect Dis J* 2007;26:210–6.

18 Sealy L, Zwi K, McDonald G, *et al*. Predictors of Discharge Against Medical Advice in a Tertiary Paediatric Hospital. *IJERPH* 2019;16:1326.

19 Thomas DP, Anderson IPS. Use of emergency departments by Aboriginal and Torres Strait Islander people. *Emerg Med Australas* 2006;18:68–76.

20 Falster K, Banks E, Lujic S, *et al*. Inequalities in pediatric avoidable hospitalizations between Aboriginal and non-Aboriginal children in Australia: a population data linkage study. *BMC Pediatr* 2016;16:169.

21 Nolan-Isles D, Macniven R, Hunter K, *et al*. Enablers and Barriers to Accessing Healthcare Services for Aboriginal People in New South Wales, Australia. *Int J Environ Res Public Health* 2021;18:3014.

22 Karger S, Ndayisaba EU, Enticott J, *et al*. Identifying Longer-Term Health Events and Outcomes and Health Service Use of Low Birthweight CALD Infants in Australia. *Matern Child Health J* 2024;28:649–56.

23 Guo XY, Woolfenden S, McDonald G, *et al*. Discharge against medical advice in culturally and linguistically diverse Australian children. *Arch Dis Child* 2019;104:1150–4.

24 Brandenberger J, Tylleskär T, Sontag K, *et al*. A systematic literature review of reported challenges in health care delivery to migrants and refugees in high-income countries - the 3C model. *BMC Public Health* 2019;19:755.

25 Hadgkiss EJ, Renzaho AMN. The physical health status, service utilisation and barriers to accessing care for asylum seekers residing in the community: a systematic review of the literature. *Aust Health Rev* 2014;38:142–59.

26 Raman S, Wood N, Webber M, *et al*. Matching health needs of refugee children with services: how big is the gap? *Aust N Z J Public Health* 2009;33:466–70.

27 Amarasena L, Zwi K, Hu N, *et al*. Changing landscape of paediatric refugee health in South Western Sydney, Australia: a retrospective observational study. *BMJ Open* 2023;13:e064497.

28 Hanes G, Chee J, Mutch R, *et al*. Paediatric asylum seekers in Western Australia: Identification of adversity and complex needs through comprehensive refugee health assessment. *J Paediatr Child Health* 2019;55:1367–73.

29 Oeseburg B, Dijkstra GJ, Groothoff JW, *et al*. Prevalence of chronic health conditions in children with intellectual disability: a systematic literature review. *Intellect Dev Disabil* 2011;49:59–85.

30 Arim RG, Miller AR, Guèvremont A, *et al*. Children with neurodevelopmental disorders and disabilities: a population-based study of healthcare service utilization using administrative data. *Dev Med Child Neurol* 2017;59:1284–90.

31 Australian Institute of Health and Welfare. People with disability in Australia 2020. 2020.

32 Liao P, Vajdic CM, Reppermund S, *et al*. Readmission and emergency department presentation after hospitalisation for epilepsy in people with intellectual disability: A data linkage study. *PLoS One* 2022;17:e0272439.

33 Williams K, Leonard H, Tursan d'Espaignet E, *et al*. Hospitalisations from birth to 5 years in a population cohort of Western Australian children with intellectual disability. *Arch Dis Child* 2005;90:1243–8.

34 Meehan E, Williams K, Reid SM, *et al*. Comparing emergency department presentations among children with cerebral palsy with general childhood presentations: a data linkage study. *Dev Med Child Neurol* 2017;59:1188–95.

35 Meehan E, Reid SM, Williams K, *et al*. Tertiary paediatric emergency department use in children and young people with cerebral palsy. *J Paediatr Child Health* 2015;51:994–1000.

36 Smales M, Savaglio M, Morris H, *et al*. "Surviving not thriving": experiences of health among young people with a lived experience in out-of-home care. *Int J Adolesc Youth* 2020;25:809–23.

37 Nathanson D, Tzioumi D. Health needs of Australian children living in out-of-home care. *J Paediatr Child Health* 2007;43:695–9.

38 Royal Australasian College of Physicians. Health Care of Children in Care and Protection Services - Australia position statement. 2023.

39 Australian Institute of Health and Welfare. Child protection Australia 2021–22. Canberra. 2023.

40 Nathanson D, Lee G, Tzioumi D. Children in out-of-home care: does routine health screening improve outcomes? *J Paediatr Child Health* 2009;45:665–9.

41 McLean K, Clarke J, Scott D, *et al*. Foster and kinship carer experiences of accessing healthcare: A qualitative study of barriers, enablers and potential solutions. *Child Youth Serv Rev* 2020;113:104976.

42 McLean K, Hiscock H, Goldfeld S. Timeliness and extent of health service use by Victorian (Australian) children within first year after entry to out-of-home care: Retrospective data linkage cohort study. *Child Youth Serv Rev* 2022;134:106359.

43 NSW Ombudsman. Aboriginal Outcomes Strategy focus area 2 (out-of-home care) – were the targets achieved. 2023.

44 NDIS. History of the NDIS | NDIS. 2020. Available: https://www.ndis.gov.au/about-us/history-ndis

45 NDIS. Am I eligible, 2019. Available: https://www.ndis.gov.au/applying-access-ndis/am-i-eligible

46 Donetto S, Tsianakas V, Robert G. Using Experience-based Co-design to improvethe quality of healthcare: mapping where we are now and establishing future directions. 2014.

47 Spencer B, Hugh-Jones S, Cottrell D, *et al*. The INSCHOOL project: showcasing participatory qualitative methods derived from patient and public involvement and engagement (PPIE) work with young people with long-term health conditions. *Res Involv Engagem* 2023;9:91.

48 Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psychol* 2006;3:77–101.

49 Damschroder LJ, Aron DC, Keith RE, *et al*. Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. *Implement Sci* 2009;4:50.

50 Weiner BJ, Lewis CC, Stanick C, *et al*. Psychometric assessment of three newly developed implementation outcome measures. *Implement Sci* 2017;12:108.
51 May CR, Cummings A, Girling M, *et al*. Using Normalization Process Theory in feasibility studies and process evaluations of complex healthcare interventions: a systematic review. *Implement Sci* 2018;13:80.
52 Slaghuis SS, Strating MMH, Bal RA, *et al*. A framework and a measurement instrument for sustainability of work practices in long-term care. *BMC Health Serv Res* 2011;11:314.
53 Kellogg KC. Operating Room: Relational Spaces and Microinstitutional Change in Surgery. *AmJ Sociol* 2009;115:657–711.
54 Carter TF. Disciplinary (Per)Mutations of Ethnography. *Cultural Studies ↔ Critical Methodologies* 2018;18:392–9.
55 Lobbedez E. Absorptive Resisting Work: How the yellow vests deployed resistance to and through violence. *Organization Studies* 2024;45:433–56.
56 Zilber TB. The Methodology/Theory Interface: Ethnography and the Microfoundations of Institutions. *Organization Theory* 2020;1:263178772091943.
57 Billo E, Mountz A. For institutional ethnography. *Prog Hum Geogr* 2016;40:199–220.
58 Lok J, de Rond M. On the Plasticity of Institutions: Containing and Restoring Practice Breakdowns at the Cambridge University Boat Club. *AMJ* 2013;56:185–207.
59 Bucher S, Langley A. The Interplay of Reflective and Experimental Spaces in Interrupting and Reorienting Routine Dynamics. *Organization Science* 2016;27:594–613.
60 McCann L, Johnson L, Ford J. Equity-focused evidence synthesis - A need to optimise our approach. *Public Health Pract (Oxf)* 2023;6:100430.