Evaluation of the implementation and clinical effects of an intervention to improve medical follow-up and health outcomes for Aboriginal children hospitalised with chest infections

Pamela J. Laird,[a,b,c,*] Anne B. Chang,[d,e,f] Roz Walker,[g,h,i] Melanie Barwick,[j,k] Jack Whitby,[a] Matthew N. Cooper,[l] Fenella Gill,[m,n] Elizabeth McKinnon,[l] and André Schultz[a,c,o]

[a]Wal-yan Respiratory Research Centre, Telethon Kids Institute, Perth, WA, Australia
[b]Department of Physiotherapy, Perth Children's Hospital, Perth, WA, Australia
[c]Division of Paediatrics, Faculty of Medicine, University of Western Australia, Crawley, WA, Australia
[d]The Child Health Division Menzies School of Health Research, Darwin, NT, Australia
[e]Department of Respiratory Medicine, Queensland Children's Hospital, Brisbane, QLD, Australia
[f]The Centre of Children's Health Research, Australian Centre for Health Services Innovation, Qld University of Technology, Brisbane, QLD, Australia
[g]School of Indigenous Studies, Poche Centre for Indigenous Health, University of Western Australia, Perth, WA, Australia
[h]School of Population and Global Health, UWA, Australia
[i]Ngangk Yira Institute for Change, Murdoch University, Australia
[j]Hospital for Sick Children, Toronto, Canada
[k]Department of Psychiatry, Temerty Faculty of Medicine, University of Toronto, Toronto, Canada
[l]Telethon Kids Institute, University of Western Australia, Nedlands, WA, Australia
[m]School of Nursing, and EnAble Institute, Faculty of Health Sciences, Curtin University, Bentley, WA, Australia
[n]Nursing Research, Perth Children's Hospital, Perth, WA, Australia
[o]Australia Department of Respiratory and Sleep Medicine, Perth Children's Hospital, Perth, WA, Australia

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Summary

Background Aboriginal children hospitalised with acute lower respiratory infections (ALRIs) are at-risk of developing bronchiectasis, which can progress from untreated protracted bacterial bronchitis, often evidenced by a chronic (>4 weeks) wet cough following discharge. We aimed to facilitate follow-up for Aboriginal children hospitalised with ALRIs to provide optimal management and improve their respiratory health outcomes.

Methods We implemented an intervention to facilitate medical follow-up four weeks after hospital discharge from a paediatric hospital in Western Australia. The intervention included six-core components that focused on parents, hospital staff and hospital processes. Both health and implementation outcomes were measured for children grouped by three distinct temporal periods of recruitment: (i) nil-intervention, recruited after hospital admission; (ii) health-information only, received during recruitment at hospital admission, pre-intervention; (iii) post-intervention. The primary outcome was the cough-specific quality-of-life score (PC-QoL) in children with a chronic wet cough following discharge.

Findings Of the 214 patients that were recruited, 181 completed the study. Follow-up rates one-month post-discharge were higher in the post-intervention (50.7%) than the nil-intervention (13.6%) and health-information (17.1%) groups. PC-QoL in children with a chronic wet cough was also improved in the post-intervention group compared the health information and nil-intervention groups (difference in means between nil-intervention and post-intervention groups = 1.83, 95% CI: 0.75, 2.92, p = 0.002), aligning with an increase in the percentage who received evidence-based treatment, namely antibiotics at one-month post-discharge (57.9% versus 13.3%).

Interpretation Implementation of our co-designed intervention to facilitate effective and timely medical follow-up for Aboriginal children hospitalised with ALRIs improved their respiratory health outcomes.

Abbreviations: ALRI, Acute lower respiratory tract infections; GP, General Practice doctor; HCP, Health care provider; PC-QoL, Parent-proxy Cough-related Quality of Life tool; SMS, Short Message Service; WA, Western Australia

*Corresponding author. Perth Children's Hospital, 15 Hospital Avenue, Nedlands, WA, 6009, Australia.
E-mail address: Pamela.Laird@health.wa.gov.au (P.J. Laird).

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Research in context

Evidence before this study

Australian Aboriginal children experience some of the highest rates of acute respiratory infections in the world, with higher severity and poorer outcomes than other Australian children. A high proportion of Aboriginal children hospitalised with acute chest infections will have bronchiectasis within two-years of discharge from hospital. Bronchiectasis in Aboriginal people is associated with early mortality as young as the third and fourth decade of life.

Effective medical follow-up post-hospitalisation for acute respiratory infections with appropriate treatment of persistent symptoms, may prevent bronchiectasis in some children.

We conducted a search of the literature to examine evidence for any interventions to facilitate medical follow-up for Aboriginal children hospitalised with acute chest infections. An OVID and PubMed search for studies published between 16 September 2002 and 16 September 2022 with the following search terms (child OR children OR paediatric OR pediatric) AND (Indigenous OR Aboriginal OR First Nations) AND (acute lower respiratory tract infection OR pneumonia OR bronchiolitis OR chest infection) AND (hospitalisation OR follow-up OR post-hospitalisation OR medical follow-up) AND (persistent symptoms OR bronchiectasis OR chronic lung disease). Articles were searched for publication in all languages. While there was good evidence for Aboriginal children being at-risk of developing bronchiectasis following hospital admission for bronchiolitis or pneumonia, there was little evidence for successfully implemented strategies to improve respiratory health outcomes in this at-risk group.

Added value of this study

We demonstrated that in-hospital strategies to facilitate medical follow-up post-hospitalisation resulted in healthier children six weeks to three months after discharge from hospital. Strategies included the facilitation of culturally secure medical care, the provision of disease-specific health information and instructions to parents and arranging post-hospitalisation follow-up.

Implications of all the available evidence

The approach of this study provides effective strategies of providing First Nations care within Western health services, which may address current gaps in health outcomes for this group of children.

Introduction

First Nations populations have a high prevalence of respiratory diseases, particularly bronchiectasis.[1] Australian Aboriginal children experience higher rates of hospitalisations for acute lower respiratory tract (ALRI) infections, such as bronchiolitis and pneumonia than other children,[2] with rates in parts of Australia among the highest in the world.[3,4] Aboriginal children with respiratory illnesses experience more severe disease, are more likely to have recurrent hospitalisations,[4,5] and are particularly at-risk of developing bronchiectasis. Indeed, previous studies demonstrated that 15–19% of Aboriginal children had bronchiectasis within two years of discharge from hospital for either pneumonia[6] or bronchiolitis.[7] Ongoing wet cough at three to four weeks post-discharge from hospital is associated with an increased risk of a future diagnosis of bronchiectasis.[7] Children with chronic wet cough often have protracted bacterial bronchitis, which if left untreated, can potentially progress to bronchiectasis through ongoing bacterial infection and inflammation.[8]

When wet cough persists among Aboriginal children one-month following discharge from ALRI-related hospitalisation, screening and appropriate management can potentially prevent bronchiectasis. Although Australian guidelines recommend medical follow-up at one-month post-discharge for Aboriginal children hospitalisedwith ALRI,[9] there are currently limited or no hospital policies or routine practices throughout Australia to ensure such follow-up occurs. Many guidelines, including the CHEST chronic cough guidelines[10] recommend two to four weeks of an appropriate antibiotic[11] for medical management for children with isolated chronic wet cough (i.e., a daily wet cough for at least one-month in the absence of other cough pointers). This relatively simple treatment can be managed in the primary care setting.

In Aboriginal contexts, good health outcomes are predicated on culturally secure medical care, i.e., care that acknowledges Aboriginal families' distinctive and diverse cultural needs.[12] Culturally secure care is a critical component to providing medical advice or instruction, such as the need for follow-up. In practical

terms, this includes the provision of health information that is delivered in a way that resonates with and is understandable to parents and ensures parents feel safe and heard.[13] Providing parents with disease-specific health information in a culturally secure way improves knowledge,[14] medical help-seeking, and health outcomes for their children.[12]

Unfortunately, while medical follow-up post-hospitalisation is conceptually simple, the process is complex and includes multiple steps with many opportunities for derailment.[15] More broadly, implementing practice change within health systems is challenging, often with low success rates.[16] Within Aboriginal contexts, sustained implementation can be even more challenging[17,18] due to failures to incorporate comprehensive and integrated Aboriginal-driven approaches.[19] However, the implementation of evidence-based interventions within health systems has been effective in Aboriginal contexts[12] when strategies were based on barriers and facilitators identified by both Aboriginal consumers and their clinicians using combined participatory action research[20] and implementation science methods.[21]

We aimed to improve follow-up rates and respiratory health outcomes (measured through a validated[22] parent-proxy chronic cough-specific quality-of-life [PC-QoL tool]) of Aboriginal children hospitalised with ALRIs. We hypothesised that implementing an intervention to facilitate medical follow-up one-month post-discharge would result in increased medical follow-up rates and healthier children six weeks to three months after hospitalisation.

Methods

Ethical approval was granted from the Western Australian (WA) Aboriginal Health Ethics Committee (HREC 920) and the WA Child and Adolescent Health Human Research Ethics Committee (RGS3220). Informed consent was obtained from all participant's carers via the clinician researcher or Aboriginal research assistant.

Study context

The study was conducted in the only tertiary children's hospital in WA, in the capital city, Perth, between October 2019 and December 2021. The hospital providesacute and specialist care to all children in the State of WA. Each year, approximately 150 Aboriginal children are admitted with ALRIs to this 298-bed hospital. In WA, the burden of ALRI and pneumonia admissions is particularly high in Aboriginal children compared to non-Aboriginal children (7.5 and ~14 times higher respectively).[2] Further, the prevalence of chronic wet cough and bronchiectasis is also high, with up to 14% and 1.3% respectively in some parts of WA.[23,24] The only pediatric tertiary hospital is in the State's capital, Perth, and is up to 3000 km by road for some pediatric patients requiring hospitalisation (e-Fig. S2). Perth is home to about 1.9 million of the State's 2.65 million people.

Study design

The study was a pre-post design (e-Fig. S1) for an intervention to facilitate medical follow-up one month after hospital discharge for children admitted with an ALRI. Before implementation of the intervention, no formal process existed to facilitate medical follow-up for this at-risk group. Therefore, outcomes were measured across three groups of participants (described below) defined according to three distinct temporal periods in which they were recruited and the nature of the intervention they accordingly either did or did not receive.

Development of the intervention was based on National guidelines, which recommend medical follow-up at one-month post-discharge for Aboriginal children hospitalised with ALRI,[9] and the known need for any intervention provided for Aboriginal people to be culturally secure and with the provision of disease-specific health information. The core components of the intervention (see e-Table S1) were determined by studying the barriers and enablers to medical follow-up one month post-hospitalisation.[15] This was achieved through implementation mapping (guided by the Consolidated Framework for Implementation Research[21]) with participatory action research to ensure Aboriginal knowledge and expertise were integral to all aspects of the study.[19]

The intervention

The intervention is a combination of factors that involve the carer (receiving health information), HCP actions and hospital system processes, all designed to facilitate medical follow-up a month following discharge. The core components of the intervention were: (i) Aboriginal lead (provided oversight to the cultural training component of the HCP training, i.e., practical ways to engage with Aboriginal families to foster safety and understanding of disease-specific health information and instructions), (ii) Stakeholder engagement to identify and solve implementation barriers, (iii) Training of health care providers (HCPs) to use new processes, (iv) Educational resources for parents provided at admission and discharge, (v) Hospital processes (new patient admissions and discharge requirements), and, (vi) SMS text reminder sent to parents one-month post-discharge, to seek follow-up. e-Table S1 outlines the details of the intervention's core components, and a legend explains which part the intervention was for, i.e., parents, HCPs, or hospital processes.

Implementation process

The intervention was implemented across all relevant departments/areas in the hospital over 16 months.

Details of implementation processes[25] are found in the supplement.

Implementation outcomes were measured to evaluate implementation effectiveness of the intervention.[26] Fidelity was defined as the extent to which the component was implemented as intended. Penetration was assessed as a measure of percentage of HCPs trained out of the possible number of HCPs in the hospital and adoption was assessed by audit of compliance with new processes (as per discharge audit and parent report).

Participants

Participants were Aboriginal children aged <18 years who were hospitalised with ALRIs and their parents/carers (henceforth, respectfully called parents) who served as a proxy for their children. The three participant groups were.

1 . Nil-intervention group: Children who had been previously hospitalised with ALRIs. This group was recruited six-weeks to six-months after being discharged from hospital. Recruitment was pre-intervention and occurred between 02/03/2019 and 02/09/2019.
2 .Health information only-group: Prospectively recruited children admitted to hospital with ALRIs. This group received disease-specific lung health information from the recruiting researcher during their child's admission to hospital, as part of the informed consent process. This health information may have positively influenced parental decision-making to attend medical follow-up at one-month post-discharge. Recruitment was pre-intervention and between 03/09/2019 and 29/07/2020).
3. Post-intervention group: Children admitted to hospital with ALRIs post-intervention commencement. This group received disease-specific lung health information from the recruiting researcher during their child's admission to hospital, as part of the informed consent process (as for the health information group). As part of the intervention (described above) the treating medical team was also encouraged to provide health information and arrange follow-up. The medical team practiced in a post-implementation environment that was adapted to facilitate follow-up. Recruitment was between 30/07/2020 and 03/12/2021.

Non-aboriginal children and children with cystic fibrosis or tracheostomy were excluded from the study

Recruitment and follow-up of participants (Fig. 1).

1. Nil-intervention group: Recruitment letters were posted to parents of children hospitalised within the six months prior to the commencement of the study. The discharge summary audit included patients admitted during the six-month period, however all data relying on parental report was only included if the telephone screening was done between six-weeks and three-months of the child's hospital discharge to ensure consistency of data analysis between the three participant groups. Those parents who were contacted outside of three-months, i.e., their discharge was up to six-months prior, we only included in the secondary outcome measures found in the discharge summary audit.
2. Health information-only and post-intervention groups: An Aboriginal or clinician-researcher invited the parent to participate in the study during their child's hospital admission and provided the parent with lung health information and rationale for medical follow-up at one month.

For all three groups, a clinician-researcher contacted the parent via telephone between six-weeks and three-months following hospital discharge. A screening questionnaire about hospital experience and medical follow-up" was administered at the time of the phone call (see supplement). The time allocation of six weeks to three months allowed the parent to visit their local doctor and complete any treatment, if indicated (See e-supplement 1). The PC-QoL tool[22] was applied for eligible children, i.e., the child had an ongoing wet cough four weeks post-discharge.

Outcomes

Clinical and implementation outcomes were measured.

Clinical outcome measures

Our primary outcome, assessed only for those children with a chronic wet cough following discharge, was the PC-QoL tool[22] - performed between six weeks and three months after hospitalisation. The PC-QoL is a valid and reliable, and patient-centered patient-proxy tool for measuring the burden of chronic cough in children.[23] The tool includes eight questions, each with a Likert-scale response from 1 to 7. The eight scores for each patient are averaged. A higher average score represents a better cough-related quality of life outcome compared to a lower average score, with improvement considered clinically relevant if the average score of the 8-questions improves by 0.9.[27] The tool has been used effectively with Aboriginal populations.[12] We hypothesized that children with a chronic wet cough post-discharge would show improved PC-QoL scores if they received effective medical care at one month. That is, children with ongoing wet cough one-month post-hospitalisation for ALRI are likely to have protracted bacterial bronchitis, which will resolve, with an associated improvement in PC-QoL, if followed up and managed with an appropriate antibiotic.

The secondary outcome, recorded for all children, was the local clinic follow-up rate within one-month (range three to six weeks) post-discharge (as per parent telephone survey at six weeks to three months post-discharge).

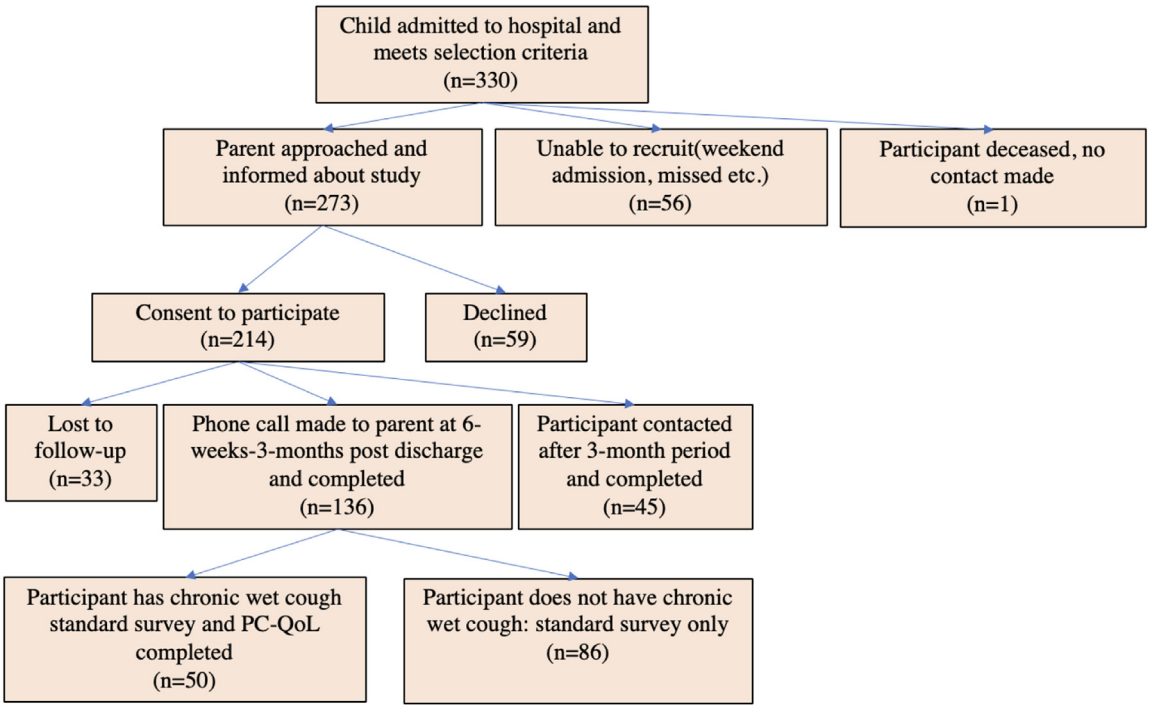

Fig. 1: **Participant recruitment and study flow.**

Additional secondary outcomes (as per parent telephone survey at six weeks to three months post-discharge), assessed only for those children with a chronic wet cough following discharge, were.

1. Child prescribed antibiotics at one-month post-discharge clinical review; and.
2. Presence of chronic wet cough at six-weeks to three-months post-discharge.

Secondary outcomes were measured by parental report for all three groups. We previously found that when parents are provided with disease specific health information, they provide accurate information regarding their child's respiratory health.[24] Specifically, parental report of their child's cough following provision of culturally secure lung health information correlated highly with clinician assessment, which correlated with clinician assessment ($\kappa = 0.92$).[23]

Implementation outcome measures

Fidelity, adoption, and penetration of the intervention core components served as the implementation outcomes[26] (See e-Table S1). Feasibility, acceptability, and appropriateness were not measured because the intervention was designed by researchers within the organization with extensive input from all stakeholders. Hence, the intervention was designed to be feasible, acceptable, and appropriate for the setting.

Statistical analysis

As the primary outcome, PC-QoL scores for children with a chronic wet cough post-discharge were summarized by their mean and standard error and compared across groups using a two-sample t-test or Welch's ANOVA (allowing for unequal variances across the groups). Secondary outcomes are presented as percentages of positive parent-report responses or audit records, together with 95% confidence intervals derived from Wilson's score interval and not adjusted for multiplicity. Occasional missing responses are counted as a negative response. In tables and text, "pre-intervention" refers to the combined nil-intervention and health information-only periods.

Data were recorded in REDCap and analysed in R version 4.02 (R Project for Statistical Computing, Vienna, Austria) within the RStudio integrated development environment (Rstudio Team, Boston MA). Handling of missing data and sample size calculations are included in the supplement.

Role of the funding source

The sponsor had no role in the design of the study, the collection and analysis of the data or the preparation of the manuscript.

Results

Of the 330 patients eligible for recruitment during the study period, 273 were approached (or contact was

attempted), 214 consented, and 181 completed the study by responding to the follow-up phone call. Of the 181 that completed the study, 136 did so within the three-month window for the parent reporting to be included in analysis (the requirement for the validity of PC-QoL). Participant demographics were similar across the three periods (Table 1). Fifty (36.8%) of the 136 children that completed the study within the three-months had a chronic wet cough post-discharge.

Primary outcome for children with a chronic wet cough

Mean PC-QoL scores progressively improved (increased) over the three groups (Fig. 2, e-Table S2, p = 0.003). The margin of improvement from nil-intervention to post-intervention groups (difference in means = 1.83 (95% CI: 0.75–2.92, p = 0.002) more than twice the minimal clinically important value (0.9).[27]

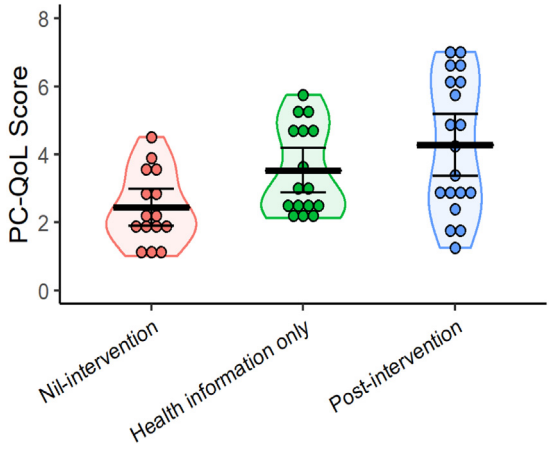

Fig. 2: **The QoL scores of children with a chronic wet cough in the three study groups**. The crossbars indicate the median and the 25th and 75th percentiles for each group.

Secondary outcomes (all children)

Medical follow-up rates: The number of children who attended medical follow-up during the prescribed three–to six-week window increased from the nil-intervention to post-intervention (13.6%–50.7%) (Fig. 3; e-Table S3).

Secondary outcomes for children with a chronic wet cough: Of the 136 participants across all groups who completed the study within the three-month timeframe, 50 (36.8%) had a chronic wet cough post-discharge from hospital. The percentage of children with a chronic wet cough who were prescribed antibiotics at one-month post-discharge differed across the three groups, progressively increasing over the three recruitment periods (13.3% [95% CI: 6.9–34.8], 25.0% [12.6–47.1], and 57.9% 57.9 [38.0–75.1]). Rates of cough resolution also progressively increased across the three groups (nil-intervention 6.7% [5.1–25.9] through to post-intervention 36.8% [20.9–57.2]) (Fig. 3; e-Table S2).

Implementation outcomes

1. Penetration: During the implementation period, 261 HCPs attended at least one training session, and 38 clinicians completed the optional online training module in the first three-months of the implementation phase (e-Tables S5 and S6). Half of

Recruitment	Pre-intervention		Post-intervention
	Nil-intervention	Health information only	
Admitted to hospital			
Total	98	93	139
Recruited to study			
Total	57	67	90
Urban residence: n (% of recruited)	33 (58%)	37 (55%)	49 (54%)
Age: median (IQR) years	1.1 (0.4–3.4)	1.3 (0.5–5.7)	1.6 (0.6–4.1)
Male	39 (68%)	38 (57%)	44 (49%)
Completed within 3-month timeframe[a]			
N	22	41	73
% of total recruited	39%	61%	81%
Age: median (IQR) years	1.3 (0.5–6.0)	0.9 (0.5–5.4)	1.7 (0.7–4.6)
Male: n (% of N)	14 (64%)	19 (46%)	38 (52%)
Participants with chronic wet cough (PC-QoL data)[b]			
N	15	16	19
% of total recruited	26%	24%	26%
Age: median (IQR) years	2.7 (0.4–7.5)	1.2 (0.6–7.0)	2.3 (0.6–10.6)
Male: n (% of N)	9 (60%)	4 (25%)	10 (53%)

[a]Screened, 6 weeks to 3 months post-discharge. [b]PC-QoL: Parent proxy chronic cough related Quality of Life tool, administered 6 weeks to 3 months post-discharge.

Table 1: **Children in each study group as recruited and with parent report data.**

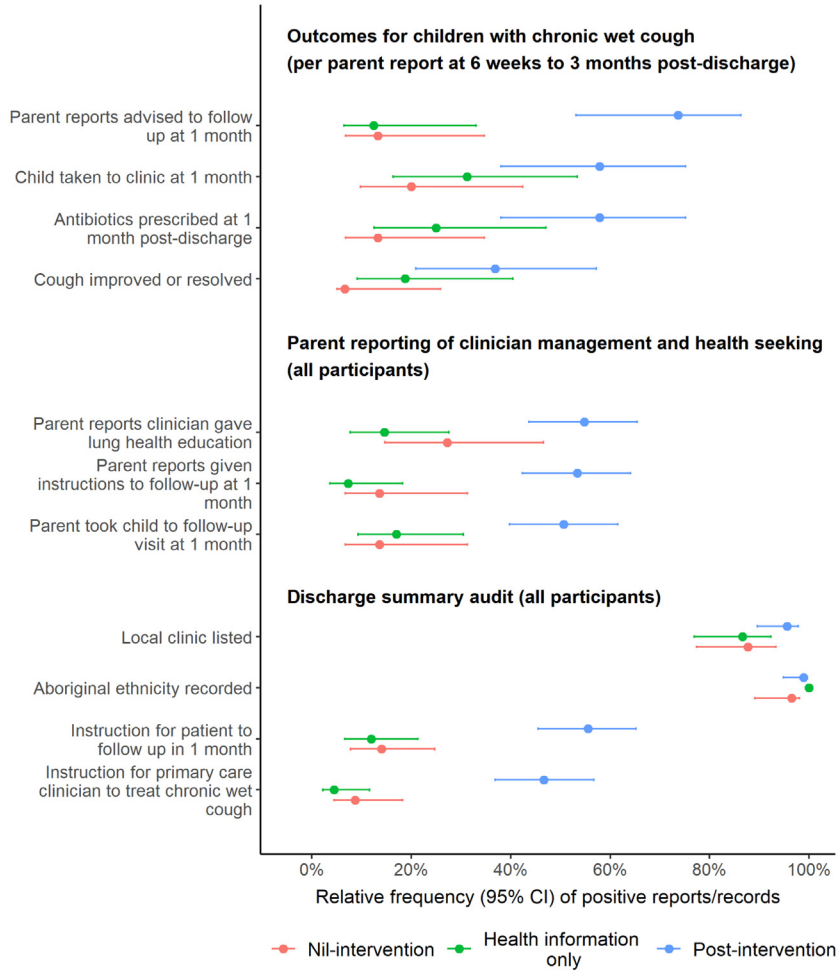

Fig. 3: **Forest plot of secondary outcome measures.**

all HCPs who could take up the intervention did so, with 51.8% (175/338) penetration. Training competencies were not assessed.

2. Adoption.
   a. The percentage of parents reporting they received lung health information increased from 27.3% pre-intervention to 54.8% post-intervention and the percentage of parents reporting receiving instructions to seek follow-up in one-month increased from 13.6% to 53.4% (Fig. 3, e-Table S3).
   b. Quality of discharge summary: post-intervention, clinicians improved the provision of clear medical follow-up instructions to the local clinician (8.8%–46.7%) and provision of instructions to parent to attend medical follow-up in one-month post-discharge from hospital to parents (14.0%–55.6%) (Fig. 3, e-Table S4).
   c. SMS text reminders: 73/73 (100%) of SMS reminders were sent to the patients in the post-intervention group. No SMS reminders were sent in the nil-intervention or health-information groups at one-month post-discharge to remind parents to follow-up at their local clinic.

Demographics of participants lost to follow-up (n = 33) were similar to those of participants who completed the study (median age of 1.3 years, 52% female, 42% urban residence).

Discussion

We found that the longer-term respiratory health of Aboriginal children hospitalised with ALRIs can be improved by implementing a culturally secure intervention to facilitate medical follow-up one-month post-discharge from the hospital. A 3.7-fold increase in the number of children presenting to medical care three to six weeks post-discharge was observed in the post-intervention group. Hospital clinicians improved their

management of Aboriginal children hospitalised with ALRIs, as reflected by both medical records and parental reporting. Clinician management included providing health information to parents about lung health, and the importance of medical follow-up at one-month and ensuring post-discharge instructions for local primary care clinicians contained clear management instructions. Finally, and importantly, PC-QoL scores showed that the respiratory health of Aboriginal children with a chronic wet cough post-discharge significantly improved post-intervention.

This study highlights that the medical management of Aboriginal children hospitalised with ALRIs should not be limited to managing acute illness during the hospital stay. Our results confirm that a substantial proportion of children will have ongoing wet cough four weeks after discharge from hospital. For this reason, liaising with local clinics regarding the management of cough is important for long-term lung health. Our results suggest that timely follow-up and evidence-based management of ongoing wet cough at one month facilitates resolution of the cough and results in higher PC-QoL many weeks after hospitalisation. Thus, improving in-hospital management and community-based follow-up can improve longer-term health outcomes.

To our knowledge, our study is the first to successfully implement an intervention co-developed with Aboriginal parents, hospital staff, and relevant stakeholders within a tertiary hospital context[16] and that demonstrated clinically important outcomes. We showed that when hospital-based clinicians provided parents with culturally secure health care, including disease-specific health information, parents were more likely to follow up with their local primary care clinic one month after discharge. Further, by ensuring hospital clinicians provide accurate hospital discharge summary information with clear follow-up instructions to local primary care clinics, Aboriginal children can receive timely and appropriate medical care, thereby preventing chronic disease in many. A similar study conducted in the community and primary care setting also demonstrated improved health seeking by parents of Aboriginal parents with chronic wet cough following provision of health information, improved medical management by clinicians and improved respiratory health outcomes for the children.[12] Another Alaskan study implemented environmental consults, mailed toolkits and arranged home modifications to homes of First Nations children hospitalised with ALRIs. This study demonstrated a reduction in respiratory symptoms at 6-month follow-up.[28] The implications for improved health outcomes and disease prevention for First Nations through comprehensive and tailored interventions for consumers and healthcare providers are encouraging, especially within the context of the heavy burden of chronic disease, particularly following episodes of critical illness.[29] Further, our study's improved primary and secondary outcomes help strengthen the claim by both the Australian government and First Nations Australian leaders[30] that successful reduction of health inequities between First Nations and other Australians requires co-led and co-designed initiatives.

Post-hospitalisation follow-up health seeking increased when parents were provided lung health information with instructions to seek medical follow-up at one-month, and the hospital adapted its workflow process to provide discharge summaries with key information to local clinicians. A recent systematic review echoed the importance of clinicians providing health information to Australian First Nations to empower families with disease specific health knowledge.[31] Our group's previous study in primary care reported similarly increased help-seeking following a community-wide health information campaign on awareness of chronic wet cough.[12] Further, evidence suggests that interventions developed with a comprehensive, collaborative, and co-designed approach, which included Aboriginal knowledge and expertise, lead to improved health systems, successful interventions, and improved health outcomes.[12]

While we demonstrated an increase in rates of post-hospitalisation follow-up and higher PC-QoL scores for the patients who received information throughout their care, many children (in all study groups) continued to be symptomatic at six weeks to three months post-discharge despite having sought medical care. Ongoing chronic cough symptoms in those children who sought follow-up care, in our study may be attributed to the fact that 42% of children did not receive antibiotics for their chronic wet cough when it was likely caused by protracted bacterial bronchitis. The relative delayed or non-treatment of children with suspected PBB has previously been reported.[12,32] The study intervention was focused on hospital staff and workflow processes and did not specifically target training of community-based primary care clinicians in the best management of chronic wet cough. Given that up to 19% of young Aboriginal children hospitalised with ALRIs have bronchiectasis within two-years of discharge,[6,7] ensuring community-based primary care clinicians have the knowledge and skills to manage chronic wet cough may further improve health outcomes beyond those observed in this study.[12] Indeed, the ongoing cough symptoms for the children who did not receive antibiotic treatment in our study, highlights this need. Early detection and optimal management of bronchiectasis in children improves their long-term outcomes including radiographic reversibility.[8]

Our study had several limitations. Firstly, we relied on parental reporting of their experiences in hospital and after discharge, including reporting of cough symptoms and the window for administering the PC-

QoL was up to three-months post-discharge. Hence, a degree of recall bias was likely. However, the researchers were careful to ask the questions in the same way in each group of the study, to avoid influencing responses and the researchers were not the clinicians involved in the intervention. A second limitation and potential bias is that the participating parents were women. However, it is customary that Aboriginal women provide care for their children and in this context. Thirdly, as this was uni-centre study, external validity is limited. However, our findings are similar to those from primary care and community settings in another region of Australia,[12] and align with literature on how collaborative, co-designed approaches in First Nations contexts have increased likelihood of effective implementation.[19] Expansion of this intervention to other health settings may inform scalability, with potential application to other diseases for First Nations Australians and is currently being undertaken. Fourthly, as our study was not an RCT, our control group was not concurrent and self-control comparison was not possible in the context that we would not know who develops an ALRI and/or develop chronic wet cough. Also, without an adequate control group, confounders may be present and unaccounted for. However, the stepwise improvement across multiple aspects of medical management suggests that improvements in the primary outcome measure was caused by implementation of the intervention.

Another limitation is that we did not have data on the effect of COVID-19 nor the participants' socio-economic status, level of parental education, disease severity and underlying comorbidities. However, in WA there was very little (close to zero) community transmission of COVID-19 until the state borders were opened in 2022, following the study conclusion. Also, we assumed that the variability in these factors would be similar across all three groups. Finally, while the intervention has six core components, we did not have data as to which component was the most impactful; further research may provide information on the mechanisms of change for the intervention.

Conclusion

A comprehensive hospital-based intervention that equips health staff with the knowledge, resources, and workflows necessary to provide culturally secure care and health information to parents and to arrange post-discharge follow-up of Aboriginal children hospitalised with ALRIs resulted in improved medical follow-up, treatment, and longer-term health outcomes.

Contributors

PL and AS had full access to the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis, including and especially any adverse effects.

PL served as principal author. PL and AS designed the study. PL, AS, AC, RW, and FG wrote the original protocol. PL and AS applied for ethical consent. PL, EM, AS and MC carried out the analysis. PL wrote the first version of the manuscript; all authors critically revised the manuscript and approved the final version of the manuscript.

Data sharing statement

Data collected from the study has been included in the manuscript (Table 1 and e-Tables S2–S6, Fig. 2). The study protocol is submitted as a supplemental file and informed consent forms are available if requested.

Editor note

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Declaration of interests

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Appendix A. Supplementary data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.lanwpc.2023.100708.

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