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# The Collaboration for Increasing Influenza Vaccination in Children (CIVIC): a meeting report

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The burden of seasonal influenza disease in Australian children is substantial, especially for those with medical comorbidities including chronic cardiac, respiratory, neurological and immunosuppressive conditions. Influenza is more likely to be severe in children with comorbidities compared to previously healthy children (e.g. more frequent and longer hospitalisation, more frequent intensive care unit admission and requiring respiratory support).<sup>1</sup> Direct protection against influenza by vaccination is critical for children with comorbidities and remains the most effective tool for influenza prevention.<sup>2,3</sup> Influenza vaccine uptake in children with comorbidities is greater than in children without comorbidities in Australia, ranging between 30–50% and 8–22%, respectively.<sup>1,3,4</sup> However, this level of coverage is still inadequate, especially with the increased risks posed by influenza infections for children with comorbidities. Recommendations for influenza vaccination by hospital-based physicians have previously been shown to significantly increase uptake in children with comorbidities;<sup>5</sup> whereas, general practitioners have been identified to be the primary

information source of influenza vaccination for children without comorbidities.<sup>6,7</sup> Previous receipt of hospital-based vaccinations was also significantly associated with increased reported influenza vaccine uptake in children with comorbidities. Additionally, 80% of caregivers reported that they were happy for their children with comorbidities to receive vaccinations during future hospital visits.<sup>5</sup>

Children with medical comorbidities have been provided funded influenza vaccination through the Australian National Immunisation Program (NIP) since 2010.<sup>8</sup> Public funding of influenza vaccination for all children aged between 6 months and 5 years (introduced in 2008 in Western Australia, by other states in 2018 and established nationally through the NIP in 2020) has further promoted and enabled access to influenza vaccines for children with medical comorbidities.<sup>8</sup> However, these programs have not addressed issues related to vaccine service delivery, clinical provider knowledge, facilitation of vaccine recommendations by clinicians, parental/legal guardian knowledge, or awareness and attitudes for influenza vaccination in children and specifically those with comorbidities. These issues likely

contribute to low vaccine coverage in these populations.

To examine current factors contributing to low influenza vaccine uptake and evaluate potential solutions addressing structural, provider, and parental barriers for influenza vaccine uptake in children with comorbidities, a co-design meeting and workshop occurred on 2 February 2020 in Melbourne, Australia. This report summarises the key themes and outcomes from this meeting and workshop where a multidisciplinary group of experts examined the current barriers to influenza vaccine uptake in children with comorbidities in Australia and evaluated potential interventions to increased influenza vaccine uptake in these children. This meeting represented the start of a collaboration between Australian paediatric vaccination program experts, and the formation of CIVIC: The Collaboration for Increasing Influenza Vaccination in Children. CIVIC strives to reduce the burden of influenza in all children by increasing influenza vaccination through evidence-based strategies. However, the initial focus will be on improving vaccine uptake in high-risk children with medical comorbidities.

## Meeting structure

Attendees included immunisation specialists, paediatricians, epidemiologists, social scientists and consumer advocates, many of whom have had experience in designing and implementing interventions to increase vaccine uptake. The diverse backgrounds of attendees encouraged rigorous evaluation of barriers and potential solutions from a range of perspectives. The meeting was divided into four sessions with presentations and small group discussion workshops on: i) influenza vaccination barriers in children with and without comorbidities; ii) implementation and outcomes of previous interventions; iii) interventions' impact and challenges; and iv) future programs' designs, funding and implementation. The audio of the meeting was recorded with participants' consent and under ethical approval from the Child and Adolescent Health Services of Western Australia. Attendees were encouraged to take notes during the meeting and share with authors afterwards. Audio recordings were transcribed non-verbatim and cross-referenced with participants' notes.

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Vaccination barriers and interventions were explored using the Capability, Opportunity, Motivation and Behaviours Model (COM-B).<sup>9</sup> This model proposes that changing behaviour involves three inter-related components: *Capability*: the knowledge and skills related to the behaviour; *Opportunity*: including physical (i.e. access) or social (i.e. recommendations) influences; and *Motivation*: reflective processes including risk-appraisals and automatic processes of emotions, snap judgements and habits. Once these factors influencing behaviour have been identified,

targeted interventions can be identified. Attendees used the P3 model to propose development and implementation of potential interventions to increase vaccination.<sup>10</sup> The P3 model was developed to understand, develop and implement interventions across three levels: practice, provider and patient/parent. Utilised in combination, the COM-B and P3 models have been previously used to target individual barriers across multiple healthcare levels. These models were developed from individual health behaviour and ecological

models.<sup>9,10</sup> Using both models in combination allows for an intervention design to simultaneously target individual barriers for behaviour across the multiple healthcare levels.

**Session one: Influenza vaccination barriers in children with comorbidities**

The meeting commenced by reviewing the impact of severe influenza disease and influenza vaccine uptake in children with medical comorbidities. Specifically, national prospective data were presented.<sup>1,6</sup> This was

**Table 1: Interventions identified and evaluated by attendees for improving influenza vaccination in children with comorbidities.**

Intervention domain	Interventions	P3 level			Barriers addressed	COM-B component			Additional Challenges
		Provider	Practice	Parent		Capability	Opportunity	Motivation	
Education	Key vaccination information 'cheat sheets' for clinicians to guide vaccine recommendations	√			Providers' knowledge and recommendation confidence	√		√	Requires provider to be aware of the resource and a desire to use it
	Communication training for effective recommendation strategies	√			Providers' recommendation confidence and anxiety for negative parent interaction	√		√	Strong negative perception of 'learning modules' by providers
	Educational messages 'embedded' in reminder messages			√	Parental awareness and knowledge			√	Previously shown to be detrimental to uptake compared to plain reminder text messages
	Communications campaign with "ambassadors with comorbidities" using websites, email and SMS reminders	√		√	Parental and provider awareness and knowledge			√	High relative cost and reduced capacity to directly link to changes in vaccination behaviour and uptake
Reminders and messaging	Simultaneous reminders through electronic medical record prompts for and parental SMS/email messages	√		√	Parental and provider awareness Vaccination discussion likelihood Eligible patient identification		√	√	Electronic medical record use not uniform across hospital and primary care sites Message fatigue potential for providers
	Automatic recommendation delivery through online patient health portals (i.e. My RCH Portal)			√	Parental awareness and vaccination discussion likelihood			√	Requires existing patient portal Requires integration across multiple systems for multiple sites
	Promotional posters and 'Tonic Health Media' setting-based messaging platform		√		Parental and provider awareness			√	Potential for promotion fatigue and "blending into the background"
Structural changes	Influenza vaccine champions	√			Provider awareness Department siloing of resources and vaccination	√		√	Strong 'buy-in' required from hospital leadership and government departments required
	School-based vaccination program		√		Patient vaccine delivery frequency		√		High relative costs and strong government 'buy-in' requirements
	'Standing orders' or mandatory vaccination recommendation program	√			Patient vaccine delivery frequency Provider awareness		√	√	Strong hospital leadership support required Issues of existing hospital policy Negative perception by providers Non-accredited immunising nurses requiring vaccine prescriptions for patient delivery
	Incentivising of increased uptake through KPIs, score cards and funding opportunities		√		Provider awareness and hospital executive desire			√	Negative perception by providers and hospital executives Additional cost of incentives
	Mobile vaccine delivery across all wards and outpatient clinics		√		Direct patient delivery Hospital department siloing	√		√	Requires acceptance by each separate department High resource burden
	Centralised immunisation clinic for free influenza vaccination for all site visitors and patients		√		Direct patient delivery Hospital department siloing	√		√	High resource burden Relatively high financial cost

followed by the presentation of results from a national survey with parents of children (half of whom had comorbidities) hospitalised with acute respiratory illness in 2019<sup>11</sup> and a systematic review's results on facilitators and barriers for paediatric influenza vaccine uptake (Carlson, unpublished). A lack of provider recommendation, difficulties finding time to vaccinate, and remembering to book appointments were the predominant opportunity factors identified that limited influenza vaccine uptake.<sup>11</sup> Ambivalent support by parents for influenza vaccination was a motivational barrier and the absence of previous influenza vaccination history were other significantly associated barriers.

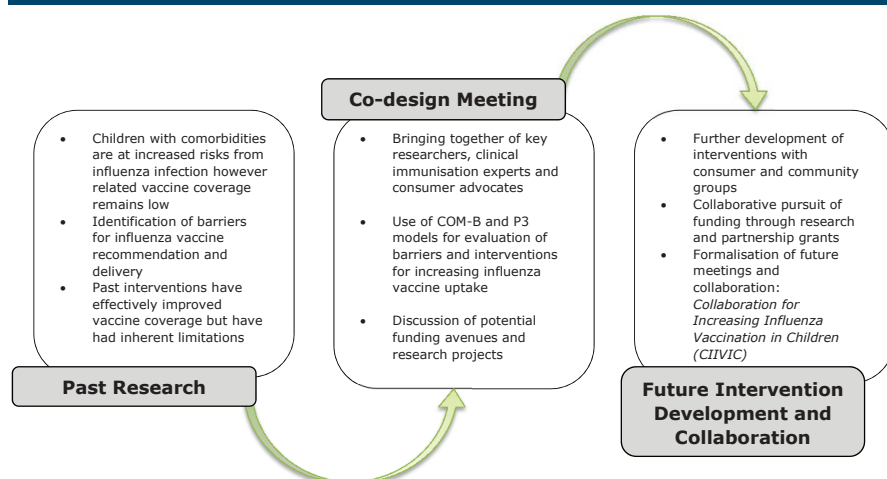
General practitioner (GP) and hospital specialist perspectives were presented from recent studies.<sup>12,13</sup> Key motivational and capability barriers identified included confusion about their respective clinical role for vaccine recommendation for children with comorbidities and difficulty in identifying the comorbidities eligible for funded influenza vaccination. Both provider groups viewed the other as primarily responsible for vaccine recommendation. Hospital specialists identified 'siloining' within hospital departments, a lack of awareness for vaccination changes, and deprioritising of vaccination discussions as barriers for vaccination recommendations and delivery. GPs reported a lack of collaboration and communication with hospital specialists as barriers.

### Session two: Implementation and outcomes of previous interventions

A systematic review of interventions to increase influenza vaccination targeting children with comorbidities was presented and demonstrated that previous interventions increase uptake by an average of 60%. However, no single type of intervention was shown to be superior (Norman, *Pediatrics*, accepted). The review identified high degrees of bias across studies primarily due to low-quality methodologies.

The P3 model was presented and illustrated how multi-component interventions could target multiple barriers identified through COM-B simultaneously and across multiple levels of healthcare delivery. The P3-MumBubVax intervention package demonstrated how multi-component interventions can effectively address different maternal vaccination barriers

**Figure 1: Past, current, and future steps needed in Australia for influenza intervention design and implementation through *Collaboration for Increasing Influenza Vaccination in Children (CIVIC)*.**



simultaneously.<sup>14</sup> The P3-MumBubVax intervention package uses clinic-level vaccine champions and vaccination prompts, provider-level online vaccine communication training, vaccine discussion 'cheat sheets' and a maternal and childhood vaccine information website. Parents are provided with information about a maternal and childhood vaccination information website and maternal vaccination text-message reminders.

### Session three: The impact and challenges of interventions

Using the COM-B and P3 models as guiding frameworks, small group discussions mapped interventions' potential impacts, effectiveness and implementation challenges (Table 1). Overall, no single intervention was identified that could address barriers across all P3 levels nor address each COM-B component. Interventions targeting parents and providers predominately addressed capability and motivation barriers through education and promotion interventions. Opportunity barriers and practice-level barriers were addressed by structural interventions including vaccination reminders and standing orders in hospitals and vaccination clinics.

Attendees discussed intervention challenges, consistently identifying high costs and the requirement for hospital leadership support for larger structural changes (Table 1). Attendees additionally examined current monitoring and evaluation systems for interventions, including surveillance of vaccination reminders, vaccine uptake and process evaluation surveys. Ongoing evaluation allows greater intervention design

refinement and benefits from pre-existing monitoring systems. However, challenges for monitoring were recognised including restrictions for electronic health records, non-uniform immunisation reporting, and the capacity to identify comorbidities. Overall, attendees agreed that multi-component interventions had the unique capacity to target multiple COM-B components across the P3 levels and that appropriate monitoring is needed.

### Session four: designs, funding, and implementation of future programs

Participants highlighted the uniqueness of influenza vaccination within Australia's immunisation landscape due to recent changes in funding, vaccination requirements and past adverse events.<sup>15</sup> Issues and barriers identified in this meeting present specific funding and implementation challenges for future interventions targeting influenza vaccine uptake. Figure 1 summarises the past, current and future steps needed to work towards increased influenza vaccination in children with comorbidities.

### Implications for public health

Numerous behavioural and structural barriers affect influenza vaccine uptake in children across different healthcare settings in Australia. Hospitals play a critical role in influenza vaccination for children with comorbidities due to their existing vaccination resources and the central clinical role that the medical specialists play in their care. Better collaboration between hospital and primary care immunisation program leaders is needed to address barriers for

education, messaging and surveillance and to overcome differences between provider beliefs and their role in recommending influenza vaccination. National collaboration was recognised to be required to design, leverage funding, test and translate interventions to ensure different models of care and healthcare settings were accounted for. This meeting was the critical first step in the formation of the CIIVIC collaboration to explore the current state of knowledge and work towards improving influenza vaccine uptake in this vulnerable group of children. Attendees agreed that multi-component interventions are likely to be more effective than single interventions, addressing different barriers simultaneously across multiple healthcare levels. Interventions directed at providers and parents including vaccine education messaging can target capability and motivation barriers; whereas, practice-level interventions including standing orders, mobile vaccine carts and dedicated vaccination clinics can address opportunity barriers for vaccination access. Monitoring and ongoing evaluation of interventions and vaccine uptake were viewed as critical for the refinement and success of interventions.

Protecting children with comorbidities through vaccination remains a critical priority due to the health impacts posed by severe influenza disease. Provision through the NIP has increased influenza vaccine access but has not addressed inherent barriers for recommendation and delivery. Bringing together leading research, clinical and community voices in Australia through this meeting provided a unique opportunity to evaluate these barriers and potential solutions to improve influenza prevention in children with comorbidities. The COM-B and P3 models allowed participants to explore barriers and interventions through a comprehensive but flexible framework. The hospital environment was identified as a critical component for improving patients' influenza vaccine uptake, but all healthcare management interactions provide opportunities to influence behaviours.

The next steps are the development of interventions with critical stakeholders including patients, their families, clinical providers and hospital leadership. This will involve working groups of CIIVIC members to convene stakeholder and consumer meetings across Australian hospital sites. These meetings will allow for the dissemination of the results of the first CIIVIC meeting and evaluation of the feasibility and acceptability of potential interventions by stakeholders and consumers. The results of these meetings will then be shared at future CIIVIC group meetings for further refinement of interventions. The outcomes of these stakeholder and consumer meetings, future CIIVIC meetings and published research findings will then be used to leverage funding for the rigorous evaluation of the effectiveness of multicomponent interventions in a number of immunisation settings. These steps are necessary to inform future practice and policy changes to improve influenza vaccine uptake in all children, but particularly in those with medical comorbidities.

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