The Role of Digital Health Policy and Leadership
K. Keshavjee and A. Khatami (Eds.)

doi:10.3233/SHTI231319

Improving Childhood Vaccination Rates with Process Innovation in Central Zone, Alberta

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Abstract. This project aimed to accurately assess the current state of routine immunization program delivery in a Central Zone community in Alberta and provide actionable recommendations supported by literature review. Engaging with frontline public health nurses responsible for immunization program delivery in the community, contributing factors to low vaccination rates, process inefficiencies and policy gaps were identified. Based on additional literature, strategies to mitigate these gaps with the goal of increasing vaccination rates were proposed and validated. Although in this case, strategies to mitigate process inefficiencies were the most supported given program funding, a multi-pronged approach is still recommended to drive long-term improvements in vaccination rates.

Keywords. Vaccination, routine immunization, process, policy, Alberta

1. Introduction

Vaccination rates for vaccine-preventable diseases (VPDs) in Alberta for children are significantly lower than national target goals to prevent disease in this population effectively. For example, a 2019-2022 Alberta Health Services (AHS) report showed the immunization rate for the second dose of the MMR (measles, mumps, rubella) vaccine hovers at 74% in Alberta [1], where ideally 95% coverage is the national goal [2]. Immunization coverage refers to the proportion of a population that is appropriately immunized against a VPD at a point in time [3]. Figure 1 shows a steady national decline in the MMR vaccination rates, demonstrating that this is a growing problem faced across the country and based on a recent WHO report, across the world in the wake of the pandemic [4].

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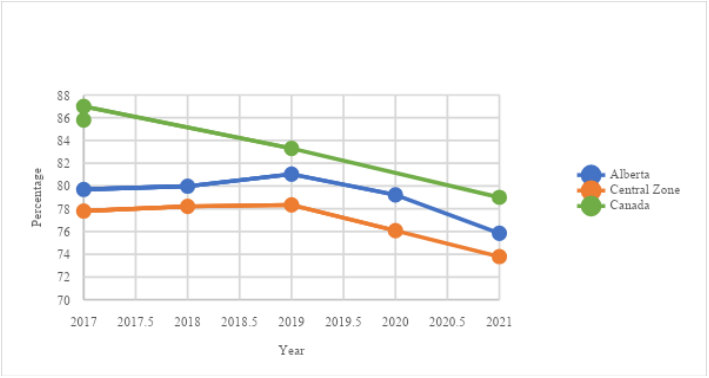

Figure 1. Percentage of children that received their second dose of the MMR vaccine by age 7, 2017-2021 in Central Zone, Alberta and Canada [1].

Alberta, unlike Ontario, has a single health entity called Alberta Health Services (2008) that was created in 2008. Alberta's Immunization Program operates under the authority of the *Public Health Act* and the Immunization Regulation, where the Chief Medical Officer of Health (CMOH) is responsible for monitoring Albertans health and providing recommendations to the Minister of Health and AHS [5]. The five zones of AHS (North, Central, South, Calgary, and Edmonton) operationalize the program with public health nurses being accountable for implementation, in accordance with provincial requirements [5].

This was an independent project with a focus on all routine vaccinations delivered to school-aged children in Central Zone, Alberta. The goal was to understand the current state of immunization program delivery and based on stakeholder engagement and literature review; develop actionable recommendations for the organization. Vaccines are well-known as being a cost-effective intervention, a study estimating a dose of the vaccine to cost approximately $20 in Canada [6], while delivery varies across local and provincial borders. Improving immunization program delivery can alleviate the downstream disease burden on our healthcare system and minimize public health costs related to the infectious disease response. One study analyzing the costs of public health response to the Ontario 2015 measles outbreak estimated total response to cost approximately $1.2 million, with almost half of the costs attributed to the local public health response to the outbreak.[6] This project's upstream approach to improve vaccination rates provides an opportunity to use public health resources effectively and proactively.

2. Methods

The first project objective was to understand why vaccination rates among school-aged children were falling below national goals prior to and now after the COVID-19 pandemic [1] in the Central Zone, one of the five zones in Alberta. As routine immunizations are delivered exclusively by nurses at public health centers, three AHS public health nurses (PHN) were engaged to understand this current state.

Conducting thorough research and validating the findings with frontline staff was key in effectively analyzing the problem in this project. Prior to engaging with these stakeholders, an initial review of Alberta's policies around vaccinations and a brief

literature review to analyze the root cause of low vaccination rates in Alberta, was conducted. The findings were reviewed with the PHNs to validate that the understanding of the policy landscape was accurate. Preliminary findings from the literature was reviewed to narrow down the causes of low vaccination rates within this Central Zone city based on the nurses' experience working with the community. These nurses engaged were responsible for administering vaccinations for all age groups in this community, with PHN experience ranging from over 20 years to 6 years. They were first engaged through a focus group, where the causes of low vaccination rates and initial solution options were discussed.

The second phase of the project was to review their current workflows and processes to understand barriers and analyze strategies that could be implemented to improve processes based on the nurses' feedback, supported by evidence found in the literature. This was conducted via continuous email over the span of three months. The process used in this project are noted below and could be repeated in other organizations facing similar problems in vaccination rates.

3. Results

3.1. Understanding the Problem

In Alberta, routine childhood vaccinations are exclusively administered by public health nurses either in schools or at a community health center (CHC), with minor exceptions for COVID-19 and flu shots. There are currently no mandates in schools or other institutions (i.e., daycares) to ensure vaccination in children and adequate immunization coverage. From our review and validation, we realized that factors preventing timely vaccination varied across delivery zones in Alberta, but also across cities mere kilometers away from each other. For example, in this community, the nurses cited misinformation and mistrust in the government as one of the contributing factor preventing timely vaccinations while in a neighboring city, long wait times for appointments was cited as a common factor.

"Distance to the clinic wouldn't really be relevant in our situation, but in some other locations, for sure, like Red Deer – they always have longer wait times than we do." - PHN 1

"The resources are on the AHS website now, and I was thinking, well unfortunately, there seems to be a correlation with some vaccine hesitancy and skepticism with the government; the trust is not here. We say [to parents], go to this government website that says why we should vaccinate your kid, which is tricky if there's that mistrust there." - PHN 2

3.2. Identifying Processes

To further understand the current state and subsequently, design and validate solution approaches with the nurses, a basic understanding of the child/parent's experience was needed, in addition to the nurses' workflows. Two processes were developed that incorporated the child/parent, the nurses, and their IT systems by reviewing AHS website resources and interviewing the nurses. One was the process for vaccination within a community clinic and the second for vaccination within a school clinic. It was evident that in both processes, there was significant coordination and administrative work

required by the nurses. For example, for school clinics, the nurses manually reviewed each child's vaccination history to determine the vaccines they were eligible for and were also responsible for coordinating clinic dates and consent forms with the school. Based on the nurses' responses, their typical workday consisted of these tasks along with vaccine administration at the clinics, with very little time left to engage with the parents.

The nurses noted that due to program decisions in recent years (before the pandemic), they no longer conducted in-person community outreach and education sessions and found this especially detrimental after the COVID-19 pandemic.

"We spent a lot of time doing that [classes on immunizations] and it's just in recent years that they haven't allowed us to do the post-natal [educational] classes and we really don't have time to do immunization sessions." - PHN 2

Current communication between parents and public health nurses now consists of newsletters, consent forms for in-school clinics and vaccination reminder phone calls, where parents may ask a few questions. The nurses believed that due to the government's actions during the pandemic and the reduced contact with public health nurses, they are now seeing more vaccine hesitant parents. This is evident in the parents' poor attitudes towards the nurses when they receive phone calls to remind them of overdue vaccinations for their child(ren) and nurses' experiencing an increased number of questions about vaccines from parents during the appointments.

3.3. Solution Design

With the information obtained about the current program delivery and challenges, recommendations were provided that would improve and streamline the current processes as well as compiling an initial list of strategies that were successful in other settings for their consideration. These were examined with the frontline nurses to validate what would be successful given the population they serve. For example, a technology solution implementation (online appointment booking) and process improvement in the current processes (utilizing existing digital reports) were validated, to redirect the nurses' focus on increasing outreach and education in the community. Some studies have shown that education is a factor in vaccination decisions and acceptance [7, 8]. Based on data from Statistics Canada, we found that approximately 18% of the population in this community did not have any certificate, diploma, or degree, and 30% have obtained a high school diploma [9]. So, increasing vaccine education in this population could likely begin to improve relationships between parents and the public health nurses within AHS's immunization program and potentially contribute to an increase in vaccination rates.

4. Policy Implication

One of the strategies discussed with stakeholders was implementing a mandatory vaccination policy at public institutions like school, similar to Ontario's *Immunization of School Pupils Act*. The nurses had a mixed response, with some believing this is the only approach that will increase vaccination rates, while others believing that the strategy is too blunt and may cause more resistance and mistrust from the public. Comparison of two studies in the literature, one evaluating public attitude towards vaccines across over 60 countries and the other evaluating vaccine coverage after implementing strategies such as a mandatory policy did not demonstrate a causative effect on attitude post policy

implementation. It seemed that countries with negative vaccine attitudes will more likely implement a mandatory vaccine policy [10, 11]. Another systemic review of mandates (mainly from the United States) found that generally, increase vaccination rates followed mandates [12]. For the project, further investigation is needed in Alberta to make an informed recommendation on using this policy lever, but initial stakeholder discussions suggest that mandating a vaccine policy may not as easily increase vaccination coverage.

5. Conclusion

Appropriate program and population evaluation is needed to identify challenges that may be unique to the local community to correctly determine a strategy to address low vaccination rates. This approach should be taken by organizations facing similar problems to deeply understand the problem and make evidence-based decisions. Looking past only using a technological solution to solve the problem and instead assessing all contributing factors (process, policy etc.) will likely yield valuable and actionable findings for an organization and contribute to improved vaccination rates.

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