Hospitalized Children and Opportunities to Vaccinate Vulnerable Populations: An Integrative Literature Review

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Abstract: The present study aimed to identify evidence available in the health literature concerning the immunization of hospitalized children. This is a descriptive study based on an integrative literature review. Nine scientific papers published between 2001 and 2013 were analyzed. The results were organized into three themes: opportunities to vaccinate hospitalized children; factors against immunizing hospitalized children; and strategies and interventions to improve child vaccination coverage. Hospitalization is an opportunity to identify factors related to why parents do not vaccinate their children and then implement strategies, such as educational interventions, records-updating, immunization reminders, and providing guidance after hospital discharge.

Keywords: Child, immunization, hospitalization.

1. INTRODUCTION

Immunization is a necessary action and one of the most important in protecting populations against infectious diseases. Immunization has been an important and cost-effective health intervention in the reduction of child mortality and morbidity, as well as in reducing rates of hospitalization for children [1-3].

About 34 million children, 98% of whom live in developing countries, are not fully immunized for their age [4]. Studies have identified a significant delay in the immunization of preschool children, even in the case of developed countries such as Switzerland [3].

Although immunization rates have improved in the last 20 years, there are differences in rates that are linked to geographical, ethnic, racial, social and economic factors [5]. It is difficult to identify the causal relationships of these asymmetries in terms of immunization coverage, but it is possible to state that the values held by parents and the culture from which they come influence beliefs concerning the importance and need for immunization. Additionally, limited access to health services in some areas and among certain social classes, especially among those living in rural areas, and a lack of immunization availability, also contribute to these differences [5].

Low immunization coverage may be due to many reasons, varying from logistics to human behavior. There are countries that differentiate immunization between male and female child, with a preference for males [4]. Parental education and religion may also influence the vaccination status of a child [4].

A study conducted in Brazil [6] suggests that the following factors strengthen the occurrence of childhood immunization: the mother's experience and the mother's sense of personal achievement in motherhood; fear of disease; that the parents consider immunization to be a sign of good parenting and of having a good attitude toward care; access to immunization; schedule flexibility; information disclosure; having one's vaccination card at hand when visiting a health unit; and campaigns promoting immunization. Factors that contribute to non-immunization include parental inexperience; the difficulty following concurrent applications of vaccines; refusal on the part of some families to vaccinate their children; fragmented health care; lack of dialogue; false counter-indications; and finally, the fact that some families view immunization as a mandatory action rather than an important action that prevents disease and promotes health. Immunization that is implemented only through authoritarian measures departs from the ideals of family care. For this reason, professionals working to immunize children should seek to strengthen bonds with families in order to increase adherence to protective measures and to promote child immunization [6]. Another study offers the following reasons underlying the lack of immunization of children: migration; domestic problems; distance

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from immunization services; and the child being ill on the day scheduled for vaccination [7]. The use of a holistic and sensitive approach is needed to promote more educational and efficient interventions among families [5].

Verifying immunization records during the hospitalization of children is an opportunity to identify children who are not immunized and to notify parents regarding vaccinations that are overdue [3]. The fact that children do not receive overdue vaccines at the time they visit a health facility, for whatever reason, is considered a lost opportunity [8]. According to the American Academy of Pediatrics (AAP), lost opportunities are an important factor in children not being vaccinated [9].

It is necessary to identify the factors that limit vaccine coverage even when the media frequently promote immunization [10]. Health professionals should be aware of barriers to childhood vaccination in order to improve access to vaccines. The knowledge health professionals possess concerning immunization, guidance they provide parents, taking advantage of all opportunities to vaccinate children, and screening patients whenever necessary, are prerequisites to achieving higher rates of vaccination coverage [11]. The AAP recommends state evaluation of vaccinations in each health meeting in order to increase vaccination indicators [9].

Literature reviews addressing the immunization status of hospitalized children are important to broadening discussions and encouraging reflection on the topic, which is part of seeking support for integral health care provided to children in the contexts of both hospitals and primary health care. It is so relevant to highlight health care elements taking into account the rights of children, and taking advantage of hospitalization to immunize children with overdue immunization schedules, as well as discussing with parents about the need to vaccinate their children. The present study aimed to identify evidence available in the health literature concerning the immunization of hospitalized children.

2. METHODS

This investigation is a descriptive study based on an integrative literature review of publications in the health field that address the immunization statuses of hospitalized children.

Currently, systematic and integrative reviews are based on evidence-based practice (EBP), which allows for the synthesis and analysis of up-to-date knowledge concerning a specific theme. Such reviews are conducted with methodological rigor, depth, and result in reliable conclusions [12-13].

This integrative literature review proceeded in the following steps: development of the guiding question and the review's purpose; establishment of inclusion and exclusion criteria; categorization of studies; organization of collected data; analysis and interpretation of results; discussion and presentation of results; synthesis of knowledge; and suggestions for further investigation [14].

The guiding question was defined according to: "hospitalized child" was considered the patient; "vaccination in hospitalized time" was the intervention; "hospitalization is or is not an opportunity to increase vaccination coverage" was the comparison; and "useful strategies to vaccinate hospitalized children" was the outcome [15]. The guiding question was "Can hospitalization be a significant opportunity to improve vaccination coverage for hospitalized children?"

The studies included in this review met the following inclusion criteria: children younger than 12 years old; being cared for in different hospital units or in pediatric and neonatal units; studies published in Portuguese, English or Spanish from 2001 to 2013; and indexed in one of the following databases: Embase, PubMed, Medline Ovid, Health Virtual Library, Web of Science, Cinahl and Scopus. Exclusion criteria were studies addressing vaccine efficacy and safety, bacteria, antibiotics and diseases; studies addressing children older than 12 years old; literature reviews; dissertations and theses. The search terms were immunization, vaccination, and hospitalized child.

In order to select the papers, each title and abstract was read to confirm whether they treated the PICO question and met the inclusion and avoided the exclusion criteria. A total of 271 papers from 2001 to 2013 were identified. Of this total, 262 were excluded: 126 papers focused on treatment, symptoms, diagnosis, survival, morbidity, mortality, and disease-related costs; 45 papers focused on vaccine production, efficacy, safety, cost, effectiveness, adverse effects, and vaccination coverage; 36 focused on the impact of vaccination on the incidence and prevalence of a specific disease; 32 papers focused on antibiotic resistance, research of etiological agents or serotypes; 16 papers focused on laboratorial exams and immunology; three papers focused on child growth and development; two papers focused on health professional vaccination and their behavior in working with immunizations; and two were related to literature reviews. Thus, nine scientific papers were analyzed.

Table 1: Integrated Review Articles, According to Authors, Year and Country of Publication, Type of Study, Objectives and Conclusions, 2001-2013

Author	Year/Country	Type of Study/Objective	Conclusion
Weddlen; Jackson	2013/USA	Survey study/ To evaluate the effectiveness of an inpatient documentation system for identifying missed vaccine opportunities and to identify parental satisfaction with their vaccination services.	A review of vaccine records is recommended to accurately assess status. Inpatient hospitalization represents an opportunity to assess vaccination status, address parental concerns, and provide updated vaccinations.
Prinja *et al*.	2010/India	Cohort study/ To study the effectiveness of planning and management interventions for ensuring children in India are immunized at the appropriate age.	An intervention involving community volunteers significantly improved age-appropriate DPT immunization in India. The government's intention to recruit Indian village-based volunteers as part of a health sector reform aimed at decentralizing the administration can help to increase timely immunization.
Kumar *et al*.	2010/India	Survey study/ To identify the immunization status of children admitted to a pediatric ward of tertiary-care hospital in Delhi, India, and to find out the reasons for partial immunization and non-immunization.	The immunization status varied significantly with sex, education of parents, urban/rural background, route and place of delivery. The most common reason for not being vaccinated was insufficient knowledge about immunization, and subsequent doses, belief in the side effects, and lack of faith in immunization. The immunization status needs to be improved by education, increasing awareness, and counseling of parents and caregivers regarding immunizations and associated misconceptions.
Gilbert; Wrigley	2009/New Zealand	Survey study/ To audit current practice around opportunistic immunization in a New Zealand hospital and make recommendations for improvement	The current practice around seize opportunities to immunize the hospital is still poor. A series of measures that could be expected to improve this, including the establishment of routine systems to obtain immunization records, a visual reminder system for immunization and training personnel.
Ressler *et al*.	2008/Australia	Survey study/ Determining the accuracy and effectiveness of immunization of children admitted to the pediatric unit and the impact of participation in the immunization program control.	Admission to hospital provides opportunities for updating of immunization; however, to be effective, the screening of health services and immunization documentation must be accurate.
Muehleisen *et al*.	2007/Switzerland	Prospective and intervention-control study/ To evaluate the effect of reminders for parents of vaccination during hospitalization and immunization of children in hospital	More studies are needed to better conclusions because the study may have affected the behavior of physicians, and therefore reflected improvement in the first month.
Setse *et al*.	2006/Zambia	Case-control study/ To assess whether HIV-1 infection was a risk factor for incomplete immunization with diphtheria-tetanus-pertussis (DTP) and oral polio vaccine (OPV) in children hospitalized with the diagnosis of measles.	Infected children at increased risk of vaccine-preventable diseases, not only because of impaired immune response, but due to lower rates of vaccination coverage.
Carvalho *et al*.	2004/Brazil	Clinical Trial/To assess the vaccination status of hospitalized children, analyze the situations that indicate or contraindicate immunization of every child from the diagnosis and medical therapy instituted and update the immunization schedule of hospitalized children who did not have any contraindications to vaccination	The hospitalization was an excellent opportunity to update the vaccination schedule, and have set up in the moment of formation of new behaviors and positive attitudes to maternal child care. There is need for mobilization and sensitization of health professionals to make better use of opportunities to update childhood vaccinations.
Poehling *et al*.	2001/USA	Survey study/ To determine the predictors of immunization status influenza in children who are hospitalized during the seasonal influenza	A minority of children hospitalized with high-risk conditions received the flu vaccine. The medical recommendation to receive the vaccine had a positive impact on the vaccination status of children.

The data were analyzed and the results are presented descriptively, categorized into three themes: (1) Opportunities to vaccinate hospitalized children, (2) Factors against immunizing hospitalized children, and

(3) Strategies and interventions to improve child vaccination coverage.

3. RESULTS

The Table **1** presents the nine papers included in this integrative literature review. The origin of two studies was the United States; two papers were from India, while Brazil, Switzerland, New Zealand, Australia and Zambia had one paper each. The methods used were survey study (five); cohort study (one); intervention (two clinical essays); and control case (one).

4. OPPORTUNITIES TO VACCINATE HOSPITALIZED CHILDREN

One relevant aspect addressed in the papers is that there is an opportunity to check the vaccination status of a child at the time of hospital admission, to update overdue vaccines, and immunize children at risk, that is, an opportunity to provide necessary vaccines to children, a fact that some parents ignore [3-4, 8-9, 16-18].

Hospitalization represents a great opportunity to evaluate the vaccination condition of children, to offer appropriate vaccines, to develop a plan to complete vaccinations, and to identify the causes of missing vaccinations, such as parents' lack of knowledge or poor communication between health professional and parents [4, 9]. Interventions can be implemented in order to ensure that hospitalized children are properly immunized. One study addressing HIV-infected children revealed that these children have low vaccination coverage not because of the infection itself, but because they miss opportunities to be vaccinated, among other factors [19]. Older scholars' children have a greater chance of not having been vaccinated, and in hospitals it is possible to complete vaccination schedules [9].

Based on children's evaluation at the time of hospital admission and registration, the most commonly missed vaccine was influenza (67%) followed by meningococcal (57%), hepatitis A (48%), and varicella (38%) [9].

A study conducted in the United States verified the rate of influenza vaccination among hospitalized children, both those with fever and/or respiratory symptoms and those not at risk. The study reported that 31% and 14% of children, respectively, were vaccinated [17]. The vaccination status of individuals in both groups was strongly influenced by physician recommendations. More than 70% of these children had medical prescriptions for vaccinations. The most commonly cited causes as reported by parents for not vaccinating their children included not knowing whether a child was entitled to receive a vaccine. Another factor related to coverage rates was whether there was a family member already vaccinated. One possible explanation for this relationship is that families may reach a consensus to vaccinate all the family members against influenza to protect a high-risk member and also because they believe the vaccine is important [17].

A study conducted in New Zealand in 2007 addressed data concerning hospitalized children who had their immunization statuses recorded at the time of hospital admission, verifying that 60% of the hospitalized children had been fully immunized. This study also reveals that only 4% of those with incomplete immunization records had their immunization scheme updated at the hospital, while 19% had some note concerning vaccinations documented in their medical charts. This study shows that despite an acknowledgment on the part of the hospital concerning the need to use periods of hospitalization to immunize children, and even after verifying the immunization statutes of these children at the time of admission, there was no significant improvement in the immunization coverage of these children. Measures including the establishment of routine systems are needed to implement and improve immunization in hospitals, such as: verifying a child's immunization record at the time of admission; a system with a visual reminder to vaccinate those children with incomplete immunization records; and training more personnel to administer vaccines [16].

Some of the papers reported good results from programs and interventions implemented at the hospital level to improve vaccination coverage among children. A hospital in Australia implemented an immunization record system [18]; incomplete immunization was verified in Switzerland in 49% of pediatric inpatients, and an intervention was implemented in which reminders and guidelines were provided to parents for them to have their children vaccinated after hospital discharge [3].

A study conducted in Brazil in 2003 reports that 47.4% of the children admitted to a hospital presented delayed vaccination schedules [8]; 21% presented a completed schedule, and 31.6 did not report such information. Among those who presented incomplete

schedules, 73.1% were vaccinated and only one child experienced fever after vaccination.

5. FACTORS AGAINST IMMUNIZING HOSPITALIZED CHILDREN

According to studies, the factors influencing the non-immunization or partial immunization of hospitalized children include factors related to parents' lack of knowledge concerning side effects, subsequent doses, mistaken beliefs regarding immunization efficiency, disbelief in vaccine safety, the belief that the oral polio vaccine (OPV) is the only important vaccine, not knowing whether the child is entitled to the vaccine, and a lack of perception concerning the susceptibility to diseases [4, 9, 17].

There are also logistics-related factors: a shortage of vaccine doses in health services and accessibility [4]. There are factors related to health professionals: a lack of knowledge in general or knowledge concerning the vaccine's real counter-indications; poor guidance or lack of guidance to parents.

There are factors related to caregivers: issues related to socio-economic status, ethnic origins, sex, and race [4].

The most common reasons for not immunizing hospitalized children include a concern on the part of health professionals regarding the disease the child is experiencing, vaccine safety, or time restrictions [16].

6. STRATEGIES AND INTERVENTIONS TO IMPROVE CHILD VACCINATION COVERAGE

The levels of child vaccination can be improved through education, increased awareness, trust and guidance provided to parents and caregivers designed to clarify associated misconceptions [4]. It is essential to identify the factors that encourage families to vaccinate their children in order to decrease the gap between the children's right to immunization and their vaccination status [17].

A lack of knowledge concerning immunization, a child's right to it, and misconceptions concerning health issues are important barriers to influenza vaccination. Campaigns directed to the elderly and health professionals are implemented annually, but little is disseminated about the right of children to receive immunizations, especially those at risk [17].

The limited number of health professionals is an important problem in many countries and efforts on the part of governments are needed to solve this problem. A study conducted in India reports that positive results were achieved with volunteers that aided in the immunization process and the related logistics [20].

One of the obstacles faced by doctors and nurses is the absence of immunization records. In many cases, the record is completed only based on parents' memory [9]. Most of parents (92%) thought that their children had received all of the appropriate vaccinations, but when revising the records, only 16% were in compliance with the vaccination program [9]. It is necessary to build strategies to optimize vaccination records.

The following strategies to take advantage of the opportunity to vaccinate hospitalized children were proposed: providing information to health professionals and sensitizing them to the importance of administering vaccines to hospitalized children and establishing a routine to check vaccination cards during daily visits to inpatients [8].

7. DISCUSSION

Hospitals are facilities that offer a valuable opportunity for professionals to check the immunization status of hospitalized children and can support other healthcare services in monitoring children after hospital discharge [9, 16, 21].

Health professionals should check the vaccination cards of children at the time of hospital admission and update missing doses. The professionals should also pay attention to those children with lengthy hospitalizations, especially low-weight newborns and premature infants, taking into account the indications and recommendations for each vaccine [21]. In some hospitals, the immunization of hospitalized children has become a routine procedure in the practice of health professionals and the documentation of the immunization status of hospitalized children is considered an indicator of hospital performance [16].

It is also important for health professionals working in hospitals to be concerned with preventive measures [18]. Immunization teamwork can be incorporated into of hospital routines without any increase in costs. Health professionals should be made aware of the importance of immunization and the possibility of using non-traditional places to promote immunization [22-23]. Many hospitals lose the opportunity to administer vaccines and routines, visual reminders, and personal training that need to be implemented in order to improve such actions [16].

Every contact between children and health professionals should be considered an opportunity to implement immunization. Pediatric inpatients are a group that is particularly vulnerable to incomplete and delayed immunization [24]. The professionals working in immunization services should pay attention to vulnerable groups and those with low immunization coverage rates, to understand the nature and extent of problems that affect immunization rates in these groups, as well as intensifying focused interventions in order to achieve more equitable vaccination coverage [5].

The immunization of children in hospitals may be a challenge for both health professionals and parents. One reason is that some parents prefer a single health professional to be the one who regularly administers vaccines to their children, while other parents have the perception that their children are not healthy enough to receive a vaccine. It is, however, important to consider that hospital immunization can help update the vaccination scheme of some children and even create immunization records where none had previously existed [25]. Under-recording on vaccination cards is also an important obstacle in the assessment of children's vaccination statuses. A study conducted in the United Kingdom investigated under-recording on vaccination cards and verified that 49% of the mothers reported more vaccines were administered than the ones officially recorded [24]. Physicians and nurses consider a lack of immunization records to be a barrier to the administration of vaccines. The implementation of electronic immunization records, accessible by any professional in the public health system, would partially resolve this issue [10].

There are challenges to be overcome, but achieving a satisfactory solution is not a difficult task. The first challenge to overcome is the fact that hospitalized children are in an environment attuned to intensive care rather than to primary prevention. That is, at the hospital, the child is subject to a certain routine and has many needs specific to his/her hospitalization, so that the administration of vaccines may be overlooked. Other challenges include a lack of documentation concerning the immunization status of children and the fact that many nurses feel insecure administering vaccines due to a lack of training or a lack of updated knowledge in the field [26].

False counter-indications and out-of-date conceptions on the part of health professionals result in missed opportunities [8]. Hospitalized child is sometimes considered a counter-indication to immunization [21].

Vaccines are usually administrated by nurses and physicians in most countries. Some studies conducted in England, Canada and the United States report differences in immunization practices between these professionals. These differences are related to attitudes, beliefs, behavior and intentions. Behaviors of nurses and physicians were compared and it was verified that nurses had more positive attitudes and beliefs concerning the administration of multiple vaccines during a single consultation [10]. Nurses also experienced more pressure from parents to administer all the recommended vaccines and tended more frequently to administer all the required vaccines during a single consultation.

Among hospitalized children, the influenza vaccine should be considered a priority in health care [9]. Many times, these children have a high risk of mortality relating to influenza. Additionally, they can be considered vectors in the spread of influenza. Hospitalization is a great opportunity to vaccinate children against influenza during seasonal campaigns [27].

Use of the media is a powerful strategy for improving vaccination coverage, although, in the case actual media regarding influenza vaccination, it does not disseminate information concerning children who are eligible for the vaccine but more strongly focuses on the elderly. Being older than 65 years old is not the most important risk factor for influenza-related mortality. Healthy individuals older than 45 years of age are at a lower risk when compared to many children (and their caregivers), especially children with risk factors such as respiratory problems, heart disease, cancer, immunosuppression, immunodeficiency, and hemoglobinopathies [23]. Creating greater awareness in the general population concerning the immunization rights of children by disseminating information through the media, i.e., using posters, magazines, and vaccination campaigns, is needed [5].

One of the greatest difficulties in improving vaccination coverage is that many children do not adhere to a health service or their families seek a health service only when they are sick. As a consequence, health professionals have difficulty identifying these children's immunization needs, misunderstanding counter-indications and, consequently, losing the opportunity to update a child's vaccination scheme. Health professionals need to be aware of their patients' vaccination needs, even when in a hospital environment [26].

Lost opportunities significantly contribute to low immunization rates for influenza among children afflicted with chronic diseases [28]. In this study, the parents of non-vaccinated children reported a lack of recommendations from medical staff and had a limited perception of their children's susceptibility to influenza [28]. Potential opportunities to immunize children against measles are being lost in hospitals [29]. Such a situation is considered an effect of a fragmented approach to health care delivery and indicates a need to rapidly integrate curative and preventive practices into the health services.

It is possible to improve the immunization coverage of a population by up to 30% if health professionals invest in all the opportunities available to administer vaccines [30]. The opportunity to vaccinate hospitalized children should be taken, especially to immunize a predominantly non-immunized population. Moreover, it may also be an opportunity to implement educational actions among families and health professionals, as well as to connect hospitals to the community [8, 22]. Health professionals should consider alternative places to administer vaccines. The integration of primary health care and hospital care can contribute to improving vaccination coverage rates among children [8, 31].

Hospital facilities offer a great opportunity to vaccinate vulnerable children at risk and can contribute to the improvement of vaccination coverage, since they are places where factors that contribute to non-vaccination can be identified, where educational interventions can be implemented to target parents, vaccination records can be updated, and reminders and guidance concerning immunizations after hospital discharge can be provided.

There are few studies addressing this subject and further research is needed. The studies available revealed the positive results of such practices. Many children seek health services only when sick, which is an opportunity to administer vaccines that is not to be missed.

A greater commitment on the part of professionals and hospital managers, as well as periodic immunization training to update medical staff knowledge, is required in order to consolidate this practice in hospitals. The use of protocols and instruments that are able to aid professionals in the implementation of this practice is a promising measure to reduce uncertainty when facing the implementation of a new routine procedure.

It is important that governments acknowledge the practice of vaccinating hospitalized children and facilitate the hiring of qualified professionals and the logistics involved in such a program, provide funding for the training of professionals and the implementation of research in the field of immunization. Furthermore, governments should revise official recommendations provided in vaccination manuals to include information concerning the immunization of children in hospitals, providing to professionals working in hospitals vital support and access to knowledge concerning immunization and its management in hospitals.

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