BLOOD LEAD LEVELS OF REFUGEE CHILDREN IN RHODE ISLAND

by

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Abstract

Lead and its harmful effects on children have been known for over one hundred years. Yet exposure continues to be a public health concern within the U.S., specifically in the urban areas (Lidsky & Schneider, 2003). Blood lead levels (BLL) were found to be elevated in 11.3% of recent refugees children within the U.S. (Hebbar, Vanderslice, Simon, & Vallejo, 2010). Currently, the Center for Disease Control (CDC) estimates that approximately half a million children between the ages of one to five years have a blood lead level above 5µ/deciliter (CDC, 2017). Lead is neurotoxic and young children are at a particularly high risk of exposure. Many studies indicate that adverse outcomes in intellectual functioning and social-behavioral conduct. It is not clear if long-term effects develop at concentrations below 10 µg per deciliter (Canfield et al., 2003).

Minimal research done to evaluate the implementation of the CDC guidelines on blood level screening of refugee children that are newly arrived into the U.S. (Raymond et al., 2012). This project analyzed the health records of refugee children who settled in Rhode Island and were receiving care in the refugee clinic within a large academic medical center. Records were reviewed for adherence to Center for Disease Control (CDC) guidelines regarding BLL in refugee children.

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Blood Lead Levels of Refugee Children in Rhode Island

Background/Statement of the Problem

Children are a vulnerable group within the population of the United States (U.S.). One of the major risks that children face is increased lead levels from their environment. Lead poisoning of children in the U.S. was recognized as early as 1914, but it was not until 1970 that federal legislation was passed to prohibit the use of lead paint in residential properties (Rabin, 1989). Heightened awareness of childhood lead poisoning became a concern during the 1960's and 1970's when reports of severe poisonings were quite common (Rabin, 1989). The National Health and Nutrition Examination Surveys of preschool children between the years of 1976 – 1980 showed that 88.2% of those children had elevated blood lead levels, with levels in the same category dropped to 0.9% in the 2003 -2008 survey (Rogers et al., 2014). Currently, the Center for Disease Control (CDC) estimates that are approximately a half million children between the ages of one to five years are diagnosed with a blood lead level above 5μ/deciliter (CDC, 2017).

Lead and its harmful effects on children have been known for over one hundred years. Yet exposure continues to be a public health concern within the U.S., specifically in urban areas (Lidsky & Schneider, 2003). In a refugee study in the U.S., blood lead levels (BLL) were found to be elevated in 11.3% of recent refugee children (Hebbar, Vanderslice, Simon, & Vallejo, 2010).

For the purposes of this study a refugee is, as defined by the Immigration and Nationality Act, "a person who is unable or unwilling to return to his or her country of nationality because of persecution or a well-founded fear of persecution on account of race, religion, nationality, membership in a particular social group, or political opinion"

(Mossad, 2014). During the fiscal year 2016 (October 1, 2015 through September 30, 2016) it was estimated that 292 refugees resettled in Rhode Island, and approximately 126 were children under the age of 18 years, as reported by the State of Rhode Island's Department of Human Services (2017).

Refugee children newly arriving into Rhode Island are generally placed in homes within the Providence area. This area of the state provides easier access to resources needed for transition, such as medical care, Dorcas International Institute of Rhode Island, and the Diocese of Providence. However, housing units in the city of Providence have an increased risk for lead hazards due to the homes' locations in older neighborhoods (Williams et al., 2012). For this reason, refugee children living in Rhode Island are at high risk for lead exposure.

An acute care medical facility in Providence, RI provides care to refugee children through its refugee clinic. Primary care consists of BLL screening, lead toxicity prevention, and education for the patient and family. During FY 2017, 347 children received care in this refugee clinic. The clinic officially opened its doors to the refugee population in 2007. The clinic's mission is to standardize and streamline the initial health exam and follow-up care of the refugee children arriving in Rhode Island from countries around the world, including Liberia, Burundi, Eritrea, Iraq, Somalia, and Nepal (Lifespan, 2018). The clinic is considered to be medical home for refugee families; they receive care that is comprehensive, collaborative, and cost effective (Lifespan, 2018).

In 2004, the CDC set recommendations for blood lead screening for all newly arriving refugee children between the ages of six months and 16 years (Raymond, Kennedy, & Brown, 2012). In 2013, the CDC recommended that children between the ages of six months to 16 years arriving into the U.S. have their BLL tested within 90 days of arrival; it is preferred by the CDC to have the blood levels tested within 30 days of arrival. The CDC recommends a rescreening three to six months after resettlement for children between the ages of six months to six years of age. Minimal research has been conducted to evaluate the implementation of the CDC guidelines for blood level screening of refugee children that are newly arrived into the U.S. (Raymond et al., 2012).

The aim of this retrospective chart review was to evaluate adherence by the State of Rhode Island, clinical providers, and patients to the lead level screening of refugee children of the 30 and 180-day recommendation by the CDC. This review was focused on children who have resettled into Rhode Island and received care in the refugee clinic within a large acute care facility in Providence, Rhode Island. The charts were also reviewed for follow-up appointments that included routine blood lead level screening at one year of age and five years of age.

Literature Review

A literature search was performed using government websites, Ovid, and Ebscohost. The search terms used were lead levels in children, lead levels in refugee children, lead levels in children in Rhode Island, and history of lead exposure. The search included articles from 1989 – 2018.

History of Lead Poisoning

Rabin (1989) explored the history of childhood lead poisoning in the U.S. and abroad beginning in 1914 with the first reported case within the U.S. By the middle of the 1920's, childhood lead poisoning was being recognized as a significant health issue. The lead industry was beginning acknowledge a link between lead exposure and lead paint within the home, including but not excluding porch and crib railings, paint chips and windowsills (Rabin, 1989).

The physicians during that time found it difficult to diagnosis lead poisoning because the symptoms mirror many other childhood symptoms, such as vomiting, abdominal pain, and constipation. X-rays for excessive absorption of lead were not available until the 1930's and simple blood tests for lead levels were not available until the 1940's (Rabin, 1989).

The lead industry recognized as early as 1930 that lead based products posed a danger to children (Rabin, 1989). During this period, the Lead Industries Association requested information from the manufactures of children's toys and furniture regarding the application of lead based paint to their products. The queries showed that by that time few manufacturers were using lead based paint. While the industry clearly understood that their product posed a considerable risk for children, they continued into the 1940's to publicly deny it (Rabin, 1989). Again in the 1940's, manufacturers claimed to have discontinued making lead based interior paint. Houses built after 1940 continued to have lead based paint used on the interior after claiming to have stopped using and manufacturing the product. Federal legislation was passed in 1970 prohibiting the use of lead based products. It was not until years later that limits were set, initially 0.5 percent lead and then in 1978 lowering to 0.06 percent (Rabin, 1989).

Sources of Lead Poisoning in Housing

Rogers et al. (2014) examined the effects of changes in the 2002 Rhode Island Lead Hazard Mitigation Law on children's blood lead levels. The Lead Hazard Mitigation Law of 2002 required landlords to attend classes to identify and mitigate lead hazards on their property, alter maintenance practices that meet lead safe requirements, and obtain certification in lead conformance from a certified lead inspector. The study focused on the neighborhoods of Central Falls, Pawtucket, Providence, and Woonsocket during 2005 – 2009 (Rogers et al., 2014). These locations were chosen due to the high percentage of poverty and older homes built before 1978 within these cities. The year 1978 is significant, as lead based paint was no longer allowed in the U.S. after that year (Rogers et al., 2014). Multiple data sources were used for the study, including lead screening data that was collected by the Rhode Island Department of Health (RIDOH) between the January 1, 2005 to December 31, 2009, for children from birth to 72 months, and their home address at the time of the blood draw. Addresses were compared for accuracy with data from the Rhode Island Housing Resources Commission (RIHRC) and the RIDOH on lead hazard mitigation certificates (LHMC).

First considered was the compliance of the properties with the Lead Mitigation Law during the study period. The BLL of children of compliant homes were compared with those in non-compliant households. Results indicated that only 10.6% of the properties acquired a LHMC during the study period (Rogers et al., 2014) Multi-family, apartment, and mixed-use housing had a greater compliance than single-family properties. BLL of children who resided in properties that obtained the LHMC during the study were significantly lower. The BLL of children in homes with an LHMC decreased from 5.2 μg per deciliter to 4.3 μg per deciliter. Of the children whose blood was screened, 3.4% had a BLL of 10 μg per deciliter or greater in houses that did not obtain an LHMC at any time during the study (Rogers et al., 2014). Limitations of the study included not knowing if the owner of the house obtained an LHMC because of compliance with the law or because a child living in the home had a high BLL. Another limitation was that the LHMC status of all the apartments in multi-family housing was unknown. Lastly, it was largely unknown how long the children lived in the house at the time of the study. The results of the study suggest that health policy can have a significant and positive impact on the health of children as evidenced by decreased BLL of the children living in the homes when landlords are compliant with Lead Hazard Mitigation Act of 2002 (Rogers et al., 2014).

Effects of Elevated Blood Lead Levels in Children

In a study by Canfield, Henderson, Cory-Slechta, Cox, Jusko, and Lanphear (2003) blood lead concentrations were associated with children’s IQ scores at three and five years of age. Decreases in IQ were found to be greater below 10 μg per deciliter than at higher concentrations. The study concluded that lead is neurotoxic and that young children are at a particular high risk of exposure. It was not clear if long-term effects occur at concentrations below 10 μg per deciliter (Canfield et al., 2003).

In this study, children born between July 1994 and January 1995 had been previously enrolled in a study at five to seven months of age which was not focused on lead poisoning. Families were asked to participate in the lead effect study when the children were 24 to 30 months of age. Of the 240 eligible participants, 65 of those children were not assessed at the age of five years for missed appointments, relocation, declined to participate, or died. Children were tested at three and five years of age (Canfield et al., 2003).

Children were assessed using the Stanford-Binet Intelligence Scale, fourth edition, which tests vocabulary, spatial pattern analysis, quantitative ability, and memory. Examiners were not told of the child's lead status (Canfield et al., 2003). Venous blood samples were obtained at seven age points between the ages of six months and 60 months. Four exposure indexes were analyzed: lifetime average, peak, concurrent, and average blood lead concentration in infancy (Canfield et al., 2003). A total of 198 children completed at least one of the assessments. Of those 198 children, 176 (86.9%) had complete data for all variables.

The results showed that the mean blood lead concentration was lowest at six months of age (3.4 μg per deciliter), reached a max at two years of age (9.7 μg per deciliter), and decreased to 6.0 μg per deciliters at five years of age (Canfield et al., 2003). The lifetime average blood lead level was 7.7 μg per deciliter at three years of age and 7.4 μg per deciliter at five years of age. At three years of age, 86 children (57%) had peak blood lead concentration below 10 μg per deciliter and 86 children (55.8%) at the age of five years showed the same results (Canfield et al., 2003).

The findings suggest that there are potentially more U.S. children affected by environmental lead exposure than previously estimated. Due to no effective treatment existing for children with moderately elevated blood lead concentration, the authors conclude that primary prevention is the best treatment (Canfield et al., 2003).

Blood Lead Levels of Children in United States

In a report by Raymond and Brown (2017), BLL of children living in the U.S. were studied. Results were sent by state/local health departments to the CDC Childhood Blood Lead Surveillance system for examination. The CDC has determined that neurological damage and behavioral disorders have been associated with BLL of < 5 μg per deciliter. However, no safe range of lead in the blood has been determined. Children under the age of five years are at a higher risk. Developmentally, they are likely to put their hands and other objects into their mouth, and those objects may be contaminated with lead dust. In addition, children grow at an increased rate which places them at risk for negative outcomes (Raymond & Brown, 2017).

The authors discuss that states were given federal funding for lead poisoning prevention and treatment available to them from the early 1990’s to 2012. This funding was used for surveillance on a quarterly basis to the CDC’s Healthy Homes and Lead Poisoning Prevention Program (Raymond & Brown, 2017). After 2012, when the funding ended, only twenty-seven states were able to continue to submit data. All other states lost their childhood lead programs due to the lack of funding. In 2014, the federal funding was restored. Thirty-five state programs were funded and the other states were again able to compile data and send it to the CDC. The CDC requires participating states to send specific information. Information collected includes demographics of the child, laboratory information, and date of the blood draw, city name/zip code, and the test results (Raymond & Brown, 2017).

The BLL data reported by the city/zip code that the child lived in at the time of the blood draw. These reports are used to track trends in childhood lead exposure and morbidity statistics. One of the limits is that data collection and reporting among the states varies according to individual state laws and regulations making it challenging to compare the blood levels between the varying states (Raymond & Brown, 2017).

A study by Schmidt (2013) discussed challenges related to elevated BLL faced by refugees. Some of those challenges are related to cultural differences and obtaining safe housing placement after arrival to the U.S. Differences in or lack of environmental controls may contribute to the problem of refugees arriving to the U.S. with elevated BLL. Some of the environmental differences in international regulations are related to exposure to industrial metal smelting, recycling of lead-acid batteries, lead based paint, and lead based gasoline (Schmidt, 2013). While most countries have unleaded gasoline, leaded gasoline of the past has contaminated the soil adjacent to roadways.

While some of the challenges are environmental, cultural concerns should also be considered. Culturally, some families prepare food and eat their meals on the floor where the children will be exposed to lead dust and lead tainted soil (Schmidt, 2013). Some limited evidence indicates that traditional products that are imported from refugees' home countries may be exposing the children. For example, in 2009, there were 14 cases of elevated blood lead levels with a Burmese population resettled in Indiana (Schmidt, 2013). The cause was traced back to a traditional folk medicine to aid with digestion called Daw Tway. The children in this study had an average BLL of 18.0 μg per deciliter (Schmidt, 2013). The researchers concluded that it is difficult to teach the dangers of these traditional products to the refugees due to cultural differences and belief systems; their ancestors have been using these products for many generations. In addition, a language/communication barrier poses challenges to prevention education, particularly when large amounts of information must be transferred to families in a relatively short amount of time (Schmidt, 2013).

Another example of a culturally based risk is described in Morbidity and Mortality Weekly Report (MMWR) by Silva et al. (2005), which explored potential sources of lead exposure in the Hispanic population of Rhode Island. The source is called litargirio. Other names are litharge or lead monoxide. It is a yellow or peach-colored powder used in Hispanic culture as an antiperspirant and deodorant. The MMWR report specifically discussed a case study involving seven-year-old twin Hispanic males living in Rhode Island. Blood levels for lead were drawn yearly during their annual physical from the age of nine months. The levels were not elevated until the age of seven years. The results at that time were 14 μg (Twin A) and 15 μg (Twin B) per deciliter. Approximately two years later, in May 2003, twin A's BLL had risen to 42 μg per deciliter and twin B's elevated to 26 μg per deciliter (Silva et al., 2005). During this time frame the house underwent lead remediation of the interior in June 2002 and in May 2003 exterior lead paint contaminants were removed. The parents also had lead education during the same time period.

In May 2003, the RIDOH conducted a home investigation because the lead levels of the children in the home continued to rise. The investigation team found litargirio in a small jar in the child's bedroom. The children had been using the substance as deodorant. The litargirio tested positive for lead using a field test. It was removed from the home at this time, and sent to the state lab for testing where it was confirmed that the litargirio contains 79% lead (Silva et al., 2005) The twins' grandmother, who was visiting from the Dominican Republic, had brought the product into their home.

Litargirio was found to be available in local stores within the Hispanic communities. The RIDOH issued a statewide health alert on June 30, 2003, advising the public to stop using the product and for any pregnant mothers, nursing mothers, or children using the product to undergo blood lead screening. The RIDOH notified the CDC and Food and Drug Administration (FDA) about what they found in Rhode Island, and a warning was issued regarding litargirio (Silva, et al., 2005).

Silva et al. (2005) reports that the RIDOH and CDC conducted a survey using a convenience sample in three hospital based pediatric clinics during January – February 2004 to assess litargirio use in the Hispanic community. The survey was administered to 1,025 persons; 599 (58%) were considered eligible. Out of the eligible population 584 (98%) participated in the survey. Eligibility was determined by considering themselves Hispanic, were a parent/guardian, lived with a child, and ≥ 18 years old (Silva et al., 2005). The results showed that of the 584 participants, 27% had heard of litargirio and 85% were Dominican. Seventy-eight percent of the Dominicans heard about the product from their home country. Ninety-five percent typically used the product while growing up in their country of origin (Silva et al., 2005). No Dominican participant reported current use of the product. No additional cases of increased BLL due to litargirio have been reported to the RIDOH or CDC at the time of this report.

The authors noted that unsafe housing is also a factor putting the children at risk for elevated BLL. The U.S. Department of State provides housing assistance and the housing is generally arranged prior the family arriving within the U.S. Landlords are required by law to reveal to the new tenants any lead paint or hazards that are on the property. The landlords are also required to address and contain any lead hazard that is on the property (Schmidt, 2013). States have differing laws. For example, Massachusetts is among the strictest with a lead free standard. Any housing provided to a refugee family with a child under the age of six years must be declared lead free (Schmidt, 2013). Unfortunately, the regulations are not always followed or enforced. The refugee families may be placed in housing that poses lead risks.

Blood Lead Levels of Children in Rhode Island

A Morbidity and Mortality Weekly Report (MMWR) by Matyas, Simon, Dundulis, Vanderslice, and Boulay (1995) summarized the blood lead level results of over 56,000 children under the age of six years living in Rhode Island. The results were reported to the Rhode Island lead surveillance system from March 1993 to February 1995. In Rhode Island, it is mandatory for children under the age of six years to be screened for elevated blood lead levels. From the first year to the second year, the percentage of children with blood lead levels greater than or equal to 10 μg per deciliter showed a decrease (Matyas et al., 1995). An exception is the group of children with a blood level of greater than or equal to 45 μg per deciliter which remained the same for these years. Within those two years, 66.9% of the children with 10 μg per deciliter or higher were living in poverty and were members of a minority group. In the same two years, the mean BLL dropped from 5.4 μg per deciliter to 4.1 μg per deciliter (Matyas et al., 1995). These changes occurred in all ethnic, socioeconomic, and age groups.

Children under the age of two years had the highest average blood lead levels in both years of data gathered. The findings in the report show that the average BLL of children in Rhode Island between the years 1993 – 1995 dropped. The reasons for the decline may be due to sampling differences, using venous vs. capillary drawing methods, prevention activities and decreases unrelated to prevention activities (Matyas et al., 1995). BLL were highest in minority children and children living in poverty. Despite the work being done in Rhode Island, elevated BLL in children was found to continue. The report recommended continued surveillance of trends (Matyas et al., 1995).

Blood Lead Levels of Refugee Children in Rhode Island

Williams, Vanderslice, and Feliz (2012) analyzed the prevalence of lead poisoning between the years of 2008 to 2011 of refugee children in Rhode Island. This report discussed the Providence neighborhoods in which refugee children were placed. This placement put them at a higher risk of lead exposure due to the age of the homes within the neighborhood. The authors also discussed the potential to lower the recommended concerning lead level in children from the previous standard of 10 μg per deciliter to 5 μg per deciliter. The RIDOH Lab screened blood lead samples of 257 refugee children from 2008 to 2011. The results indicated that of the 257 refugee children screened, 23 refugee children had BLL that were above 10 μg per deciliter, and of those, 12% were under the age of six years (Williams et al., 2012). During the same time period, 3.4% of all Providence children of the same age had elevated blood lead levels. Out of the 23 refugee children, four had an increase in their blood lead levels after their first screening. Two of these children had an increase after moving into a second housing location. The other two children had an increase while remaining in their original housing placement. The other 19 children did not experience an increase in BLL (Williams et al., 2012). Of the 257 refugee children who had BLL screening in Rhode Island between the years 2008 and 2011, 40% of the BLL fell between five to 9 μg per deciliter (Williams et al., 2012).

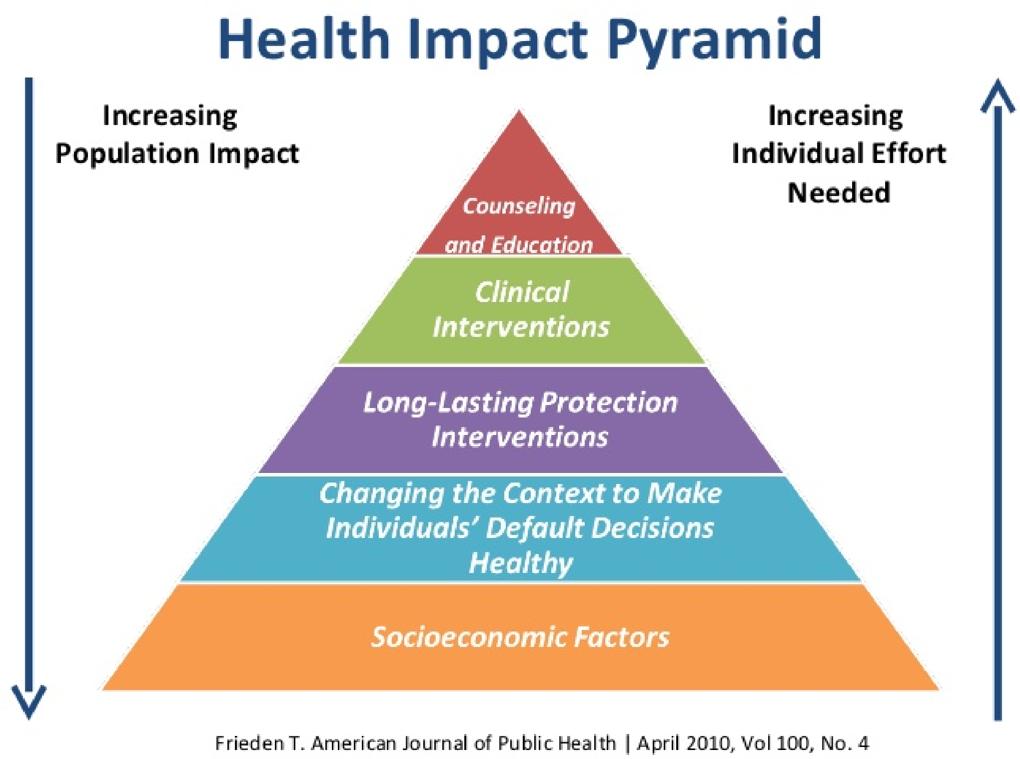
The CDC Advisory Committee on Childhood Lead Poisoning Prevention had changed the recommendation that the standard for safe lead level be lowered to 5 μg per deciliter from 10 μg per deciliter during the study period (Williams et al., 2012). It is important to note, of the 257 refugees screened between 2008 and 2011, 100 children fall into the five to nine μg per deciliter range (Williams et al., 2012).

The authors note that continuing to address the housing needs of refugee children will necessitate quarterly reports to RIDOH regarding housing placements, commitment to safe housing for refugees, and continued open communication between RIDOH and all state/federal agencies involved in the safe resettlement of refugee children (Williams et al., 2012). The authors found that screening information collected from 2008 to 2011 did not provide sufficient data that the current housing placements are contributing to elevated blood levels in the child refugee community (Williams et al., 2012). They concluded that this has contributed to many refugee children arriving in the U.S. with BLL below 10 μg per deciliter and continuing with low BLL during childhood. Children with elevated BLL experience a decline over time (Williams et al., 2012).

Hebbar et al. (2010) explored the prevalence of lead poisoning in refugee children of Rhode Island as compared to non-refugee population of children in Rhode Island. Data collected from the RIDOH between the years 2004 – 2008 were studied for lead level results of children residing in Providence, Rhode Island. The ages for the two groups of children differed: refugee children had an upper limit of 16 years and non-refugee children had the upper age limit of six years. The two different age groups were used to ensure that there was adequate data for comparison. The results showed that that the refugee children had elevated BLL, with a high of 40.3% in 2005, compared to 7.0% in non-refugee children in the same year. The results also showed that BLL of refugee children were five times greater than that of the non-refugee children (Hebbar et al., 2010). Limitations of the study were a number of settlement records from the RIDOH could not be found; this was potentially due to change in state residency, lack of screening compliance, data entry, or arrival from another state. A conclusion drawn by the authors is that future studies will be needed to show if exposure occurs after arrival into the country or prior to arrival (Hebbar et al., 2010).

Theoretical Framework

Dr. Thomas Frieden's Health Impact Pyramid (2010) was used as the theoretical framework for this project. The Health Impact Pyramid consists of five-tiers that describe effective levels of public health interventions for health improvement. The levels of the pyramid are arranged in ascending order from population impact to individual impact (Frieden, 2010). A of the Health Impact Pyramid is shown below.



Socioeconomic factors is the first tier at the base of the pyramid and includes poverty reduction and improved education. Many of the refugee children affected by lead exposure live in a state of poverty and low income and/or older housing. One of the basic ways to lower the incidence of lead exposure is to ensure safe housing for children, many times requiring money on the part of the family or the knowledge of how to improve the living conditions that to which there are exposed. Policies that impact on the risk factor of poverty such as education would be examples of interventions at this level.

Working up in ascending order, the next tier is *Changing the Context* to encourage healthy decisions. This tier includes interventions that have been put into place within the environment that makes a healthy decision the default decision, for example, a lead free home. Community support, such as refugee resource centers, registered nurses (RN), and physicians can help to educate the family on interventions to reduce the risk of lead exposure of children. The literature showed examples of lead exposure tied to traditional products from their country of origin, such as litargirio, a product containing lead used as a deodorant (Silva et al., 2005) and kohl, a traditional lead containing product used on children's eyes believed to protect the child from curses (Schmidt, 2013). Education will assist families in making wise decisions when considering the use of these products.

Third in the pyramid is *Long-Lasting Protective Interventions*. Immunization is a good example of how this protects the community as a whole but also protects the individual. Within the framework of this project, the Lead Hazard Mitigation Law of 2002 is an example of an intervention that will assist in protecting the community and individuals. The Lead Hazard Mitigation Law required landlords to attend classes to identify and mitigate lead hazards on their property, altered maintenance practices that meet lead safe requirements, and obtain certification in lead conformance from a certified lead inspector (Rogers et al., 2014).

The fourth level of the pyramid is *Clinical Intervention*. The CDC (2017) recommends screening for lead exposure for refugee children between the ages of six months to 16 years and a rescreening three to six months after resettlement for children between the ages of six months to six years of age. Without this intervention, refugee children with lead exposure would potentially be left untreated. Continued exposure would leave them at an increased risk for harm, such as lowered IQ and impaired academic achievement (Lidsky & Schneider, 2003). This lead screening should be included in a full health screening for refugee children. Upon finding an increased lead level, protocols dictate appropriate follow-up, intervention, and clinical care if indicated.

The final and fifth pyramid level is *Counseling and Educational Interventions*. Health education regarding prevention of lead exposure will benefit the individual, the family, and the community. Physicians, RN's, community outreach workers, and community resource centers may provide education to the family regarding a lead safe environment. An example of a resource available to the families of Rhode Island is the Childhood Lead Action Project (ND). Refugee children whose families have settled in Rhode Island have similar elevated BLL as in other parts of the country. While studies done by the RIDOH have shown that this is a problem within the refugee population there are local lead action agencies that are making strides in this area (Childhood Lead Action Project, ND)

The Childhood Lead Action Project has been assisting children and their families since 1992. They are working to eliminate lead in our states housing through education, parent support, and advocacy (Childhood Lead Action Project, ND). The Childhood Lead Action Project is a grassroots group that has used outreach, training, lead remediation, and advocacy to increase awareness of lead risk in high-risk neighborhoods such as Providence, RI. Examples of accomplishments of the group include, implementing lead poisoning prevention education for parents, providing information and referral services to the community on a wide range of issues, and bringing together professionals in a conference environment to discuss lead and its elimination (Childhood Lead Action Project, ND).

This education includes continuity if the family moves to a new housing location. At this time it will be important for them to use the education or resources provided to them to ensure that they are placing their family into a safe environment and ask the appropriate questions of the landlord to ensure that the housing remains safe since some families are initially placed in safe housing, but then move to housing with lead risks due to financial constraints. Families will need to stay vigilant to the impact of their environment on their children.

Methodology

Purpose

The purpose of this project is to evaluate adherence to the refugee lead level screening at 30 and 90-days as recommended by the CDC between the years 2015 and 2017 for refugee children served by a Rhode Island outpatient refugee clinic. The medical records were reviewed for follow-up appointments that consisted of blood lead level screening of refugee children at one year of age and five years of age.

Design

This project is a retrospective chart review.

Sample

The project consisted of randomly selecting and examining 50 medical records of refugee children aged six months to 16 years. Specifically, physician notes, social work notes, demographic information, and lab results of children who had a primary resettlement in Rhode Island and received care in a clinic setting between March 2015 and October 2017 were analyzed.

Site

The data collection took place in an acute care academic medical center in Rhode Island, a Lifespan Health System facility. There were no organizational barriers that prevented this project completion.

Procedures

The data collection was performed in May 2018. Collection of information began after an Institutional Review Board (IRB) for both Rhode Island College and the medical center were obtained. A primary investigator at the facility was secured.

Medical records were searched for using the patient panel of the refugee clinic. Assistance was needed from outpatient administration staff to obtain the patient panel. Medical record selection was randomized using the second to the last number in the medical record number (MRN) in the electronic medical record (EMR). The numbers were selected on a random basis utilizing a ten-sided die. Three die were rolled once and the numbers reflected on the dice correlated with the second to last number in the MRN.

The data collected consisted of the current age of the patient, the date and age of patient at the first blood lead level screening, and the date and age of the patient at the second blood draw to compare against the CDC guidelines for compliance with the recommendations. In addition, if applicable, the date of the BLL screening that had been drawn was recorded at one and five years of age recording actual ages at the time of the screening. All information was retrieved from the electronic health record (EHR) utilized by Lifespan Health Systems. All data had personal health information (PHI) removed to protect confidentiality. Individuals that have been resettled in Rhode Island as their secondary resettlement were excluded in this project. Resettlement in another state prior may have given them the opportunity to complete their health screening at their prior location. No ethical concerns were identified for this project.

A study code was assigned to each patient. Data was secured on an encrypted flash drive that was stored in a locked office. All information will be kept in a locked cabinet in a locked office of the researcher for seven years, then deleted and destroyed at the end of the project. Data was recorded in a table to analyze the percentage of children who have had their blood drawn at 30 and 90 days as well as one and five years of age. Project data was evaluated for adherence to the CDC guidelines.

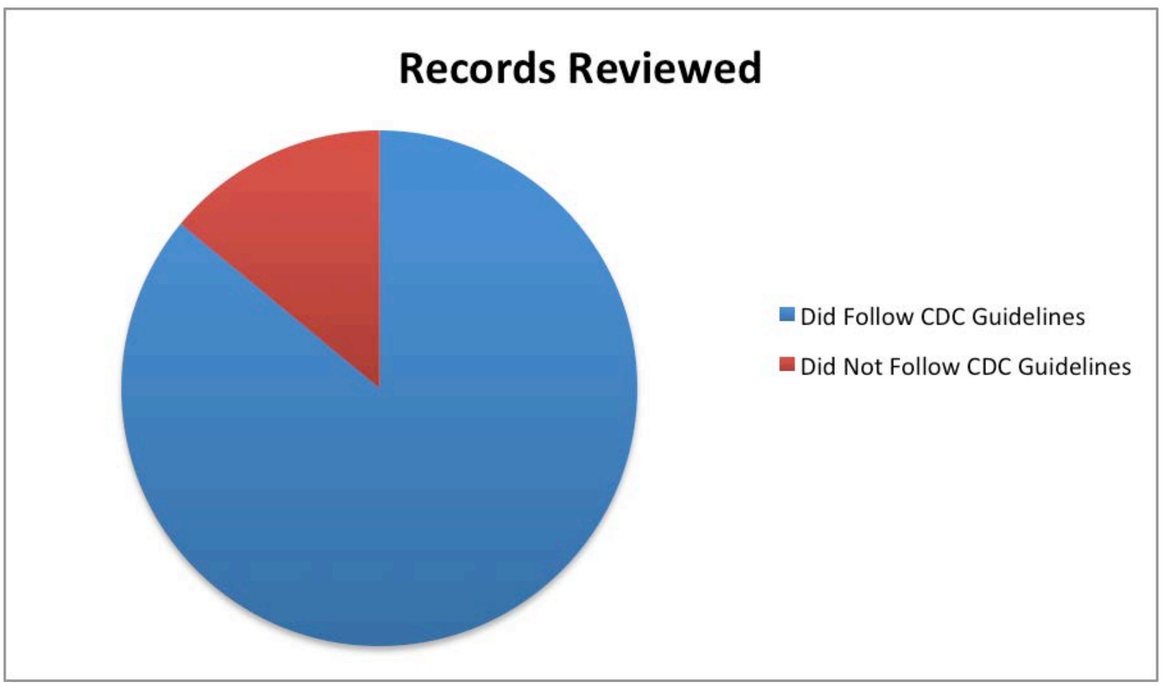
Dissemination of findings completed at Rhode Island College via poster presentation and full project findings will be available on the Rhode Island College website via Digital Commons. The project will be submitted for presentation at the Lifespan Research symposium being held in the fall of 2019. Results to be presented to the refugee clinic for informational purposes.

Results

Fifty records were reviewed for adherence to the recommended CDC guidelines of a BLL draw 90 to 180 days after the initial blood draw. A total of 18 records were excluded from the study. Nine records were excluded due to the age of the patient, two records were excluded due to Rhode Island not being first state the patient resettled in, and seven records excluded due to care received outside dates set in IRB.

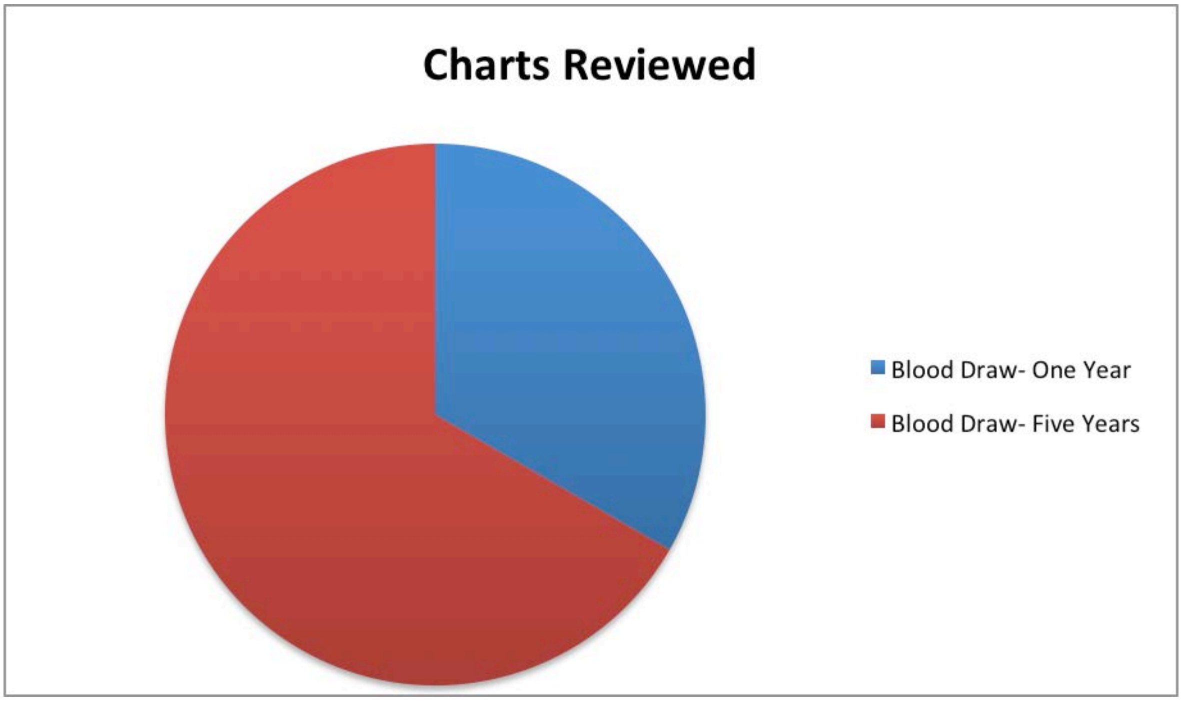
Analysis of the data shows that of the 50 records reviewed, 14% of the patients did not have a second blood draw within the three to six month timeframe (shown in Figure 1). Conversely, 86% of the patients did have the CDC guidelines adhered to by completing the second blood draw.

Figure 1.



Of the applicable charts reviewed for a BLL at one year of age, 80% of the patients had a BLL as recommended (shown in Figure 2). Of the patients who are at least five years of age, 61% had a BLL at the age of five.

Figure 2.



Summary and Conclusions

In 2004, the CDC established recommendations for blood lead screening for all newly arriving refugee children between the ages of six months and 16 years (Raymond, Kennedy, & Brown, 2012). The CDC (2017) recommends that children between the ages of six months to 16 years arriving into the U.S. have their BLL checked within 90 days of arrival; it is preferred by the CDC to have the blood levels checked within 30 days of arrival. The CDC recommends a rescreening three to six months after resettlement for children between the ages of six months to six years of age.

The study had limitations. These include both patient based and provider based issues such as why the patients did not return for second BLL and why patients went beyond six months for a second BLL. Lack of information regarding the underlying reasons for lack of adherence to the CDC recommendations prevents the ability to draw clear conclusions. Further research is needed to determine etiology.

While the results are favorable in that 86% of the patients completed a second BLL within the recommended time frame of three to six months, there is room for improvement since 14% of the patients did not follow the CDC recommendations.

Recommendations and Implications for Advanced Nursing Practice

Future opportunities exist to expand on the conclusions found during this project. Research opportunities exist from a behavioral health standpoint. An increase in the need for behavioral health services may improve patient and family adherence to recommended visit protocols. Questions arise such as, is there a correlation between increased lead levels and inpatient behavioral health needs? Does evidence link to poverty, cultural issues, or environmental issues with elevated lead levels in refugee children? If so, what can we do with the information?

An advanced practiced registered nurse (APRN) has the opportunity to take this information and educate patients and families on what an elevated lead level means to the health and well being of their child. Educating families regarding the importance repeating BLL has the potential to increase the compliance rate with CDC recommendations. An opportunity exists for an APRN to educate patients and families at all points that an RN interacts with a patient or family in our healthcare system. Education plans can be developed to discuss lead and its hazards during an inpatient stay, at well-child visits, and in encounters with community health nurses. School nurse teachers have the opportunity during parent teaching meetings over the course of elementary school years to discuss lead, its hazards, and home safety with parents.

The opportunity to advocate for safe housing for refugee families is abundant; the families need another voice to assist them to advocate for safe housing. Any housing provided to a refugee family with a child under the age of six years must be declared lead free (Schmidt, 2014). Unfortunately, the regulations are not always followed or enforced, leading many refugee families to be placed in housing that is not lead free. Advocacy by the APRN can come in many forms, including lobbying local leaders or national leaders, joining lead action programs, and participating in refugee community centers to provide a voice within the neighborhood on a grass roots level. An APRN can also advocate within the primary care setting or hospital setting by discussing blood lead level opportunities with the patients care team, explaining that it is important to not miss the opportunity to obtain the blood work in a high-risk population.

The implications for practice of the APRN, within the scope of this project, touches upon all that we do as nurses. We learn from the beginning of our education to be advocates, to be policy makers within our institutions, to work with the current evidence, and to find and prove new evidence-to be researchers. Becoming an APRN enhances the skills that RNs have been building since the beginning.

This issue is a subject that will require a multi-disciplinary approach in the community and clinical areas. An APRN can make a dramatic impact on education for the family for lead and beyond. Achieving this will also require the assistance of community supports and partnership with the refugee community. Supports include professional nurses, community health workers, peer groups, and refugee center employees. These families are coming from a stressful environment where they have faced strife and are coming to a new country, navigating a new health system, within a new community. To succeed, children and families need all of the assistance and support that can be gathered. An APRN can lead the charge in advocacy to give that family a voice.

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