Racial Differences in Selected Characteristics of Infants with Injuries

An Honors Thesis (HONRS 499)

by

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April 1994

Graduation May 7, 1994

Abstract

The purpose of this study was to investigate racial differences in health status and sociodemographic characteristics for injured black and white infants. Data were analyzed from the 1988 Maternal and Infant Health Surveys conducted by the National Center for Health Statistics. Injured infants (N=315) were randomly matched with uninjured infants. The injured infants from both racial groups were more often male and had younger mothers than the uninjured infants. Injured white infants also were more likely to be on public assistance as compared to noninjured white infants. The presence of colic and irritability during the first month of life was significant for both black and white injured groups. Logistic regression analysis showed that irritability was predictive of injury occurrence in both groups. Nursing implications include early case finding, injury prevention education, public policy advocacy, and injury research. Although all families with infants should be targeted for injury prevention education, a special emphasis should be placed on families with infants that have a

predictably higher probability of being injured, as discussed in this study.

Introduction

Injuries are a major cause of morbidity and mortality in children under age five. Common causes of childhood injuries are motor vehicle occupancy, abuse, homicide, aspiration, and suffocation (Liller, Kent and McDermott, 1991; Waller, Baker and Szocka, 1989). Drowning, house fires, and burns are also significant sources (Wintemute, 1990; Jones, 1993). Trauma studies show that the leading cause of injury in infants, children under one year of age, is falling from heights (Rivara, Kamitsuka and Quan, 1988; Kahn-D'Angelo, 1989). As identified by the national health goals for the United States, significant gains still are needed for childhood injury prevention from falls, residential fires, drowning and nonfatal poisoning (U.S. Department of Health and Human Services, 1991).

Although previous studies have identified various risk factors associated with injuries in preschool, elementary, and adolescent children, fewer investigations exist that examine injury risk factors in children under the age of one year. The aim of this study was to investigate risk factors associated with

injuries in infants.

Review of Literature

Various demographic characteristics have been found to be associated with childhood injury. These demographics include sex of the infant, race, age of the mother, education of the mother, and socioeconomic status. Males are more likely to be injured than females (Jones, 1993; Wintemute, 1990; Baker, O'Neill, Ginsburg and Li, 1992). Black infants and infants from nonblack minorities are 1.3 to 5 times more likely to be injured than white infants (Liller, Kent and McDermott, 1991; Rodriguez and Brown, 1990; McLoughlin and McGuire, 1990). Mothers with limited education, often related to their young age, is another risk factor for increased rates of injury in their children (Roberts and Quillian, 1992; Waller, Baker and Szocka, 1989). Also, low socioeconomic children are at a greater risk of suffering from an injury than other socioeconomic groups (Jones, 1993; McLoughlin and McGuire, 1990; Liller, Kent and McDermott, 1991; Rodriguez and Brown, 1990; Roberts and Quillian, 1992; Slater, Slater and Goldfarb, 1986; Eichelberger,

Gottschall, Feely, Harstad and Bowman, 1990; Wilson, Baker, Teret, Shock and Garbarino, 1991).

Few studies have been conducted on behaviors and health status of children in relation to injuries. Mathey (1987) investigated temperament in childhood injury. Findings showed a significant relationship between injury risk and children with irregular sleeping and eating habits when combined with a less active and less emotionally stable mother, a less sociable and more impulsive father, and noise and confusion in the home. Bijur, Golding and Haslum (1988) found aggression was significant in predicting subsequent injury in school-aged children who had an injury episode requiring medical attention as a preschooler.

The conceptual framework for this study was the injury causation and prevention model developed by Haddon (Haddon, 1972; Haddon, 1980; Rivara and Mueller, 1987). This model is based upon the interaction between an injury event dimension and an epidemiologic dimension. The event dimension consists of a pre-event (before injury occurrence), an event

(actual injury occurrence), and a post-event (after injury occurrence) phase. The epidemiologic dimension includes host, vector, and environmental factors that influence the occurrence of an injury. For this study, the host and environmental factors of the pre-event phase of the injury occurrence were examined. Host (infant) factors included gender and health status characteristics. Environmental factors were maternal sociodemographics and family characteristics.

The purpose of this study was to examine health and sociodemographic characteristics of black and white infants who experienced an injury during their first six months of life and to determine predictors of injury in both racial groups.

Methods

The sample consisted of infants whose mothers participated in the 1988 National Maternal and Infant Health Survey conducted by the National Center for Health Statistics. A stratified random national probability sample of live birth, infant death, and fetal death certificates from 48 states, the District of Columbia, and the City of New York was used to

obtain the subjects (Sanderson, Placek and Keppel, 1991). The total sample of 18,954 women consisted of 9,953 live births, 5,332 infant deaths, and 3,309 fetal deaths. Blacks were oversampled so that the final racial composition of the unweighted samples was 50% black and 50% white. Oversampling also was done for low birth weight babies that resulted in a sample of 3,000 low birth weight infants.

A series of pilot tests and a four state pretest were conducted prior to the administration of the survey. Data collection for the finalized survey instrument was initiated by mail. After two nonresponses from the mailed survey, mothers were interviewed either by telephone or personal visit. A 74% response rate was obtained from the mothers with live births and a 65% response rate for mothers with infant deaths. Respondents were more likely to be over 30 years old, white, married, and had at least a high school education (National Center for Health Statistics, 1991).

The sample for this present study was derived from the live birth and infant death groups. Infants whose

mothers reported any unintentional injury episodes were matched with a random sample of infants with no reported injuries. Infants reported as being neither black nor white were excluded from the two groups, which resulted in a final unweighted sample for the injury group of 315 and 324 for the uninjured group.

The outcome measure, injury occurrence, was the mother's report (yes/no) of an injury from a bad fall or accident during the past month or during each of the first six months of life. The injury group included at least one reported injury, whereas, the uninjured group did not experience any of these injury events.

Infant health status variables included gestation, number of illness visits to the doctor, and whether or not the infant was hospitalized overnight for any reason, had ever stopped breathing (apnea) at home, or had colic or irritability anytime during the first month of life. Sociodemographic characteristics were infant gender, singleton or multiple birth, maternal age, education and marital status, number of siblings, number of persons in the household, income, AFDC and foodstamp recipient, and health insurance or HMO

coverage.

Analysis. Data were analyzed with SPSS Release 4 on the VAX mainframe. Descriptive statistics were used for analyses of sociodemographic characteristics. Univariate analyses were tested with Mansel Hanson chi square. To determine significant predictors of injury occurrence, logistic regression analyses were performed.

Results

In the black infant groups, a greater proportion of injured infants were males, singleton births, and had young mothers compared to the uninjured black infants, as shown in Table 1. There were more uninjured infants whose mothers had not completed high school, whereas high school graduates were near equal for both the uninjured and injured groups. Slightly more mothers were married in the uninjured group. Income was fairly equally distributed among the the two groups, except for a slightly higher proportion of uninjured infants in $40,000 or more income bracket. Uninjured black infants had more siblings and number of persons in the household. The proportion of infants

whose families were on AFDC was greater for the uninjured group, whereas, foodstamp benefits were equally distributed among the two groups. Mothers reporting health insurance coverage were higher in the injured infants.

In the white infant groups, a greater proportion of injured infants was male and had mothers who were young and on AFDC and foodstamps. Singleton births occurred slightly less often in the injured group. Although there were slightly more mothers who had not completed their high school education in the uninjured group, maternal high school graduates were proportionately equal in both the uninjured and injured groups. Mothers with more than high school education were more frequently in the uninjured group. Also, there were slightly more married mothers in the uninjured group. As the income levels decreased, the proportion of injured infants increased. The injured group tended to have fewer siblings and number of persons in the household. The proportion of those who were insured was approximately the same for both the uninjured and injured groups (see Table 1).

As reported in Table 2, injured black infants were more likely to experience colic and irritability. Irritability was significant at the .01 level, whereas, colic was marginally significant ($p \leq .10$). At some point, regardless of the cause, a greater proportion of injured infants had experienced an overnight hospitalization. Apnea occurred equally among both the uninjured and injured groups. The uninjured group had more sick visits and had more infants under 37 weeks gestation.

Similar to the black group, injured white infants were more likely to have colic, be irritable, and have been hospitalized. However, colic ($p \leq .01$) and irritability ($p \leq .001$) were more significant for the white infants. A greater proportion of injured infants experienced apnea and had three or more health care visits for illness. A higher proportion of uninjured infants were under 37 weeks gestation (see Table 2).

Sociodemographic and health status variables were entered into a logistic model for both the black and white groups, respectively. Variables that were greater than the .20 or more significance level were

eliminated from each model (Hosmer and Lemeshow, 1989). Injury occurrence was the outcome variable. As shown in Table 3, irritability was a significant predictor of injury in black infants. Irritability was 2.7 times more likely in the injured black infants. Education of the mother and number of siblings were only marginally predictive with injuries more likely to occur in mothers with more years of education and in families with a greater number of siblings.

Table 4 reports the results of logistic regression for the white infants. Similar to the black infants, irritability again was predictive of injury in the white infants. Irritability was 2.3 times more likely in the injured infants. Although only marginally significant, infants with a greater number of siblings were more likely to have injuries.

Discussion

Demographic characteristics of the injured infants in both the black and white groups were similar with previous studies. More males than females experienced injuries. Jones (1993) and Wintemute (1990) also found that males in all childhood age groups were more at

risk for injuries. In this study, young mothers reported more injuries in their infants. This result may be due to the lack of knowledge of parenting skills in the area of injury prevention, which frequently occurs in young mothers (Castiglia and Harbin, 1992).

Both black and white mothers with less than 12 years of education had fewer injured infants than mothers with more education. These mothers may live in households with parents and other adults who would provide more supervision of the infants and more injury education to the mothers than the other educated groups. The other groups may live in homes without this additional support. Furthermore, infants in households with more members had fewer injuries than infants in households with fewer members. Univariate analysis revealed that families with three or more siblings reported fewer injuries for both racial groups. One possible explanation, similar to that of household composition, is that older siblings may be more alert in protecting their infant sibling from hazardous situations.

Although the occurrence of injuries was similar

across the economic levels for the black group, the proportion of injuries increased as the income decreased for the white group. Numerous investigations have shown that children in low income populations tend to have more injuries than other income groups (Jones, 1993; McLoughlin and McGuire, 1990; Liller, Kent and McDermott, 1991; Rodriguez and Brown, 1990; Roberts and Quillian, 1992; Slater, Slater and Goldfarb, 1986). Also for the white groups, families on AFDC and food stamps had more injured infants than families not on public assistance. This finding parallels the low income finding.

Both colic and irritability were significant factors in injury occurrence. Colicky infants may be difficult for parents to manage and may cause parental stress (Castiglia and Harbin, 1992). Stress can affect parenting behaviors, including supervision and judgment about safety, which can lead to increased injuries. More visits to the physician for illness in the white infants again may indicate parental stress in the management of an unhealthy child. However, in the black infants, injuries occurred more often with only

one sick visit as compared to two or more visits for illness to the physician. Black mothers may have been more likely to receive support from their health care providers, as well as from extended family and social support, with the first episode of illness in their infant. Characteristic health seeking behaviors and health practices of blacks include active use of family and social support systems in times of illness and crises (Russell and Jewell, 1992).

Infants from both racial groups who were hospitalized overnight for any reason and white infants experiencing an apneic episode had a higher proportion of injuries as compared to infants not experiencing these health problems. Again these findings may be due to the stress of caring for an ill child.

Irritability was a significant predictor of injuries in both black and white infants. The occurrence of irritability, which was reported in the first month of life, could have been a significant stressor for mothers. The infant's first month of life can often be a difficult time for parents, particularly when they have an infant who cannot be comforted. The

mothers from the study also tended to be first time mothers who may have lacked experience in coping with an irritable infant. In addition, normal effects of the postpartum period on fatigue and emotional well-being could add to the stress levels in caring for these infants.

This study was limited to self reported data by the mothers and sampling techniques. Mothers reported the occurrence of injuries as well as the various illness status variables such as reports of colic, irritability, apnea, hospitalization, and illness visits to physicians. A stratified random sample was used, which involved oversampling of low birth weight babies and black infants. Thus, the ability to generalize the results is limited.

Implications for Nursing. Nurses should be involved in three different areas to help decrease the incidence of childhood injury. The three areas of involvement are health practice, health policy, and future research (Liller, Kent and McDermott, 1991; Rodriguez and Brown, 1990; Bass, Mehta and Ostrovsky, 1991). Nurses will be most successful in preventing childhood injury

if they focus on the predictable characteristics of injury in infants to develop priorities that guide their actions in the three areas of involvement. It is important to remember that injuries are preventable because they occur in patterns that lead to the identification of predictable precipitating characteristics that can be controlled (Rodriguez and Brown, 1990; Liller, Kent and McDermott, 1991).

Nursing practice. Nurses can make a tremendous impact on injury prevention through their involvement in the practice of health care. Nurses should give special consideration to the groups of infants that have a predictably higher incidence of injury. These groups of infants can include those of young mothers, those from a low socioeconomic status, and those who experience illness during the first month of life. Of particular note, infants who are irritable are at especially high risk for injury. Allowing parents to verbalize their frustrations, reassuring them about the normalcy of these feelings, and assisting parents to identify effective coping mechanisms when under stress related to an irritable infant are highly recommended.

However, it is equally important for nurses to assume that any infant may be at risk for injury, because injuries do occur in infants who do not fall into these predictable high risk groups.

Nurses can teach families about injury prevention through prenatal classes, in home visits after the baby is born, and in classes on home safety in a variety of settings. Nurses also can assess infants and identify them as being at high risk for injury during the home visits, the well-baby check-ups at a doctor's office, and the visits to the doctor's office or hospital for tertiary care. Whatever the injury prevention instruction may be, the nurse should incorporate cultural aspects into the educational program (Castiglia and Harbin, 1992). For example, the extended family should be part of the injury prevention teaching when educating black mothers about injuries.

Areas to focus on during injury prevention teaching should include strategies that can reduce the incidence of injury. It would also be extremely helpful to teach the parents about the growth and development stages during the first year of life

(Roberts and Quillian, 1992; Kahn-D'Angelo, 1989). This information would aid parents in anticipating the types of injury that their child might suffer from, especially related to the infant's developing motor and mobility capabilities (Kahn-D'Angelo, 1989). It is also important to stress to parents the need for constant supervision of infants to prevent injury (Slater, Slater and Goldfarb, 1986; Widner-Kolberg, 1991).

Injury prevention strategies. Although this study focused on falls and accidents, a comprehensive injury prevention plan should be provided to parents. This plan should incorporate preventing all types of injuries that are most common in infants. These injuries include falls, motor vehicle crashes, abuse, aspiration and suffocation, drowning, and burns.

There are various strategies that can be used to prevent infants from falling. Nurses can teach parents the importance of never leaving an infant unsupervised on a changing table or other surface (Widner-Kolberg, 1991; Kahn-D'Angelo, 1989). Also, the crib rails should always be raised (Jones, 1993). Other important

interventions are blocking staircases with safety gates and keeping any windows locked or guarded (Widner-Kolberg, 1991; Jones, 1993; Liller, Kent and McDermott, 1991; Kahn-D'Angelo, 1989).

Several safety precautions can be used to prevent injuries related to other causes. The proper and consistent use of infant car seats is important to protect infants from injuries caused from a motor vehicle crash (Widner-Kolberg, 1991; Liller, Kent and McDermott, 1991; Kahn-D'Angelo, 1989). Injuries caused by abuse can be reduced or eliminated by identifying infants and parents who are at risk, reporting suspicions, and referring abusive parents to available and appropriate community resources (Roberts and Quillian, 1992). Also, aspiration and suffocation injuries can be prevented by helping parents to identify common food and household items that lead to these types of injuries and appropriate first aid interventions to use if their infant is choking (Liller, Kent and McDermott, 1991; Jones, 1993).

Drowning can be prevented by never leaving an infant alone in a bath, near a toilet or bucket with

water in it, or by a swimming pool (Widner-Kolberg, 1991; Liller, Kent and McDermott, 1991). Pool safety can include fencing the pool, covering the pool, installing a pool alarm system, and teaching adult and infant CPR to all pool owners (Wintemute, 1990; Widner-Kolberg, 1991; Liller, Kent and McDermott, 1991). Fire and burn prevention also should be taught in injury prevention classes. Fires can be prevented by installing smoke detectors, using fire-safe cigarettes, supervising and limiting the use of supplementary heaters, and dressing infants in flame-resistant clothing and sleepwear (McLoughlin and McGuire, 1990; Jones, 1993; Widner-Kolberg, 1991). Also, the risk of burns can be reduced by keeping the hot-water tank's heating settings at 120-125 degrees Fahrenheit or less and teaching parents first aid interventions for burns (McLoughlin and McGuire, 1990; Jones, 1993; Widner-Kolberg, 1991; Liller, Kent and McDermott, 1991).

Health policy. The availability of adequate resources for injury prevention can be assured through the allocation of resources from public policy. Nurses

must work with and influence policy decision-makers to focus on primary prevention strategies to protect children from injuries (Widner-Kolberg, 1991). Adequate funding and resources must be allotted for injury prevention education of health care professionals as well as parents and children, regular ongoing home visits to all families with infants and children, and support systems to assist parents in developing effective parenting skills. Prevention of injuries are more cost-effective than providing tertiary health care to injured infants. Improving communication and developing common goals among multidisciplinary health care providers would further promote the creation of policy and laws that reduce childhood injury.

Nursing research. Research is the third area that nurses should be involved in to help decrease the incidence of injury in infants. Predictable characteristics of childhood injury should continue to be researched and identified. These research areas include further investigation of levels of maternal stress in relation to childhood injuries and common

childhood illnesses throughout the first year of life that are predictive of injuries. It is also important for nurses to participate on research teams that investigate advancements in engineering and technological designs resulting in safer products for infants (Liller, Kent and McDermott, 1991; Widner-Kolberg, 1991; Bass, Mehta and Ostrovsky, 1991; Rodriguez and Brown, 1990).

Conclusion

Childhood injury prevention is a major goal and driving force of the United States' health care system. The results of this study showed that similarities were found between black and white infants who experienced an injury during the first six months of life. Nurses have multiple roles in injury prevention. These roles include injury prevention educator, public policy advocate, and researcher. Although attention should be given to all families with children, nurses should especially target families and infants who are at high risk for injury. As found in this study, these high risk groups are mothers who are young or of low

socioeconomic status and infants who are male, ill, or irritable.

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Table 1
Percent of Demographic Characteristics in the Infant Groups by Race

Characteristic	Black Injured Group (N=167)	White Injured Group (N=148)
Gender		
Male	52.0	51.8
Female	47.5	44.9
Singleton birth	50.6	48.6
Age of mother (years)		
15-19	56.0	59.2
20-34	48.9	47.2
35-49	33.3	40.0
Education of mother		
<12 years	46.6	48.9
12 years	49.6	50.0
>12 years	48.4	46.2
Marital status		
Married	49.1	48.6
Unmarried	50.2	49.1
Income		
<$10,000	49.1	56.1
$10-19,999	51.1	50.8
$20-39,999	51.0	48.7
≥$40,000	48.3	40.3
Number of siblings		
1	44.0	50.0
2	44.4	50.6
≥ 3	48.1	45.1
Number of persons in household		
1	58.9	50.7
2-3	47.1	51.7
4-9	48.8	37.3
AFDC	47.8	58.8
Food stamps	49.7	57.8
Insurance coverage	55.0	50.5

Table 2
Percent of Health Characteristics in Injured Groups by Race

Variable	Injured Black Group Percent (N=167)	x^2	Injured White Group Percent (N=148)	x^2
Colic				
Yes	62.9	2.76*	65.1	5.40**
Irritable				
Yes	69.8	7.80**	69.8	11.4***
Number of sick visits				
1	62.5		56.5	
2	45.5		50.5	
≥3	33.3	2.21	80.0	.55
Hospitalized				
Yes	56.8	.26	56.8	.89
Apnea				
Yes	50.3	.07	55.6	.23
Gestation				
<37 weeks	47.7		48.1	
≥ 37 weeks	51.9	.45	48.8	.01

*p<.10 **p<.01 ***p<.001

Table 3
The Odds of Experiencing an Injury Among Black Infants

Variable	Beta	Standard Error	p	Odds Ratio	Confidence Interval
Colic	.40	.290	.172	1.49	0.84, 2.64
Irritable	.98	.380	.010	2.66	1.27, 5.58
Singleton Birth	-.80	.490	.103	0.45	.17, 1.17
Education of mother	.01	.004	.061	1.01	1.00, 1.02
Gestation	-.01	.008	.167	0.99	0.97, 1.01
Number persons in household	.09	.063	.156	1.09	0.97, 1.23
Siblings	.01	.003	.002	1.01	1.00, 1.02

Table 4
The Odds of Experiencing an Injury Among White Infants

Variable	Beta	Standard Error	p	Odds Ratio	Confidence Interval
Irritable	.85	.370	.022	2.33	1.14, 4.81
Colic	.39	.290	.178	1.48	.83, 2.61
Number persons in household	.08	.061	.203	1.08	.96, 1.22
Siblings	.01	.003	.004	1.01	1.00, 1.02