april supplement-with cover.qxd 5/20/2003 12:19 AM Page 1

A Supplement to APRIL 2003, VOL. 95, NO. 4

JOURNAL OF THE
National
Medical
Association

Addressing Immunization Disparities Among African Americans

NMA
Since 1895

april supplement-with cover.qxd 5/20/2003 12:19 AM Page 2

CONTENTS

Introduction 1S

NMA Addresses Health Care Disparities 2S

Do Beliefs of Inner-City Parents About Disease and Vaccine Risks Affect Immunizations?..... 4S

Timeliness of Immunizations of Children in a Medicaid Primary Care Case Management Managed Care Program 16S

Assessing Immunization Coverage in Private Practice 23S

It's Time to Step Up the Management of Community Acquired Pneumonia 28S

Hepatitis A Vaccination Among Young African American Men Who Have Sex with Men in the Deep South: Psychosocial Predictors..... 31S

Adult Immunizations: Increasing Immunization Rates Among African American Adults 37S

Promoting Prevention of Viral Hepatitis in the African American Community 49S

Acknowledgments 57S

april supplement-with cover.qxd 5/20/2003 12:19 AM Page 3

INTRODUCTION

The National Medical Association (NMA), founded in 1895, is the oldest national African-American professional organization, which represents the interest of more than 25,000 Black physicians and the patients they serve in the United States, Puerto Rico and the Virgin Islands. Through its membership, professional development, community health education, advocacy, research, efforts with federal and private agencies and corporations, the NMA is committed to improving the health status and outcomes for minority and disadvantaged people.

Research indicates that immunization rates among African Americans and other minorities encompassing children to adults are significantly lower than their white counterparts. Although immunization levels for children aged 19-35 months are at an all time high, coverage levels among urban and minority children are still too low. African Americans adolescents are at increased risk of Hepatitis B, Measles, Tetanus and Varicella. Additionally, the adult vaccine preventable disease burden among African Americans is at crisis levels.

The NMA's Immunization - A Family Affair Project (IMFAM) is funded through a cooperative agreement with the Centers for Disease Control and Prevention. The Project has a national minority outreach focused on immunization initiatives targeted to African American physicians and other health care providers aimed at promoting a positive lifetime approach to preventing vaccine related diseases while addressing immunization disparities.

The NMA recognizes immunization disparities continue to disproportionately affect African Americans and other minorities. This supplement contains articles and consensus reports that address immunization disparities in these communities. The NMA believes that our physicians can make a difference and will continue to strive to close the gap of racial and ethnic disparities in immunization.

april supplement-with cover.qxd 5/20/2003 12:19 AM Page 4

NMA Addresses Health Care Disparities

Randall Maxey, MD, PhD, Chair of NMA Board of Trustees
Washington, DC

Ever-widening health disparities have created a disturbing and unbalanced picture for African American patients and their physicians. The reasons for the disparities are numerous and complex. They include differences in access to health care services, cultural behavior and beliefs, and limited access to research and clinical trials. As the nation's only organization devoted to the needs of African American physicians, health professionals, and their patients, the National Medical Association is in a unique position to provide solutions to the challenges that confront our nation's health care system.

The NMA has proposed several recommendations to address the persistent inequity in health care. For one, the NMA strongly urges that a White House Conference on Minority Health be convened with the next year with major input from the NMA and its Multicultural Health Policy Institute. This would include participation from numerous health care organizations and significant involvement of the four historically black medical schools-Howard, Meharry, Morehouse, and Charles R. Drew. We believe it is imperative that the problem of health care inequity becomes a high priority on the national agenda. A White House Conference would place a much-needed spotlight on this issue, which, except for occasional lip service, has been virtually ignored by the health care industry and severely overlooked by the mainstream media.

In order to effectively improve the health status of African Americans and minorities, we at the NMA must establish partnerships with the federal government and others (including the Congressional Black Caucus, the National Bar Association, and the pharmaceutical industry) to conduct comprehensive research and data collection to ascertain the true magnitude of the problem. The research would include disease-specific morbidity, mortality data on health care access; use of health care resources; and patient information, such as race, ethnicity, socioeconomic status, and primary language. Results from this research, which could be published annually, would yield current data about the status of black health care. It would also lay the foundation for the development of a strategic plan for disease prevention and management, as well as compiling "best practices" for achieving quality, accessible, and equitable health care.

A comprehensive national disease management study is needed to determine the disproportionate rate of health disparities between whites and non-whites, specific to disease states. Other NMA/federal partnering efforts could include roundtable/summit discussions that identify strategies to reduce the gap in healthcare, and demonstration projects that implement targeted strategies. Whenever possible, the NMA recommends partnership with the federal government to creatively use resources and personnel to combat these disparities.

Our government spends billions of tax dollars to aid foreign lands where many of us have only a distant interest. Valuable dollars are spent on preservation of little known environmentally wildlife. But when it comes to providing quality health care within black and minority communities, the issue of cost management is inevitable mentioned as the reason why more cannot be done.

Medicare, a result of NMA efforts, has positively impacted the health care of all Americans. It is time again for the sleeping giant of health care, the

© 2002. Originally published in the Journal of the National Medical Association, Vol. 94, No. 8, August 2002:747-748. For reprints, contact the National Medical Association, 1012 Tenth Street NW, Washington, DC 20001.

april supplement-with cover.qxd 5/20/2003 12:19 AM Page 5

National Medical Association, to rouse itself and become a major player in revamping the nation's health care system. Recent legislation elevated the National Institutes of Health (NIH) Office of Research and Minority Health to an NIH Center with increased resources for minority research and education. The NMA supports a greater allocation of funding for this critical new center to coincide with its expanded mission to assist underserved and minority communities.

The recently released report from the Institutes of Medicine reaffirms the NMA's long-held position that ethnic variances in health care contribute to negative health outcomes. Such variances occur in the context of broader historic economic inequality, and provide evidence of ongoing racial and ethnic discrimination in many sectors of contemporary American life. Cross-cultural training sessions (such as the NMA's Cultural Competence Program) would arm physicians and health professionals with knowledge and sensitivity about their diverse patient population.

Many managed care organizations are withdrawing from specific managed care programs, such as the Medicare Plus Choice Program. This problem is due to ostensibly low reimbursement rates. In fact, the reimbursement to physicians is now so low that overhead expenses cannot be covered on very ill patients who require more intensive care. Black physicians, who often have poor business management skills, must carry the extra burden of treating the sickest patients for the least amount of reimbursement.

Black physicians in private practice are especially facing economic challenges, with the combination of steadily decreasing payment rates, tardy payment practices, skyrocketing malpractice insurance costs, and unfair and often heavy-handed scrutiny by federal and private health care agencies. Consequently, many physicians opt out of being Medicare/Medicaid providers and some are leaving the practice of medicine altogether. This is a disturbing scenario that threatens to reduce the already slim ranks of African American physicians and further impede access to quality health care for many minority and poor patients. The NMA must vigorously support policies and measures that allow for the economic survival of physicians of African descent.

To eliminate health disparities, the NMA strongly advocates that the federal government play a leading role to strengthen the stability of patient-provider relationships in publicly funded health plans; increase the proportion of underrepresented US racial and ethnic minorities among health professions; and apply the same managed care protections to publicly-funded HMO enrollees that apply to private HMO enrollees. In addition, the NMA supports the physician's right to prescribe any FDA-approved pharmaceutical or drug that the physician deems is the best treatment for the patient-without being subject to formularies, cost restrictions, and prior authorization programs that may contribute to negative patient outcomes. These are just some of the many initiatives that can be taken to create a more just health care system within our nation.

The NMA proposes to better represent its members by being included on Health and Human Services national committees, panels, and task forces that deal with the US healthcare system. The NMA must not only be represented at the table, but must be among the decision-makers who determine the policies that affect health care in our communities.

Last year, the NMA released its consensus paper, Racism in Medicine and Health Parity for African Americans, which expressed concerns about racial bias in medicine. In response, Congress approved a study to be undertaken by the Institutes of Medicine on ethnic health disparities and the influence of racism. Entitled Unequal Treatment-Confronting Racial and Ethnic Disparities in Health Care, the IOM report further documented what the NMA has maintained since 1906: that racism is an unwelcome and unfortunate prescription that is all too often administered to minorities.

The NMA's Multicultural Health Policy Institute is designed to develop, study, and recommend corrective measures to eradicate disparate health care and restore health parity for African Americans and other communities of color. To better accomplish its work, the Institute will seek strategic alliances and collaborations with a variety of health care and social justice organizations.

In summary, we at the NMA recognize that national leadership, collaborative partnerships, and an unwavering focus on the problem of health inequities must all be part of the solution to assure affordable, quality health care. We are committed to doing what we can to push this issue forward so that it becomes a national priority.

april supplement-with cover.qxd 5/20/2003 12:19 AM Page 6

Do Beliefs of Inner-City Parents About Disease and Vaccine Risks Affect Immunization?

Jeanette M. Trauth, Ph.D, Graduate School of Public Health, University of Pittsburgh, Pittsburgh, PA
Richard K. Zimmerman, M.D., MPH, School of Medicine, University of Pittsburgh, Pittsburgh, PA
Donald Musa, MA, University Center for Social and Urban Research, University of Pittsburgh, Pittsburgh, PA
Hugh Mainzer, MS, DVM, National Immunization Program, Centers for Disease Control and Prevention, Atlanta, GA
Jean F. Nutini, MA Graduate School of Public Health, University of Pittsburgh, Pittsburgh, PA

Objective. The objective of this study was to understand how low income, inner-city parents of preschool children think about childhood diseases and prevention and the impact that this has on late receipt of vaccines.
Methods. Parents of all children born between 1/1/91 and 5/31/95, whose child received medical assistance and their health care at one of four inner-city, primary care clinics in Pittsburgh, PA., completed a telephone interview and gave consent for a vaccine record review. The main outcome measures were lateness for first and third diphtheria and tetanus toxoids and pertussis vaccines (DTP) and not receiving at least 4 DTP, 3 polio virus containing and 1 measles, mumps and rubella (MMR) doses by 19 months.
Results. 483 parents participated. Fifteen percent of children were late for the first DTP, 52% for the third DTP and, 40% had not received at least 4 DTP, 3 polio and 1 MMR by 19 months of age. Statistically significant factors associated with lateness at 19 months included: having three or more children, having two children, beliefs regarding the severity of immunization side effects and, being African American.
Conclusions. The results of this study indicate that a combination of life circumstances as well as cognitive factors were associated with late immunization.

Key words: Immunization behavior ◆ parental beliefs ◆ health communication ◆ health behavior ◆ health disparities

INTRODUCTION

The increase in childhood vaccination rates in the United States during the past decade has been a major success. Among children aged 19 to 35 months, 78% had completed 4 or more doses of diphtheria and tetanus toxoids and pertussis vaccine (DTP), 3 or more doses of poliovirus vaccine, and 1 or more doses of measles containing vaccine (MMR)-4:3:1 series in 1996[1]. However, at the critical time of 19 months of age, when children should have received all of the vaccines on the Recommended Child Immunization Schedule, only 59% of children nationally had completed the 4:3:1 series.[1] And, among poor, urban children, studies have shown that the percentages of children completing the 4:3:1 recommended primary childhood immunization series by 19 months of age is extremely low and by 24 months of age, only 54% of the children in these studies had completed the 4:3:1 series.[2-3] In order to improve the delivery of preventive health care, especially in poor, urban communities, it is first necessary to understand the cultural and social norms and beliefs of these communities.[4] In addition, there is a need to understand more about how the quality of communication between a provider

© 2002. Originally published in the Journal of the National Medical Association, Vol. 94, No. 9, September 2002:820-832. Direct correspondence and requests for reprints to: Jeanette M. Trauth, Ph.D., Department of Health Services Administration, Graduate School of Public Health, 217 Parran Hall, University of Pittsburgh, Pittsburgh, PA 15261. Telephone: (412) 624-0968; Fax (412) 624-5510; e-mail Trauth@pitt.edu. This work was supported by an ASPH/CDC/ATSDR Cooperative Agreement grant #SO13-13/13.

and patient contributes to health disparities.[5]

A number of studies have addressed or reviewed parental beliefs about vaccination.[6-14] However, relatively few of these studies specifically address the beliefs of disadvantaged, inner-city parents[9-11] and few compare beliefs with immunization status.[11,12,15] Yet, understanding the beliefs of poor, urban parents, and how they affect immunization behavior, is a prerequisite to the design and implementation of effective communication programs for this audience.[16]

This article summarizes the results of a study of parents of urban, low-income preschool children regarding their conceptualization of childhood diseases and prevention and factors associated with late receipt of vaccines.

METHODS

This study was conducted in four inner-city, primary care centers in Pittsburgh, Pennsylvania that were representative of settings where children of low-income households in urban areas receive their primary care: the Primary Care Clinic at Children's Hospital of Pittsburgh- a medical center affiliated with the University of Pittsburgh which offers primary health care to a large Medicaid-insured population; the East Liberty Family Health Care Center, an inner-city, neighborhood health center serving any who need care in the community regardless of income or insurance status; the Matilda H. Theiss Health Center, located in a large, public housing project adjacent to the University of Pittsburgh which serves a predominately Medicaid-insured population; and, the Allegheny County Health Department's Northside Child Health Clinic. These four clinics were chosen because they were known to serve predominately children with Medicaid insurance.

SUBJECTS

Medicaid billing records at three of the four clinics were used to identify children who were born between January 1, 1991, and May 31, 1995, and who were currently receiving primary care at the clinic. The age range of the children was 12 months to 5.5 years (mean age was 3.5 years; median age 3.6 years) and was chosen in order to capture the parents' (or guardians') knowledge, attitudes, beliefs and immunization behavior with regard to their preschool children. In instances where two or more age-eligible children had the same address and telephone number, the youngest child was selected for inclusion in the study. At the fourth site, clinic personnel had concerns about confidentiality and preferred to identify the sample (utilizing the same criteria) and mail the introductory letters themselves. Approval for this study was received from the Institutional Review Board for the Health Sciences, University of Pittsburgh.

Introductory letters, including an endorsement from the respective clinic director, were sent to parents of all eligible children. Parents were asked if they would participate in a 30 minute telephone survey and provide permission for researchers to review their youngest child's immunization record by signing and returning an enclosed consent form. Parents were offered a payment of $25 for participation. The letters were mailed in a series of eight waves of 100 to 200 each, over the course of the survey period from June to October 1996. Follow-up calls to non-responding parents were initiated two weeks after the mailings. Telephone interviews were not conducted until a signed consent form was returned. Interviews were conducted by trained staff using a computer assisted telephone interviewing (CATI) system.

After the telephone survey was completed with the parent, a medical record review was completed for each child to determine dates of immunization for 4 (DTP), 3 polio virus containing and 1 (MMR) vaccine doses. Records were abstracted from each immunization provider reported by the parent and synthesized to produce the most complete immunization record possible. Chart review data was collected between October of 1996 and January 1997.

QUESTIONNAIRE

In order to understand parents' conceptualization of childhood disease and prevention, the following process was followed. First, a panel of eight experts in several disciplines including pediatric infectious disease, public health and decision theory was consulted regarding what they believed parents needed to know in order to make an informed decision regarding com-

pleting a core set of immunizations for their preschool children. Based on the responses from the expert panel, the major determinants of decision making behavior were identified. Next, a set of open-ended, face-to-face interviews were conducted with 25 African-American parents of children less than two years of age who were late for one or more of the basic series of childhood immunizations. The purpose of the open-ended interviews was to develop the structured, closed-ended telephone survey instrument that addressed the major determinants of decision making behavior, and develop the response categories for the survey items from the perspective of the target population of parents.

The second step of this process involved the pilot testing and administration of the telephone survey instrument. Variables chosen for inclusion in the survey included items generated by the expert panel as well as key constructs from the Precaution Adoption Process Model - a stage-based, theoretical model of health behavior adoption.[17] This model provided the theoretical framework for the instrument design because it allows one to examine both cognitive and non-cognitive aspects of immunization behavior. The model assumes a linear approach to health behavior adoption and postulates that before one adopts a new health behavior, they progress through a series of stages. They must first have an awareness of childhood diseases followed by an acknowledgment of their susceptibility to the disease. Next, they must decide to take a precaution to avoid or lessen the consequences of the disease. And, finally, the person takes the preventive action-- i.e. gets the vaccine for their child.

The telephone survey instrument consisted of 51 questions - 12 of which had subparts - for a total of 138 data points. The instrument contained questions based on the following constructs: childhood disease recognition, parental experience with childhood diseases, parental beliefs regarding the likelihood of children getting whooping cough (the term whooping cough is used interchangeably in this manuscript with pertussis) and measles, parental beliefs about their child's susceptibility as well as childhood disease transmission and prevention, judgments about the severity and consequences of getting childhood diseases, knowledge of and beliefs about immunization effectiveness, judgments regarding likelihood of side effects, beliefs about barriers to immunizations and, demographics-age, race, education, income, employment status and number of children. Information regarding the sex of the respondent was not collected in this study because this information was not available to the investigators at the time that recruitment letters were mailed. Once parents mailed in a consent form agreeing to be interviewed by telephone, it was felt that it would be awkward to ask the parent during the telephone interview if they were male or female. Therefore, this information was not collected.

STATISTICAL METHODS

The dependent variable in this study was late receipt of DTP1, DTP3 and the combination of four DTP, three polio and one1 MMR vaccines at three points in time: 3 months, 7 months and 19 months of age respectively. A child was considered late if they received DTP1 at 3 months (>/= 91 days) and/or if they received DTP3 at 7 months (>/= 213 days) and/or if they had not received at least 4 DTP, 3 polio and 1 MMR vaccines by 19 months of age. When vaccination dates couldn't be determined they were left as missing data. In addition, in some cases children were classified as late for a vaccination by "default." For example, if the date of immunization for DTP3 was missing and DTP2 was received very late (when DTP3 should have been given), then DTP3 was entered as being late.

The authors used a 30-day grace period in determining lateness for DTP1, DTP3 and completion of the 4:3:1 series at 19 months based on typical clinic practice. At the time of this study, the Recommended Childhood Immunization Schedule, which is approved by the Advisory Committee on Immunization Practices, American Academy of Pediatrics and the American Academy of Family Physicians, recommended that the first doses of DTP and polio be given at 2 months, the third doses of DTP and polio be given at 6 months and by 18 months, a child should have received four DTP, three polio and one MMR vaccines. These guidelines were used in this study.

The rationale for the choice of vaccine compo-

nents included as dependent variables in this study was as follows. The choice of DTP and MMR was influenced by the fact that there was a measles outbreak in the early 1990s and the fact that the incidence and consequences of pertussis is highest among children < 6 months. Pertussis and measles are two childhood diseases that children were dying from in the 1990s. Polio was chosen as a dependent variable because it is part of the 4:3:1 series. The varicella and pneumococcal vaccines were not included in this study because the varicella vaccine was only recommended but not mandatory at the time the study was conducted and the pneumococcal vaccine was not yet licensed.

The survey and immunization record data were joined together to create a combined data set for analysis. The analysis of the data included the following. First, in order to identify the underlying dimensions of parental beliefs about immunization and to reduce the number of predictive variables, a series of factor analyses (principal component extraction with varimax orthogonal rotation) was carried out in each of the question content domains. Factor analysis is a statistical technique used to identify a relatively small number of underlying factors that can be used to represent the associations among a larger set of interrelated variables. In this case, meaningful factors were found for questions focusing on the domains of parental beliefs regarding disease transmission, disease prevention, immunization effectiveness and the side effects of immunizations. Scales for these factors were constructed as the mean of the questions in a domain having a factor score of 0.50 or higher (the factor score measures the strength of the relationship of each variable with the underlying dimension). These scales were then utilized in the bivariate and multivariate analyses.

Second, the bivariate relationships between the independent variables and the three dependent variables were examined. In some cases, a new independent variable was created to summarize parental answers to a question when multiple responses were possible. For example, participants were asked two questions which measured their correct knowledge of symptoms of whooping cough and measles. Based on their responses, two, new yes/no variables were created called: "correct knowledge of symptoms of whooping cough" and, "correct knowledge of symptoms of measles". If a respondent was able to name at least three out of five correct symptoms for whooping cough and, three out of four correct symptoms for measles they were coded as having correct knowledge of whooping cough and measles respectively. These two, new independent variables were then used in the bivariate analyses for each of the three dependent variables-late for DTP1, late for DTP3 and late for 4-3-1 at 19 months.

Finally, logistic regression was used to examine the independent effects of each variable on the immunization outcome measures. In order to address the possibility of racial differences, interaction terms were included in the three logistic regression models for the significant variables in each model. None of these interaction terms were statistically significant, suggesting that there are no interaction effects by race in immunization behavior. However this result must be viewed with some caution because of the small sample size and should be examined in subsequent studies.

Tables summarizing the results of the bivariate analyses were not included in this manuscript because of the volume of data involved. The survey instrument consisted of 51 questions, 12 of which, had subparts for a total of 138 data points. Each of these 138 independent variables was included in bivariate analyses by the 3 dependent variables (i.e. late for DTP1, late for DTP3, and late for 4-3-1 at 19 months). It was not practical to display all of the significant and non-significant bivariate findings in table format.

RESULTS

Response Rate

According to clinic records, 1316 households had children in the selected age range. See Figure 1 for a disposition of the sample. Twenty-five households were excluded because the respondent was ineligible due to one of the following reasons: either the respondent was not the parent or legal guardian of the child in question or the respondent was unable to complete the survey due to illness, hearing impairment, or language /comprehension barriers.

An examination of the immunization data for all 507 participants indicates that there was no statistically significant difference between those who completed the telephone survey (n= 483) and those who did not (n = 24) in terms of lateness for immunization.

Demographics of Respondents

The majority of those surveyed were African American, had 12 or fewer years of education and, had an annual household income of less than $10,000. See Table 1 for a summary of the demographic characteristics of the total population. The demographic characteristics of the study participants reflect the characteristics of the population who receive care at the four study sites rather than the population of the region. The four study sites are representative of the typical settings where children of low-income households in urban areas receive their primary care.

Immunization Status

Using the definitions of lateness described above, only 15% of children were late for the first DTP immunization at 3 months of age. However, at 7 months, a little over half of the children - 52% were late for the third DTP vaccination. By 19 months of age, 40% of children had not received at least four DTP, three polio and one MMR.

Parental Awareness and Experience with Childhood Diseases

Parents were asked about their awareness of and experience with measles and whooping cough. Fifty-seven percent (n = 275) of parents said that they had heard of whooping cough. When they were read a list of symptoms (see Table 2) and asked which ones a child with the disease would have, the vast majority of parents who had heard of whooping cough, knew one or more of the correct symptoms. For instance, 96% (n = 264) said a painful cough, 95% (n = 261) said difficulty breathing and 91% (n = 250) said a fever were symptoms of whooping cough. Twenty-one percent (n = 101) of respondents said that they knew someone who has had whooping cough. Seventy-two percent (n = 347) of parents had heard of measles. Among those who had heard of measles, almost everyone knew the obvious symptoms of red rash all over the body and high fever. Twenty-seven percent (n = 130) of respondents reported knowing someone who has had measles.

Figure 1. Disposition of the Sample

Sampling Step	Total Sample	
	Number	Percent
Total households in sample	1316	
Households w/ wrong number, disconnected and/or not working telephone	428	33%
Households able to be contacted	888	
Households w/ ineligible respondent	25	3%
Total eligible households	863	
Telephone never answered after 7-10 calls	293	34%
Refused participation	63	7%
Never completed the interview	24	3%
Parents completed the interview	483	56%

Based on the results of the bivariate analysis, parental awareness regarding the symptoms of these two diseases had no significant impact on the timing of their child's immunization at 3, 7 or 19 months.

Parental Beliefs Regarding Susceptibility

Parents were asked whether they thought their child could get whooping cough. The majority of parents (65%) said yes. Among parents who believed that their child is susceptible to whooping cough, 43% were late at 19 months for completing four DTP, three polio and one MMR vaccines. Regardless of whether the parent was on-time or late at 19 months, parents gave three main reasons for why they considered their child to be susceptible. The most frequently mentioned reasons for both groups were that "anyone can get whooping cough," followed by "being exposed to the disease" and, "being around a lot of kids." Only four parents said, "not getting shots" was a reason why their child could be susceptible to whooping

april supplement-with cover.qxd 5/20/2003 12:19 AM Page 11

Table 1. Demographic Description of Sample

	Number	Percent
Total	483	100
Race		
African American	365	75.9
White/Other	116	24.1
Missing	2	-
Number of Children		
One	142	29.4
Two	167	34.6
Three or more	174	36.0
Age		
16 to 21	51	10.6
22 to 30	225	46.6
31 and over	207	42.9
Education		
12 or Fewer Years of School	338	70.0
Some Post Secondary Education	145	30.0
Income below $10,000		
No	141	29.4
Yes	338	70.6
Missing	4	-
Employed		
No	334	69.2
Yes	149	30.8
Enrolled in School		
No	377	78.1
Yes	106	21.9
Clinic		
Children's Hospital Primary Care Clinic	347	71.8
East Liberty Family Health Care Center	53	11.0
Matilda H. Theiss Health Center	54	11.2
Allegheny County Northside Child Clinic	29	6.0

cough. (See Table 3 for a complete list of reasons cited by parents.)

Among the 35% of parents who said their child was not susceptible to whooping cough, 35% were late at 19 months for completing four DTP, three polio and one MMR vaccines. The main reason that both on-time and late parents gave for why their children were not susceptible was that: they were "up-to-date with their shots."

Parental Beliefs Regarding Disease Transmission

Parents were asked how they thought whooping cough and measles are transmitted. Two underlying dimensions of parental beliefs regarding transmission were identified from the factor analyses (Table 4). The first factor was labeled the "poor parenting factor" based on participants' wording, and included the following reasons why children got whooping cough: "not dressing child properly in cold weather," "child is sickly," "child is not kept clean" and, "child has a poor diet." Parents who gave one of these responses were very likely to give all of these responses. The second underlying dimension of parental beliefs regarding disease transmission was labeled the "contagion factor." This belief is characterized by parents who state that the reasons children get whooping cough are that they: "do not have shots," "have a weak immune system," "are in contact with a person who has whooping cough" and, "are exposed to germs or viruses in the air."

Table 2. Parental Beliefs Regarding Symptoms of Whooping Cough and Measles

Whooping Cough Symptoms

1. Mucous in the lungs
2. Swelling in arms and legs
3. Painful Cough
4. Infection
5. Nose bleeds
6. Red rash all over the body
7. Difficulty breathing
8. Fever

Measles Symptoms

1. Red rash all over body
2. Mucous in the lungs
3. Red eyes
4. A virus
5. Nose bleeds
6. High fever
7. Swelling in arms and legs
8. Cough

Parental Beliefs Regarding Disease Prevention

Parents were asked what they might do to protect their children from getting whooping cough. Three underlying dimensions of parental beliefs regarding prevention of childhood diseases were identified (Table 4). One set of responses was labeled as, the "good parenting factor" and included, "getting regular checkups," "dressing a child warmly in cold weather," and/or making sure a child has a healthy diet." A second factor was labeled as, "general prevention" and

Table 3. Parental Beliefs Regarding Reasons for their Child's Susceptibility to Whooping Cough & Measles

1. Being around a lot of kids
2. Being exposed to the disease
3. Not getting shots
4. Weaker immune system
5. Born with the disease /heredity
6. Not healthy
7. Parental neglect (no check-up, not dressing child properly)
8. Child's age (young children are more vulnerable)
9. Shots are not effective for some children
10. Having a bad cold
11. Anyone can get whooping cough/ measles
12. Other reason
13. No Answer
14. Don't know

included, such things as "not allowing your child to be around a lot of other children" and "preventing colds." The third factor was labeled "specific prevention" and included such strategies as "keeping a child away from people who have whooping cough" and, "getting shots for a child." Parents who gave one of the responses under each factor were very likely to give all of the responses.

Parental Beliefs Regarding Immunization Effectiveness

Parents were asked if they agreed or disagreed with a series of statements regarding their understanding of how shots work and their effectiveness. Three factors were identified which describe how parents think about shots for childhood diseases (Table 5). The first factor was labeled "shots as treatment" and summarizes the following parental responses: "shots contain medicine to treat diseases," "shots can cure diseases" such as whooping cough and measles, "it doesn't matter at what age a child gets shots" and, "shots wear off after several months." The second factor was labeled "shots as prevention" and included: "shots prevent children from getting diseases" and "children who have shots won't get whooping cough and measles." A final factor was designated as "shot maintenance" and this factor summarized the following two parental responses: "a series of several shots is needed for full protection" and "shots build up a child's immune system."

Table 4. Parental Beliefs Regarding Disease Transmission and Prevention: Factor Analysis Results *

Factor	Factor Loading
A. Parental Beliefs Regarding Disease Transmission (Whooping cough only)	
"Poor Parenting" Factor	
Not dressing child properly in cold weather	0.706
Being sickly	0.694
Not keeping child clean	0.659
Poor diet	0.626
"Contagion" Factor	
Not having shots	0.675
Weak immune system	0.663
Being close to a person w/ whooping cough	0.603
Exposure to germs or viruses in air	0.569
B. Parental Beliefs Regarding Disease Prevention (Whooping cough only)	
"Good Parenting" Factor	
Get regular checkups	0.724
Dress child warmly in cold weather	0.653
Make sure child has a healthy diet	0.522
"General Prevention" Factor	
Don't allow child around a lot of children	0.831
Prevent colds	0.586
"Specific Prevention" Factor	
Keep child away from someone w/ whooping cough	0.758
Get shots for child	0.751

Note: Only items with factor loadings > .500 (a common convention) are included.
* Factor analysis is a technique that is used to identify the underlying dimensions of responses to survey items by examining their inter-correlations. Factor loadings are coefficients which represent the strength of the association of each item with the underlying dimension. The higher the factor loading the more closely related the item is to the underlying dimension.

Parental Beliefs Regarding Adverse Effects

Parents were also asked about the likelihood of certain problems occurring as a result of their child getting shots for measles and whooping cough. They were asked to rate seven possible outcomes as: very likely, somewhat likely, or not at all likely to occur. Two factors were identified which describe how par-

ents think about the possible side effects of immunizations for childhood diseases (Table 5). The first factor, "severe side effects" included the following responses regarding possible outcomes: "brain damage," "severe allergic reactions," "high fever" and, "getting the disease from the shot". The second factor was labeled, "minor side effects" and included: "fussiness and crabbiness," "low grade fever" and, "soreness where the shot was given" as possible outcomes after receipt of childhood immunizations.

Factors Associated with Late Immunization

The significant relationships identified in the bivariate analyses were used in the logistic regression analysis in order to assess the independent effects of each variable on lateness at three time points (see Table 6). The main factor associated with lateness for DTP1 at 3 months, is having three or more children (OR= 3.05). In addition, parents who hold the belief that immunizations are effective because "shots are a treatment" for childhood diseases, are far less likely to be late than those who do not hold this belief (OR= .23).

The factors associated with lateness for DTP3 at 7 months, again, are the number of children in the household. Those who have two children are approximately two times as likely to be late (OR= 1.77) and those having three or more children, are more than three times as likely to be late as those who have only one child (OR = 3.39). In addition, parents who reported having received childhood immunization information from their provider or office staff, were less likely to be late as those who did not report receiving information (OR= .27). Finally, parents who believe that whooping cough is a contagious disease and is transmitted as a result of "being in close contact with a person who has the disease" and/or "not having shots," are half as likely to be late than those who do not share this belief (OR = .50).

At 19 months, the factors that are associated with lateness for completing four DTP, three polio and one MMR vaccines again include the number of children, parental beliefs regarding the likelihood of severe side effects occurring as a result of getting childhood immunizations and, race. Having three or more children is associated with lateness at 19 months (OR = 4.29). Believing that "brain damage" and/or "severe allergic reactions," are sequella to childhood immunizations is also associated with lateness (OR = 1.84). And, being African American was also associated

Table 5. Parental Beliefs Regarding Immunization Effectiveness and Side Effects: Factor Analysis Results*

Factor	Factor Loading
A. Parental Beliefs Regarding Immunization Effectiveness	
"Shots as Treatment" Factor	
Shots contain medicine to treat disease	0.696
Whooping cough & measles can be cured by shots	0.694
It doesn't matter at what age child gets shots	0.522
Shots wear off after several months	0.509
"Shots as Prevention" Factor	
Shots prevent children from getting disease	0.779
Children with shots won't get whooping cough & measles	0.722
"Shot Maintenance" Factor	
A series of several shots is needed for full protection	0.798
Shots build up child's immune system	0.606
B. Parental Beliefs Regarding Side Effects of Immunizations	
"Severe Side Effects" Factor	
Brain damage	0.769
Severe allergic reactions	0.739
High fever	0.688
Getting the disease from the shot	0.673
"Minor Side Effects" Factor	
Fussy and crabby	0.818
Low grade fever	0.725
Soreness where shot was given	0.691

Note: Only items with factor loadings > .500 (a common convention) are included.
* Factor analysis is a technique that is used to identify the underlying dimensions of responses to survey items by examining their inter-correlations. Factor loadings are coefficients which represent the strength of the association of each item with the underlying dimension. The higher the factor loading the more closely related the item is to the underlying dimension.

with lateness at 19 months (OR= 2.03).

DISCUSSION

Immunization series completion coverage among two year old children in the United States has improved greatly over the past decade. In the present study, 60% of poor, inner-city preschool children received four DTP, three polio and one MMR vaccines by 19 months of age, leaving 40% who were late. The desired outcome of childhood immunization interventions has been to increase immunization series completion levels among two year old children. Although it is important to understand the factors affecting lateness during the first year of a child's life (e.g. are parents initiating and maintaining well-baby care - as measured by timing of DTP1 and DTP3-- at a time when the incidence of childhood diseases such as pertussis and the health consequences are most serious), ultimately, public health practitioners want to understand and intervene on the factors affecting vaccine series completion. For this reason, the discussion here focuses primarily on understanding the determinants of late immunization at 19 months of age for the completion of four DTP, three polio and one MMR vaccines. The Precaution Adoption Process model provides a useful framework for thinking about and interpreting the study's findings in terms of parents' mental frameworks and their behavioral stage of readiness to vaccinate their child.

Stage 1: Parental Awareness and Experience with Childhood Diseases

Parents in this study had a general awareness of and some experience with childhood diseases. When given a list of symptoms for whooping cough and measles, most parents could give one or more correct symptoms-- perhaps by chance. (See Table 2). However, general awareness of symptoms did not have a significant impact on parental behavior in terms of the timing of their child's immunization.

Table 6. Logistic Regression Results Predicting Lateness (Cell Entries are Odds Ratios and 95% Confidence Intervals)

	Dependent Variable-Late for:					
	DTPI (n = 417)		DTP3 (n = 420)		4DTP, 3Polio, 1 MMR At 19 Months (n = 368)	
	OR	95% CI	OR	95% CI	OR	95% CI
African American	1.58	(0.75, 3.30)	1.42	(0.85, 2.39)	2.03*	(1.11, 3.73)
Two children: (Ref group 1 child)	2.11+	(0.94, 4.73)	1.77*	(1.06, 2.97)	2.38**	(1.30, 4.36)
Three children or more (Ref group 1 child)	3.05**	(1.40, 6.64)	3.39***	(2.00, 5.72)	4.29***	(2.36, 7.81)
Education: more than high school	1.05	(0.57, 1.96)	0.76	(0.47, 1.22)	0.66	(0.38, 1.14)
Income less than $10,000	1.37	(0.72, 2.59)	1.24	(0.77, 1.98)	0.70	(0.41, 1.18)
Knows someone with whooping cough	1.47	(0.75, 2.86)	1.57+	(0.94, 2.63)	1.26	(0.71, 2.26)
Thinks own child is susceptible to whooping cough	1.28	(0.71, 2.31)	1.33	(0.86, 2.06)	1.39	(0.83, 2.31)
Knows someone with measles	-	-	-	-	1.35	(0.80, 2.27)
Thinks own child is susceptible to measles	-	-	-	-	1.14	(0.67, 1.94)
Received information from MD	1.13	(0.31, 4.11)	0.27*	(0.10, 0.74)	0.87	(0.33, 2.28)
"Poor Parenting" factor scale	0.74	(0.46, 1.19)	1.12	(0.77, 1.62)	0.87	(0.58, 1.31)
"Contagion" factor scale	0.68	(0.32, 1.46)	0.50*	(0.26, 0.97)	1.25	(0.59, 2.65)
"Shots as treatment" factor scale	0.23*	(0.07, 0.78)	0.86	(0.36, 2.09)	1.27	(0.47, 3.45)
"Shots as prevention" factor scale	1.28	(0.59, 2.78)	0.99	(0.56, 1.76)	1.96+	(1.00, 3.87)
"Shot maintenance" factor scale	1.65	(0.47, 5.78)	0.82	(0.34, 1.99)	1.09	(0.42, 2.88)
"Severe side effects" factor scale	1.15	(0.63, 2.12)	1.15	(0.72, 1.84)	1.84*	(1.08, 3.16)
"Minor side effects" factor scale	0.74	(0.39, 1.40)	1.48	(0.90, 2.44)	1.23	(0.70, 2.17)

*** p<=.001; ** p<=.01; * p<=.05; + p<=.10

Perhaps this is because, as the model suggests, knowing about childhood diseases either from personal experience or from information provided by a health-care professional is but a first step in the process of protecting one's child from the hazard. It is a necessary but not a sufficient condition for ensuring that a parent gets immunizations in a timely manner for their children.

Parents who had a fairly accurate conceptualization of disease transmission, as captured by the factor analysis and labeled the "contagion factor" (see Table 4), were half as likely to be late for DTP3 at 7 months as those who did not share this view. This suggests that a parent's mental framework- that is, how she thinks about disease transmission, is related to timing of immunization- especially when the conceptualization tends to be accurate.

Stage 2: Acknowledgment of Personal Susceptibility

The model states that beliefs about personal susceptibility facilitate taking a precaution rather than not taking an action. Among those who said their child was susceptible and were late, the logic appeared to be that "anyone can get the disease" and, if they're "around a lot of kids" this increases the likelihood of exposure. These parents did not link susceptibility to "not getting shots". Previous studies have shown that perceived susceptibility to illness was inversely related to up-to-date immunization status.[15,18] Bates et al., (1994) offered a possible explanation for this phenomenon. Mothers who perceived that their children were less susceptible to illness more frequently utilized preventive services - suggesting that mothers who believe that prevention works and obtain regular preventive care also believe that they can keep their children from becoming ill. The findings from the current study would support this explanation- the primary reason parents said their child wasn't susceptible to whooping cough, was because they were up-to-date with their shots.

Stage 3: Decides to Immunize Child

The Precaution Adoption Model states that parental beliefs regarding immunization play an important role in the decision to get immunization. One set of beliefs examined in this study were those regarding the effectiveness of immunizations. We found that these beliefs cover a range of accurate and inaccurate information - both of which could motivate parents to get shots. For instance, parents who believe that shots are effective because they "treat" a disease, are less likely to be late at DTP1 as those who do not share this belief. If a parent believes that shots "contain medicine" and/or shots can "cure" childhood diseases, then she may be more inclined to get her child immunized. This finding suggests a need for health education regarding the importance of getting a child immunized to protect him/her from serious diseases even though the immunization itself may cause some discomfort.

Likewise, parental beliefs regarding the side effects of immunizations can also affect their immunization decision. We found that these beliefs are grouped into two categories. Parents are able to distinguish severe from minor side effects (see Table 3). Parents who believe that severe side effects are likely to occur after an immunization, are more likely to be late for receiving four DTP, three polio and one MMR vaccines at 19 months. If parents believe that severe adverse consequences are likely to occur, this presents a major barrier to getting the child immunized. At this stage, a parent's beliefs about barriers to getting immunizations is a determinant of their decision to get their child immunized.

Stage 4: Gets Immunization

The results of the logistic regression overwhelmingly indicate that having three or more children was the strongest predictor of lateness at all three points in time: 3 months, 7 months and at 19 months of age. This finding is in keeping with the Precaution-Adoption Process Model which states that one of the major determinants of a person actually taking a precautionary action is the "time, effort and resources available considering competing life demands".[17] Previous studies have shown that birth order and the number of children that a parent has increases the likelihood of being late for immunization.[19,20,21] This

study produced similar results. The simplest explanation is that, the greater the number of children, the greater the number of demands on the parent's time and that is the reason they are more likely to be late.

Finally, the Model suggests that reminders to take a preventive action, also play a key role in whether the person actually follows through with her intention. The results of this study showed that parents who reported receiving immunization information from a physician were significantly less likely to be late at 7 months for DTP3. At 19 months the direction of the odds ratio is the same (i.e. less than 1) however the results are not significant.

STRENGTHS AND LIMITATIONS

There are several important features of this study. First, this study is one of only a few which addresses the beliefs of disadvantaged, inner-city parents and compares their beliefs with their child's immunization status. Second, understanding parents' mental frameworks for thinking about childhood diseases, is a unique approach and one that is necessary to the design and implementation of effective communications programs targeting this audience. This study is one of only a few studies to do so in the immunization area. Finally, the use of computer-assisted telephone interviewing (CATI) is both a strength and a weakness. CATI systems facilitate accuracy in the management of the sample and reduce the number of interviewer errors--for instance, missing a skip pattern. However, using telephone interviews as a means of collecting data from a low-income population is also problematic. As Figure 1 illustrates, 33% of the total sample had a telephone that was either disconnected, not working or was a wrong number. Making contact with individuals who may not be able to afford telephone service on a consistent basis or who may be highly mobile is very difficult. Although telephone surveys have these obvious limitations, the alternatives - mail surveys or face-to-face interviews at an individual's home also have significant drawbacks.

Potential limitations of this study are as follows. The first limitation of this study is the age of the data. The telephone survey was completed in late 1996 and the medical record review was completed in 1997. However, given that there have been so few studies that have addressed the beliefs of disadvantaged, inner-city parents and fewer still that compare parental beliefs with immunization status, the authors believe the findings are still relevant. A second limitation is the response rate, which was modest and raises the issue of non-response bias. It is impossible to know to what extent, if any, the non-respondents differ with regard to their knowledge, attitudes, beliefs and immunization status. Generalizations from our study are obviously limited to the survey's target population: low income, inner-city parents of preschool children. A third limitation was that the interview was conducted with the parent after the child had already received the vaccinations that were evaluated. However, it seems reasonable to assume that parental knowledge about and attitudes toward immunization would become more informed and realistic with experience over time, and, perhaps, less likely to stand out as predictors of lateness. Therefore the factors that were associated with late immunization in this study are probably good predictors of lateness in this population. Finally, the odds ratios for some significant factors were large due to small sample size so the results should be viewed with some caution.

CONCLUSIONS AND RECOMMENDATIONS

The present study attempted to understand how disadvantaged parents living in the inner-city, think about childhood diseases and prevention and determine if this is related to the late receipt of vaccines for their preschool children. The results of this study indicate that a combination of life circumstances as well as cognitive factors were associated with late immunization.

The major life circumstance associated with late immunization was having three or more children in the household suggesting busy schedules and competing priorities. Thus, it is imperative to take advantage of the opportunity to vaccinate anytime parents bring their preschool child to visit a health care provider so as not to impose burdensome requirements on already over burdened parents. In addition, one of the implications of this study could be to increase opportunities for immunizations by making

them available throughout the community, not just in health care settings.

The cognitive factors that were associated with timing of immunization have to do with parental beliefs about immunization effectiveness and adverse effects of immunizations. Primary care providers need to reinforce the accurate beliefs that parents hold regarding immunizations that may motivate them to get their children vaccinated. Likewise, they must also correct inaccurate beliefs especially about side effects. This will help to establish a partnership for more informed decision making based on the principles of risk communication.[16]

ACKNOWLEDGMENTS

The authors with like to thank the following individuals and organizations for their willingness to participate in this study: The four primary care clinics which allowed us to conduct this research are owed a great debt of thanks: Children's Hospital of Pittsburgh (Dr. Heidi Feldman and Dr. Evelyn Reis), East Liberty Family Health Center (Dr. David Hall, Dr. Rick Zimmerman and Ms. Carol Buyers), Matilda Theiss, and the Allegheny County Health Department. In addition, Dr. Donald Mattison, the former Dean of GSPH, stimulated the development of this project by providing the initial seed funding to do a pilot study because of his interest in risk communication. Finally, the authors wish to express our sincere appreciation to Ms. Anne Medsger for her supervision and management of all aspects of the telephone survey including assistance in the design of the instrument and comments on the analysis of the data.

REFERENCES

1. Centers for Disease Control and Prevention: "Estimated Vaccination Coverage with Individual Vaccines and Selected Vaccination Series by State and Immunization Action Plan Area. US, National Immunization Survey, Q1/1996-Q4/1996.

2. Williams IT, Dwyer DM, Hirshorn EM, Bonito RC and Graham NM. Immunization Coverage in a Population-Based Sample of Maryland Children. *Archives of Pediatric and Adolescent Medicine.* 1994; 148: 350-356.

3. Guyer B, Hughart N, Holt E, Ross A, Stanton B, Keane V, Bonner N, Dwyer DM and Cwi JS. Immunization Coverage and Its Relationship to Preventive Health Care Visits Among Inner-City Children in Baltimore. *Pediatrics.* 1994; 94: 53-58.

4. U. S. Department of Health and Human Services, Eliminating Racial and Ethnic Disparities in Health: Overview. www.raceandhealth.hhs.gov. 2000.

5. Agency for Health Care Policy and Research. Understanding and Eliminating Minority Health Disparities. R.A.: HS-00-003, Oct. 20, 1999.

6. Cutts FT, Orenstein WA, Bernier RH. Causes of low preschool immunization coverage in the United States. *Annual Review of Public Health* 1992;13:385-398.

7. Freeman TR, Bass MJ. Determinants of Maternal Tolerance of Vaccine-Related Risks. *Family Practice Research Journal.* 1992;9:36-41.

8. Melman ST, Chawla T, Kaplan JM, Anbar RD. Multiple injections: Ouch! *Archives of Family Medicine.* 1994;3:615-618.

9. Lannon C, Brack V, Stuart J, et al. What mothers say about why poor children fall behind on immunizations. *Archives of Pediatric and Adolescent Medicine.* 1995;149:1070-1075.

10. Keane V, Stanton B, Horton L, Aronson R, Galbraith J, Hughart N. Perceptions of vaccine efficacy, illness, and health among inner-city parents. *Clinical Pediatrics.* 1993; 2-7.

11. Strobino D, Keane V, Holt E, Hugart N, Guyer B. Parental attitudes do not explain underimmunization. *Pediatrics*. 1996;98:1076-1083.

12. Prislin R, Dyer J, Blakely C, Johnson C. Immunization Status and Sociodemographic Characteristics: The Mediating Role of Belifs, Attitudes, and Perceived Control. *American Journal of Public Health.* 1998; 88:1821-1826.

13. Salsberry PJ, Nickel JT, Mitch R. Why aren't preschoolers immunized? A comparison of parents' and providers' perceptions of the barriers to immunizations. *Journal of Community Health Nursing.* 1993;10(4):213-224.

14. Gellin BG, Maibach EW, Marcuse EK: Do Parents Understand Immunizations? A National Telephone Survey. *Pediatrics.* 2000;106:1097-1102.

15. Bates AS, Fitzgerald JF, Dittus RS, Wolinsky FD. Risk Factors for Underimmunization in Poor Urban Infants. *Journal of the American Medical Association.* 1994; 272: 1105-1110.

16. Bostrom A: Vaccine Risk Communication: Lessons form Risk Perception, Decision Making, and Environmental Risk Communication Research. *Risk Health Safety Environ.* 1997;8:173-200.

17. Weinstein, ND. The Precaution Adoption Process. *Health Psychology*. 1988 7(4) pp.355-386.

18. Becker MH, Nathanson CA, Drachman RH, Kirscht JP. Mothers' health beliefs and children's clinics visits: a prospective study. *Journal of Community Health.* 1977; 3:125-135.

19. Wood D, Donald-Sherbourne C, Halfon N et al. Factors Related to Immunization Status Among Inner-City Latino and African-American Preschoolers. *Pediatrics.* 1995; 96:295.

20. Schaffer SJ and Szilagyi PG. Immunization Status and Birth Order. *Archives of Pediatric and Adolescent Medicine*. 1995; 149:792-797.

21. Bobo JK, Gale JL, Thapa PB and Wassilak SGF. Risk Factors for Delayed Immunization in a Random Sample of 1163 Children from Oregon and Washington. *Pediatrics.* 1993; 91:308-314.

TIMELINESS OF IMMUNIZATIONS OF CHILDREN IN A MEDICAID PRIMARY CARE CASE MANAGEMENT MANAGED CARE PROGRAM

J. James. Cotter, Ph.D., J. D. Bramble, Ph.D., Viktor E. Bovbjerg, Ph.D., Carol B. Pugh, Pharm.D., Donna K. McClish, Ph.D., Gary Tipton, M.D., Wally R. Smith, M.D.
Richmond, Virginia

Objective. This study assessed the timeliness of immunization for children in a Medicaid managed care primary care case management program controlling for patient and provider predictors of immunization status.
Methods. Using administrative data and patient medical records, up-to-date (UTD) and age appropriate immunization (AAI) status were reviewed for 5,598 children. The 4:3:1 immunization series (4 diphtheria, pertussis, tetanus vaccinations; 3 polio vaccinations; and one measles, mumps, rubella vaccination) was the standard.
Results. Childhood immunization rates were low when assessed using strict adherence to vaccination recommendations. At age 18 months, 28.3% were classified as UTD, and 6.3% were classified as AAI. Compared to children not up-to-date, UTD children were more likely to have public rather than private providers, to have had older mothers, and less likely to have been African-American. Among UTD children, AAI children were more likely to reside in urban areas.
Conclusions. Low-income children continue to be under-immunized, even under a managed care initiative. Health care providers and child health advocates need to continue pressure for programs that will increase adherence to nationally recommended guidelines.

Key words: Medicaid ◆ managed care ◆ immunization ◆ children

INTRODUCTION

Although childhood immunization is a primary disease prevention strategy, children, especially low-income children, often do not receive their vaccinations on time. Up to 40% of two-year-olds do not receive their immunizations at age-appropriate intervals.[1-2] During the last two decades, sporadic outbreaks of measles in the U.S. affected thousands of children and the number of cases of other preventable childhood diseases rose,[3-4] while immunization levels in some urban areas have even declined.[5]

The expansion of Medicaid benefits in the 1990s,[6] and the increasing enrollment of Medicaid recipients in managed care sought to improve access to care for low-income children. Managed care programs, in general, have emphasized their

© 2002. Originally published in the Journal of the National Medical Association, Vol. 94, No. 9, September 2002:833-840. From the Virginia Commonwealth University, Creighton University and the University of Virginia. Direct correspondence J. James Cotter, PhD, Department of Gerontology, Virginia Commonwealth University, MCV Campus, Randolph Minor Annex, Room 101, 301 College Street, PO Box 980228, Richmond, VA 23298-0228; phone (804) 828-1565; fax (804) 828-5259; e-mail jcotter@mail2.vcu.edu. Funding was provided by the Department of Medical Assistance Services of the Commonwealth of Virginia.

ability to provide enhanced preventive services. In particular, primary care case management has been held up as correctly incentivized to improve preventive care. Yet, Medicaid managed care has a mixed record in achieving immunization rates at recommended levels and intervals.[7-8]

This paper describes the timeliness of immunization for children in a Medicaid managed care primary care case management program. Important patient and provider predictors of appropriate immunization status were identified using claims data, health department records, and medical records.

METHODS

Rates of immunization for 5,598 children who were moved from fee-for-service care to a newly implemented primary care case management managed care program were reviewed in 1995 as part of the Quality Assessment and Improvement Project for Medicaid Managed Care in Virginia.[9] Managed care was implemented for Virginia's Medicaid population through a staged geographic approach. This project studied managed care as implemented in the first geographic area to be included in Medicaid managed care. The managed care program assigned each Medicaid recipient to a primary care physician (PCP) who, in exchange for a monthly per-patient management fee, was responsible for preventive services and functioned as a gatekeeper for access to medical care.

We identified all children who turned two years old during a one-year period (July 1, 1993, to June 30, 1994) and who were enrolled in the Medicaid primary care case management program for a period of at least six months. In primary care case management, the Medicaid recipient is assigned to a designated primary care provider for management of health care. Although some information on immunizations was available through the administrative database of the Medicaid agency, we surveyed providers for additional information regarding the immunization status of each child. The administrative database was deemed inadequate on its own to answer the research question because a) providers sometimes immunize without billing, b) some of the patients may have received their immunizations before they came on to the Medicaid program, either from the same provider or another provider, and c) some patients may obtain their immunization from their local public health departments.

We informed all primary care providers in the primary care case management program about the purpose and scope of the immunization study, and sent them a survey about the immunization status of each child. Included with the survey were letters of endorsement from the state medical society and the state chapter of the American Academy of Pediatrics. To reduce the burden of data collection, we first combined immunization information from the state Medicaid claims and the state health department databases and gave it to each PCP using a customized data collection instrument. The PCP was then asked to complete the immunization assessment through abstraction from his/her own patient records.

For all immunizations, state Medicaid records accounted for 36% of received immunizations, state Health Department records accounted for 10%, and providers documented another 24% of the required immunizations; thus 70% of the immunizations were accounted for with this method. There was no documentation of completion for the remainder (30%) of the required immunizations.[10] At the time of the study, the American Academy of Pediatrics and the American Academy of Family Practice recommended 16 vaccinations at specific intervals by the age of 18 months.[11] We used this database to study predictors of children having received the 4:3:1 immunization series (4 vaccinations with diphtheria, pertussis, tetanus; 3 polio vaccinations; and one measles, mumps, rubella vaccination). Up-to-date immunization (UTD) was defined as receipt of all recommended vaccinations by 18 months of age, even though the child may not have received individual shots at the age-appropriate interval.[12] Age appropriate immunization (AAI) was defined as receipt of appropriate vaccinations at no more than 30 days past the recommended age for the vaccination in the immunization series. For example, a child was considered to have received

age appropriate immunizations at two months if the appropriate shots were received by 90 days post-partum. By definition, AAI children were a subset of the group of UTD children.

DEMOGRAPHIC VARIABLES AND ANALYSES

Race was defined from the administrative data as African-American, white or other; there were insufficient numbers of children of Latino, Asian or Native American origin to analyze separately. Race was self-reported at time of application for Medicaid. Mother's age was classified as either young (<20 years of age) or older (20 years of age and above); for 9% of the children, mother's age was not available and was coded as unknown. Urban status was defined as residence in a Standard Metropolitan Statistical Area. Assigned primary care providers in this Medicaid managed care program were classified as public providers (health departments and community health centers) or private providers (family practice, pediatrics, and other specialties).

Chi-square analysis was used in unadjusted analyses of UTD status and AAI status. Two logistic regression models were used to estimate relative odds of being immunized versus not immunized after adjustment for gender, race, provider type, mother's age, and rural/urban residence. The first model estimated the relative odds of the child having UTD immunization status at 18 months of age. The second model estimated the relative odds of AAI status among UTD children. All analyses used SAS.[13]

RESULTS

Among the 5,598 children studied, most were African-American (73.4%), approximately one-half were male (51%), and most mothers were in the 20 years and over age group. The designated primary care providers included public health providers (9.3%), and private providers (90.7%). Private providers included family practitioners (10.7%), pediatricians (78.3%), and other specialists. Of the 5,598 children, 2,583 (46.1%) were immunized (4:3:1 series) by 24 months of age and 1,582 (28.3%) were classified as UTD at 18 months. Of the UTD children, 351 (22.2%) were classified as AAI at 18 months. Thus 6.3% of all children were AAI. (See Table 1.)

As children grew older, increasingly smaller percentages of them received their immunizations at age appropriate intervals (Figure 1). The percentage of UTD children decreased for children beginning with 2 months of age but then rose again among children aged 15 months and older.

Table 2 shows that, in adjusted analysis, children who were UTD at 18 months were more likely to have been served by public as compared to private providers and that African-American children were less likely to be UTD than others. In addition, children with mothers over the age of 20 were more likely to have had their immunizations by 18 months than those with younger mothers. Among UTD children, AAI children were more likely to reside in urban areas. No other predictors were associated with AAI status among the UTD children.

DISCUSSION

We found that among Medicaid children in a managed care program, who were assigned to a primary care case manager physician, up-to-date immunization rates at 18 months were still low. Age appropriate immunization rates were even lower. The temporal patterns of immunizations indicated that compliance with the immunization schedule faltered after the second month of life (See Figure 1). By 18 months of age AAI status declined from 37% to 6%. UTD status declined from 37% to 19% at 15 months and then increased to 28% at 18 months and to 46% by 2 years of age. Other studies of low-income urban populations have found similar rates.[12, 14-15]

Children who were African-American and those with young mothers were less likely to be up-to-date at 18 months. Although some studies have found little effect of race on immunization status[16,17,18] our results are consistent with those that found racial disparities in immunization rates.[19-20] Our finding that children of mothers under 20

april supplement-with cover.qxd 5/20/2003 12:19 AM Page 21

Table 1. Characteristics for the Sample of 5,598 Children in Each Immunization Status Group, for the 4:3:1 Immunization Series.

Characteristics	Total %(n=5,598)	Not immunized by 18 mos. % (n=4,016)	UTD by 18 mos. %(n=1,582)	AAIfor 18 mos. %(n=351)
Male	50.7	51.0	50.0	49.6
Female	49.3	49.0	50.0	50.4
Provider type				
Public	9.3	7.1	15.0*	16.2
Private	90.7	92.9	85.0	83.8
Race				
White	21.0	18.5	27.2*	29.9†
African-American	77.2	79.9	70.5	66.1
Other	1.8	1.6	2.2	4.0
Mother's age				
<20 years	16.1	17.0	13.8*	12.0
20 years and older	74.4	77.5	79.2	73.1
Age not known	9.5	8.7	8.8	9.9
Rural/urban				
Non-MSA	4.8	5.0	4.4	1.7‡
MSA	95.2	95.0	95.6	98.3

Note: UTD - Up-to-date with immunizations by 18 months; AAI - age-appropriate immunization.
* Significant ($p < .05$) differences between UTD and children not immunized by 18 mos. Significant difference († $p <.01$ and ‡ $p=<.05$) between AAI and UTD children.

were less likely than children of older mothers to achieve full immunization for their children by 18 months, although not extensively reported previously,[20,17] confirms another recent study.[21] It is likely that younger mothers had fewer resources and less knowledge and experience of the need to help their children achieve full immunization status.

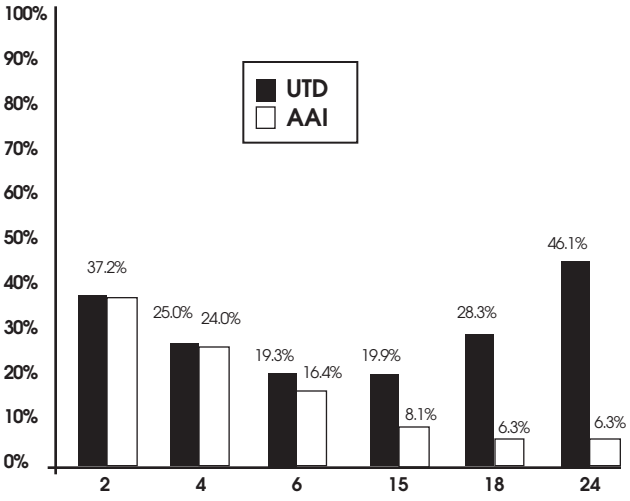


Figure 1. Timeliness of immunizations of Medicaid children during first 24 months of life (n=5,598).

Our findings that low-income children served by public health departments or community health centers were more likely to have received complete immunizations by 18 months of age parallels results of other studies,[22] even though in studies of a general population (not studied here), private providers have higher rates.[23-24] It may be that patient compliance was easier due to the traditional reliance on health departments by these patients for immunizations. Also, the traditional emphasis of public health providers on preventive care may have been an important component of assuring compliance with immunization recommendations.

In the model predicting AAI status among UTD children, we found rural residence was the only significant predictor of not being immunized at appropriate age intervals. A potential area for further research is whether the long travel time to care in rural areas may affect access to timely follow-up; immunization at exact age-appropriate intervals may therefore be difficult. A catch-up strategy of achieving multiple vaccinations at the same visit on the part of both mothers and providers could have been utilized as a more expedient, con-

Table 2. Results of Multivariate Logistic Regression Analysis: Predictions of Immunization Status, for the 4:3:1 Immunization Series.

Variables	UTD vs. Other Children Odds Ratio (CI)	AAI vs. Other UTD Odds Ratio (CI)
Gender: (referent = male)	1.04 (0.93-1.18)	1.01 (0.80-1.28)
Provider: (referent = private)	2.41 (2.00-2.90)	1.07 (0.77-1.49)
Race: (referent = white)		
African-American	0.56 (0.49-0.65)	0.78 (0.60-1.02)
Other race	0.84 (0.55-1.30)	1.88 (0.92-3.85)
Mother's age (referent = under 20 years of age)		
20 years of age and older	1.25 (1.06-1.48)	1.19 (0.82-1.21)
Age not known	1.03 (0.80-1.33)	1.18 (0.70-2.00)
Urban (referent = not in MSA)	1.24 (0.93-1.65)	3.24 (1.38-7.59)

Note: CI denotes confidence intervals.

venient option.

Age-appropriate rates were considerably lower than UTD rates and variables that predicted UTD status did not predict AAI status. Immunization at the appropriate age is important for conferring immunity and is a public health goal. Numerous children are incompletely protected during a period when they are most susceptible to preventable childhood diseases. This trend is particularly alarming as the recommended schedule of immunizations has expanded. Studies demonstrate that the techniques and interventions with patients and providers that are important to achieve UTD status may not be similarly effective to achieve AAI status. Opportunities for proactive prevention may differ depending on the desired immunization level. Further research on these criteria with a nationally representative sample is needed.[7]

As HMOs exit the Medicaid market, states are reverting to primary care case management programs. Our results raise concerns about the effectiveness of primary care case management as a mechanism to promote timely immunization to these patients. A recent survey has shown that physician attitudes in great measure determine whether immunizations are given.[25] The already-stressed, safety-net provider pool caring for vulnerable populations in managed care may be stressed beyond their resources to promote adherence. This population, despite Medicaid coverage, may have limited psychosocial resources to aid compliance with recommendations for preventive care. Fostering adherence for resource-poor populations requires more intensity than for other groups. Safety-net providers may not have the resources to implement such programs. Additionally, parents may not act assertively in obtaining immunization for their child. Although outbreaks have occurred,[26] and children may be increasingly susceptible to certain childhood diseases,[27] the danger from childhood diseases may be incorrectly perceived by parents as minimal.

Thus, we believe our results imply that community advocates and providers must work together to design improved systems of health care delivery that do not impede, but rather foster, successful immunization programs. A number of proactive strategies have proven effective, including outreach to families, both in-person and by telephone. Scheduled home visits would ensure that mothers, especially young mothers, are aware of the importance of immunizations. More effective tracking systems, such as assessment and feedback of coverage levels to providers and immunization registries, could be useful in assisting parents to obtain immunization in a timely manner and also monitor how well the population is immunized against childhood illnesses. Georgia public health clinics were able to double their vaccination coverage levels in six years through the use of assessment

and feedback to health district offices and clinics.[28] Registries hold the potential to improve vaccination coverage, especially for children with many providers, by giving better information to providers and setting up systems of reminder notices. At present only about one-half of children under the age of 6 are covered in an immunization registry.[29]

Another area of the system of service delivery with potential for improvement is the use of acute care visits for immunizations.[30] The Center for Disease Control developed a number of system-changing strategies to improve immunization rates including improved financing of recommended vaccines, improved reminder systems, better information systems for monitoring outcomes of immunization delivery; and continued education of families.[31] Last, the Institute on Medicine has recommended "increased financial and administrative support" for state immunization infrastructure programs. We would hope that such support encompasses additional resources for safety-net providers. The efforts to implement these strategies must continue to be a focus of providers and public health advocates.[32]

LIMITATIONS

The validity of the reported immunization rates has not been verified. The data collection methodology relied on documentation from state administrative records and provider chart reviews. Physician practice office staff completed the abstraction of information from the PCP's medical record. Independent chart reviews were not conducted to verify the data submitted.[10] Also, unless the mothers shared formal immunization records, the assigned PCP may not have had an accurate record of immunizations given prior to their involvement with the patient. Attribution of immunization status by provider type should thus be interpreted cautiously.

These Medicaid children may not have been representative of the general population of Medicaid children. Children were served through one type of managed care program in one state, although many states have similar managed care programs. Further, the age of the data is a shortcoming. Immunization recommendations have been adjusted since the time of the study. However, the addition of more immunizations to the recommended schedule will only exacerbate the difficulties of ensuring age appropriate immunization. Also, the Vaccine for Children program became fully operational after the time period of this study and offered the potential to positively impact immunization rates for children on Medicaid.[21,33] Thus, subsequent surveys of immunization rates for this population might find higher rates of timely immunization.

In our analysis we have used a strict interpretation of immunization recommendations. Although the immunization schedule called for all 16 vaccinations to be given by the age of 18 months, most studies report results based on 24 months. The CDC has used a range of 19 to 35 months.[11] Less rigorous reporting methods have suggested that current estimates of immunization rates are higher than they would be if judged against the full recommendations.[24,33]

CONCLUSION

Our analysis suggests that the timeliness of immunization of children in a primary care case management programs needs to be improved. The rates are lower than the goal of Healthy People 2000, the major goal statement of the public health service at the time of the study. Quality assessment and improvement efforts should concentrate not simply on assuring that children are up-to-date by age 24 months, but also that each child has maximum immunity across their first 18 months of life. The importance of immunization at appropriate intervals should be emphasized. State Medicaid programs may want to intensify their efforts with both parents and managed care providers to assure immunizations are received at the appropriate intervals. Child health advocates must better educate parents and physicians about the need for timely immunization, must make access to vaccinations easier, and must reevaluate how to provide improved resources for compliance.

ACKNOWLEDGEMENTS

The research presented in this article was performed under contract with the Department of

Medical Assistance Services of the Commonwealth of Virginia. We are grateful for the advice and for the data provided by personnel of the Virginia Department of Medical Assistance Services and of the Virginia Department of Health. The views expressed are those of the authors and do not necessarily represent those of the Virginia Department of Medical Assistance Services nor those of the Virginia Department of Health.

REFERENCES

1. Mayer ML, Clark SJ, Konrad TR, Freeman VA, Slifkin RT. The Role of State Policies and Programs in Buffering the Effects of Poverty on Children's Immunization Receipt. American Journal of Public Health 1999;89:164-170.

2. Bolton P, Hussain A, Hadpawat A, Holt E, Hughart N, Guyer B. Deficiencies in current childhood immunization indicators [see comments]. Public Health Rep. 1998;113:527-532.

3. Freed G. Childhood Immunization Programs: an Analysis of Policy Issues. Milbank Quarterly 1993;71:65-96.

4. Chase, Marilyn. Authorities are urging a new series of shots to keep kids healthy. The Wall Street Journal . Jan. 25, 1999.

5. Committee on Immunization Finance Policies and Practices of the Institute of Medicine. Calling the shots: Immunization finance, policies and practices, Washington, DC, National Academy Press; 2000.

6. Newacheck PW, Pearl M, Hughes DC, Halfon N. The Role of Medicaid in Ensuring Children's Access to Care. JAMA 1998;280:1789-1793.

7. Vivier PM, Alario AJ, Simon P, Flanagan P, O'Haire C, Peter G. Immunization status of children enrolled in a hospital-based Medicaid managed care practice: the importance of the timing of vaccine administration. Pediatr.Infect.Dis.J. 1999;18:783-788.

8. Szilagyi PG. Medicaid managed care and childhood immunization delivery. Journal of Public Health Management Practice 1998;4:67-72.

9. Smith WR, Cotter JJ, Rossiter LF. Changing the System: Quality Assessment and Improvement for Medicaid Managed Care. Health Care Financing Review 1996;17:97-115.

10. Cotter JJ, Smith WR, Rossiter LF, Pugh CB, Bramble JD. Combining state administrative databases and provider records to assess the quality of care for Medicaid children. American Journal of Medical Quality, 1999;

11. CDC: Recommended childhood immunization schedule - United States, January 1995. JAMA 1995;273:693-693.

12. Zell ER, Dietz V, Stevenson J, Cochi S, Bruce RH. Low Vaccination Levels of US Preschool and School-age Children. JAMA 1994;271:833-839.

13. Anonymous. SAS/STAT User's Guide, Version 6, Cary, NC, SAS Institute Inc.; 1990:

14. Murphy TV, Pastor P, Turner SB, et al. Estimating immunization coverage from school-based childhood immunization records. Pediatr.Infect.Dis.J. 1995;14:561-567.

15. Szilagyi PG, Rodewald LE. Missed opportunities for immunizations: a review of the evidence. J.Public Health Manag.Pract. 1996;2:18-25.

16. Williams IT, Milton JD, Farrell JB, Graham NMH. Interaction of socioeconomic status and provider practices as predictors of immunization coverage in Virginia children. Pediatrics 1995;96:439-446.

17. Bates AS, Fitzgerald JF, Dittus RS, Wolinsky FD. Risk factors for underimmunized in poor urban infants. JAMA 1994;272:1105-1110.

18. Griffin MR, Daugherty J, Reed GW, et al. Immunization coverage among infants enrolled in the Tennessee Medicaid program. Archives of Pediatric and Adolescent Medicine 1995;149:559-564.

19. Mustin HD, Holt VL, Connell FA. Adequacy of well-child care and immunization in US infants born in 1988. JAMA 1994;272:1111-1115.

20. Suarez L, Simpson DM, Smith DR. The impact of public assistance factors on the immunization levels of children younger than 2 years. Am.J.Public Health 1997;87:845-848.

21. Alessandrini EA, Shaw KN, Bilker WB, Schwarz DF, Bell LM. Effects of Medicaid Managed Care on Quality: Childhood Immunizations. Pediatrics 2001;107:1335-1342.

22. Wood D, Halfon N, Sherbourne C, Grabowsky M. Access to Infant Immunizations for Poor, Inner-City Families: What is the Impact of Managed Care. Journal of Health Care for the Poor and Underserved 1994;5:112-123.

23. Szilagyi PG, Rodewald LE, Humiston SG, et al. Immunization practices of pediatricians and family physicians in the United States. Pediatrics 1994;94:517-523.

24. Yawn BP, Edmonson L, Huber L, Poland GA, Jacobson RM, Jacobsen SJ. The Impact of a Simulated Immunization Registry on Perceived Childhood Immunization Status. American Journal of Managed Care 1998;4:185-192.

25. Zimmerman RK, Schlesselman JJ, Baird AL, Mieczkowski TA. A National Survey to Understand Why Physicians Defer Childhood Immunizations. Archives of Pediatric and Adolescent Medicine 1997;151:657-664.

26. Landen MG, Beller M, Funk E, Rolka HR, Middaugh J. Measles outbreak in Juneau, Alaska, 1996: implications for future outbreak control strategies. Pediatrics 1998;102:E71

27. Papania M, Baughman AL, Lee S, et al. Increased susceptibility to measles in infants in the United States. Pediatrics 1999;104:e59

28. Evaluation of Vaccination Strategies in Public Clinics. Morb Mortal Wkly Rep 1995 Apr 28; 44(16): 323-324.

29. Morb Mortal Wkly Rep 2002 Jan 25;51(3):53-6 .

30. Hanson KL, Butts GC, Friedman S, Fairbrother G. Physician credentials and practices associated with childhood immunization rates: private practice pediatricians serving poor children in New York City. Journal of Urban Health. 78(1):112-24, 2001 Mar.

31. The National Vaccine Advisory Committee. Strategies to sustain success in childhood immunizations. JAMA. 282(4):363-70, 1999 Jul 28.

32. Committee on Immunization Finance Policies and Practices, Institute of Medicine. Calling The Shots: Immunization Finance Policies and Practices. Washington, DC: National Academy Press, 2000.

32. Wood DL, Halfon N. The impact of the vaccine for children's program on child immunization delivery. A policy analysis. Arch.Pediatr.Adolesc.Med. 1996;150:577-581.

33. Goldstein KP, Philipson TJ, Hyeseon J, Daum RS. The effect of epidemic measles on immunization rates. JAMA 1996;276:56-58.

april supplement-with cover.qxd 5/20/2003 12:19 AM Page 25

ASSESSING IMMUNIZATION COVERAGE IN PRIVATE PRACTICE

Sonja S. Hutchins, MD, MPH, Jessie Sherrod, MD, MPH, and Roger Bernier, MPH, PhD
Atlanta, Georgia and Los Angeles, California

To achieve national health objectives of eliminating most childhood vaccine-preventable diseases by the year 2010, all health care providers will have to improve the immunization rates of their patients. Currently, immunization rates of children 19 to 35 months of age are less than national objectives, suggesting a need for optimized immunization services. A key strategy for improving age-appropriate immunization coverage by health care providers is the assessment of immunization coverage. Because most (62%) immunization services in the United States are delivered in the private sector, a concerted effort in private practice is critical to improving immunization rates. Assessment of immunization coverage of patients enrolled in private practice serves 1) to measure the overall performance of the practice in providing the standard of care, 2) to identify strategies for improving coverage, and 3) to document the quality of health services delivered (report card). Assessment of immunization coverage has been demonstrated in several practice settings to he highly effective in improving immunization rates. All types of physicians should benefit from assessing immunization coverage of their patients. Simple assessment tools are available at no cost to the public and can be obtained by contacting the Center for Disease Control and Prevention. These tools include a manual self-assessment or a computerized software package (CASA) to fit the needs of the practice. (J Natl Med Assoc. 2000; 92:163-168.)

Key words: immunization assessment ◆ immunization coverage ◆ private practice

To meet and then sustain our national health objectives for the year 2010 of eliminating most childhood vaccine-preventable diseases and of attaining 80%-90% immunization coverage of 2-year-old children, health care providers will have to improve the immunization rates of their patients.[1] Based of the most recent scientific evidence, the Advisory Committee on Immunization Practices and the Task Force on Community Preventive Services have identified periodic assessment of immunization coverage of patients by a health care provider as a key strategy for improving immunization rates[2,3]. Health care providers in private practice are critical to improving immunization coverage because they administer most of the vaccination in the United States. Of the 2-year-old children in the 1998 National Survey Provider Check Study, 62% has a private provider, 19% had a public health care provider, 8% had a hospital-based provider, and 6% had another, nonpublic health care provider[4]. The objectives of this article are to review reasons why providers should assess immunization coverage, describe which providers will benefit from assessment, and discuss what assessment is and the role it has in optimizing the deliver of immunization services.

Immunization coverage is defined as the percentage of patients in a practice who are adequately vaccinated or covered by vaccines at a certain age. This

© 2000. Originally published in the Journal of the National Medical Association, Vol. 92, No. 4, April 2000:163-168. From the National Immunization Program, Centers for Disease Control and Prevention, Atlanta, Georgia, and the King/Drew Medical Center, Los Angeles, California. Reprint requests should be addressed to Dr Sonja S. Hutchins, National Immunization Program, Mailstop E-61, Center for Disease Control and Prevention, Atlanta, GA 30333.

information can assist a provider in optimizing the delivery of vaccine by documenting whether eligible patients for vaccination are vaccinated on time, and if not, by identifying the reasons for inadequate vaccination. In particular, results of assessment can assist in systematically judging whether patients are undervaccinated. In addition, periodic assessments of practice performance can be useful in tracking improvements.

WHY ASSESSMENT IS IMPORTANT

There are at least three principal reasons for assessing immunization coverage: (1) national objectives for preventing childhood vaccine-preventable diseases exist; (2) suboptimal immunization coverage is a reality; and (3) effectiveness of the assessment strategy has been demonstrated.

NATIONAL HEALTH OBJECTIVES

As a nation we have established goals to achieve high levels of immunization in the population. Because our ultimate goal is to have a society free of most childhood vaccine-preventable diseases (zero cases), our objectives among children 19-35 months of age are to achieve immunization coverage levels of 90% with individual vaccines and 80% with all the recommended vaccines combined by the year 20101. There is not a specific coverage objective for older children because school-aged children have been highly vaccinated (>95% covered) since the early 1980s due to widespread state-based immunization laws for school enrollment.

Though our goals are high, they are within our reach. Since 1996 we have sustained record high levels of immunization coverage among children 19-35 months of age with individual vaccines: diphtheria-tetanus toxoid and pertussis vaccine (DTP) (95%), poliovirus vaccine (91%), measles-containing vaccine (MCV) (91%) and haemophilus influenzae type b vaccine (Hib) (92%)[1,5]. In addition, paralytic poliomyelitis caused by the wild type virus and tetanus among children 15 years of age or younger have been eliminated, while diphtheria, measles, rubella, and haemophilus influenzae type b invasive disease among children 5 years of age or younger are close to elimination[1,6].

SUBOPTIMAL IMMUNIZATION COVERAGE

Although we have achieved and sustained record high levels of immunization coverage and record low levels of disease, there is still a need to improve out record and to sustain very high coverage into the future. In 1998, immunization coverage was 73% with the combined series of four doses of DTP, three doses of polio, one dose of a MCV, three doses of Hib vaccine, and three doses of Hepatitis B vaccine, which was 7% below our 80% objective for the year 2010[1]. When coverage with varicella vaccine of 43% is included in the combined series, we are at least 37% below our objective[1]. Though providers are conscientious about offering vaccines to patients on time, during the past two decades the immunization schedule has undergone seven major changes, including the introduction of routine vaccination of infants with Hepatitis B, Hib, and varicella vaccines. It is to be expected that both parents and providers are confused about how well children are vaccinated. One study of private physicians in Massachusetts found that providers' beliefs regarding how well patients in their practice were immunized led to overestimates of coverage compared with the measured coverage rate. Providers believed that 85% to 100% of patients were fully immunized, but only 61% were actually fully immunized (CDC, unpublished data). Age-appropriate immunization becomes even more challenging if a child is frequently ill or parents do not make all the scheduled appointments.

We need to improve on our record to prevent outbreaks of vaccine-preventable diseases. For instance, although measles vaccination coverage across the United States is greater than 90%, it is lower in many urban centers6. If high levels are not reached and sustained in all parts of the country, we could face another epidemic of measles within a few years of consistently low coverage, particularly in our urban areas. It was just ten years ago when the nation experienced the worst measles epidemic since the 1970s. The health burden was considerable. There were reports of tens of thousands of cases, thousands of hospitalizations, and more than 100 measles-associated deaths[7]. One lesson learned was that a gap existed in our health care delivery system for providing vaccines on time to preschool-aged children younger than five years of age. Of the preschool-aged children at highest risk for measles, nearly all (93%) had been seen by a health care provider during their lifetime, primarily within the year before their illness when they were eligible for measles

vaccine8. In addition, nearly one-quarter (24%) of the children surveyed had health care providers who missed at least one opportunity to administer measles vaccine simultaneously with other vaccines before their illness, reasons for which were unclear.

Missed opportunities for immunization is an important reason for undervaccination, which have been documented in a number of studies in the US and in many other countries (both developed and developing countries)[9]. Reasons for missed opportunities include failure to administer immunizations simultaneously, false contraindications for vaccination, health worker beliefs about immunization practices, and parental refusal. The most common reason for a missed opportunity occurs during a visit for an illness that is not a contraindication for immunization, yet the eligible child is not immunized.

EFFECTIVENESS OF ASSESSMENT

While we need to improve our immunization record, there is strong evidence that assessment of immunization coverage is an effective tool. In recent years, a few published studies have evaluated the effect of assessing immunization coverage on improving immunization levels; all have demonstrated improvement in coverage. One of the first studies was conducted in public health clinics in Georgia, where 70% of Georgian children received their immunizations[10]. Annual assessments of coverage were conducted from 1987 to 1993 on nearly all of the 230 public clinics in Georgia. Immunization coverage and a diagnosis of the causes for suboptimal coverage were presented to the clinic staff and public health officials. Incentives were provided to encourage improvement in immunization rates. Information on coverage was shared between the clinics, strategies for improving immunization rates were shared at annual district and state meetings, and a peer-based incentive was created with peer pressure to improve coverage. This approach has been codenamed by the CDC as AFIX (Assessment, Feedback, Incentive, and Exchange). Improvement in coverage in Georgia public clinics was examined over a 7-year period. Coverage increased from less than 40% to 80% statewide with the incremental annual increases of 6%[10]. During the same period, missed opportunities for immunization decreased from 18% to 0%.

A number of other states have used AFIX in public clinics: Colorado, Illinois, Indiana, Iowa, and South Carolina. Although not all of these states have duplicated the AFIX model exactly, one or more of the AFIX components were used. Illinois increased coverage 12% in 3 years, from 44% in 1993 to 56% in 1995; Iowa increased coverage 27% in public clinics in 3 years, from 50% in 1993 to 77% in 1995; and South Carolina increased coverage 15% in 3 years, from 69% to 84% (Table 1)[11]. Subsequently, the AFIX-like strategy has been extended to other states.

Assessment has also been used by managed care organizations (MCOs) to improve immunization coverage. For instance, Group Health of Puget Sound increased coverage 27% in nearly 2 years, from 62% in the first quarter of 1993 to 89% in the third quarter of 1994 (Table 2)[11]. In four states belonging to US Health Care, measles, mumps, rubella (MMR) vaccine coverage increased 18% in 3 years (CDC, unpublished data). Other MCOs, including Harvard Pilgrim Health Plan, Health Partners in Minnesota, and Cigna in Phoenix have increased coverage rates using continuous quality management techniques, which are also heavily data-driven[12,13]. In addition, among 418 private physician offices in Pennsylvania, New Jersey, New York, and Connecticut, in an independent practice association managed care organization, Morrow found a nearly 20% improvement in measles-mumps-rubella immunization coverage among providers who followed the MMR standards 1 year after an intervention began of peer review, feedback, and financial incentives[14].

AFIX components used in private practice settings also have demonstrated an improvement in immunization coverage. In a large group practice in Massachusetts with 10 pediatricians among 1400 2-year-old children surveyed, coverage increased 18% (from 54% to 72%) at the end of the first year of the intervention (CDC, unpublished data). The practice introduced a combination of assessment and feedback of vaccination status of patients at every encounter and recall and reminder systems for patients who were late or due for vaccinations. More recently, in a statewide study of 231 private physician offices in Maine from 1994 through 1996, assessment and feedback improved the median up-to-date immunization coverage at 24 months to 9% above baseline coverage 1 year after the intervention began[15]. By 1997, nearly all states have reported assessment and feedback

among private physicians.

Besides the quasiexperimental studies, a number of randomized controlled trials have also demonstrated the effectiveness of the assessment and feedback strategy in improving immunization practice. Buffington and Bennett found in private physicians offices in an academic organization a 16% improvement in influenza coverage over the control group among elderly persons 65 years of age or older after continuous assessment and feedback was provided weekly[16,17]. Assessment included the provision of weekly number of immunized patients and the cumulative percentage of the target population that had been immunized. In addition, Fairbrother et al.[18] found a feedback and financial bonus intervention that improved the percentage of up-to-date children for vaccination by 25% because of better documentation of immunization records. In only one of the three randomized controlled trials identified was assessment and feedback found to be ineffective. Carey et al.[19] examined compliance with standards by an annual audit of the organization and delivery of preventive services (e.g. influenza vaccination) in 37 rural community health centers in North Carolina. The mean influenza vaccination rate in 1987 of 59% was higher than the rate 2 years later in 1989 (48%), while all other preventive practices showed improvement[19]. Perhaps infrequent assessment, feedback and the use of the mean and not the median influenza vaccination rate may explain the lack of improvement in immunization coverage. Mean rates are influenced more by extreme variation in rates.

ALL PROVIDERS SHOULD ASSESS COVERAGE

A review of the literature strongly suggests that providers who administer vaccines will benefit from monitoring their performance through assessment, including physicians in private practice. For those who work in public clinics, all states now require clinics to measure immunization coverage of 2-year-old children and the Advisory Committee on Immunization Practices recommends routine assessment by all providers[2]. In addition, managed care organizations have begun to use immunization assessment as an indicator of the quality of health care services. Report cards or the Health Plan Employer Data and Information Set (HEDIS) measurements are becoming more important to MCOs. HEDIS was developed by the National Committee for Quality Assurance, an accrediting organization for MCOs[20]. Many physicians in private practice do participate in one or more MCOs through an independent practice association. As we change to a more managed health care delivery system, documentation of the quality of services and care will become common. While providers who work directly as an employee of a "staff model" MCO similar to Kaiser Permanente or Prudential will be required to measure quality of services, all other providers receiving capitation or other forms of payment from MCOs will soon feel the pressure to assist MCOs in documenting the provision of quality care.

Another reason is that for interested or enrolled providers in the Vaccines for Children program, assessment can provide required information for reporting. Vaccines for Children is a new program enacted by Congress in 1993 to provide free vaccine to children who are eligible for Medicaid, American Indian or Alaskan Native, or uninsured or underinsured for immunization if vaccine is administered in a federally qualified health center21. In addition, immunization coverage can be used to summarize the patient profile, which is used to determine the type and amount of vaccines needed by the practice. In some states, coverage estimates can fulfill the reporting requirements for vaccine usage for providers in all practice settings, including private physicians.

TOOLS AND TECHNIQUES FOR ASSESSMENT

Immunization coverage can be assessed manually or automatically using a computer. One manual technique is a self-assessment questionaire[11]. A sample of 30 children aged 2 years or younger who visit a practice are selected for review. Selected children are the first 30 children seen in a day or over several days. Three forms are used to assist with screening for immunization status of children, analyzing data, and identifying the next step for improving immunization coverage of patients. In particular, these forms summarize the number of children up-to-date for immunization, reasons why patients are not immunized, the immunization rate, and the number immunized by age and type of visit. From these findings, conclusions and additional steps to implement are generated.

The other technique is the use of a CDC-developed software package, the "Clinic/Provider Assessment Software Application (CASA)" for use in a microcomputer. It is a user-friendly program that has already assessed immunization coverage in public clinics in the 50 states. The medical records of a sample of children aged 19 to 35 months or all children are selected depending in the number of patients by age in the practice. Demographic information on patients and the vaccination dates are entered into the program. CASA then summarizes the data and generates reports on the overall immunization level, age-specific levels, and some reasons for suboptimal coverage, including missed opportunities, late starts, and drop out rates. It also prints a list of the names of children who had a missed opportunity for immunization or dropped out of the practice so that they can be recalled for immunization or reminded that they missed a visit.

Both the self-assessment tool and CASA can be obtained at no cost from the National Immunization Program at the CDC by calling 800-232-2522 or via the Internet (http://www.cdc.gov/nip/)[11].

CONCLUSION

Assessing immunization coverage of patients in private practice is key to optimally delivering quality immunization services. In addition, it serves to document for the private practice success in providing what is considered the standard of care, which is needed in this era of report cards for health care services. There are techniques and tools available at no cost to fit the available resources of a private provider. Assessment is a wise investment in the health of children and adults.

REFERENCES

1. U.S. Department of Health and Human Services. Healthy People 2010 (Conference Edition, in Two Volumes). Washington, DC: January 2000.
2. Task Force on Community Preventive Services. Recommendations regarding interventions to improve vaccination coverage in children, adolescents, and adults. Am J Prev Med. 2000; 18(4S):92-96.
3. Centers for Disease Control and Prevention. Recommendations of the Advisory Committee on Immunization Practices: programmatic strategies to increase vaccination rates-assessment and feedback of provider-based vaccination coverage information. MMWR. 1996; 45:219-220.
4. Rodewald LE, Maes EF, Smith P, et al. Immunization providers for U.S. poor children: privatization and performance. In: Abstracts of the Pediatric Academic Societies & American Academy of Pediatrics Joint Meeting. Washington, DC, 2000.
5. Centers for Disease Control and Prevention. Status report on the childhood immunization initiative: national, state, and urban area vaccination coverage levels among children aged 19-35 months-United States, 1996. MMWR. 1997; 46:657-664.
6. Centers for Disease Control and Prevention. Status report on the childhood immunization initiative: reported cases of selected vaccine-preventable diseases-United States, 1996. MMWR. 1997; 46:665-671.
7. National Vaccine Advisory Committee. The measles epidemic: the problems, barriers, and recommendations. JAMA. 1991:266:1547-1552.
8. Hutchins SS, Gindler J, Atkinson WL, et al. Preschool children at high risk for measles: opportunities to vaccinate. Am J Public Health. 1993; 83:862-867.
9. Hutchins SS, Jansen HAEM, Robertson SE, et al. Studies of missed opportunities for immunization in developing and industrialized countries. Bull World Health Org. 1993; 71:549-560.
10. Dini DF, Chaney M, Maligner RE, et al. Information as intervention: how Georgia used vaccination coverage data to double public sector vaccination coverage in seven years. J Public Health Man Prac. 1996; 2:45-49.
11. National Immunization Program. Immunization assessment [on-line]. Available: www.cdc.gov/nip/afix.
12. Carlin E, Carlson R, Nordic J. Using continuous quality improvement tools to improve pediatric immunization rates. Joint Commission Journal on Quality Improvement. 1996; 22:277-88.
13. Centers for Disease Control and Prevention. Use of a data-based approach by a health maintenance organization to identify and address physician barriers to pediatric vaccination. California, 1995. MMWR. 1996; 45:188-93.
14. Morrow R.W., Goading AD, Clark C. Improving physicians' preventive health care behavior through peer review and financial incentives. Arch Family Med. 1995; 4:165-169.
15. Massoudi MS, Walsh J, Stokely S, et al. Assessing immunization performance of private practitioners in Maine: impact of the assessment, feedback, incentives, and exchange strategy. Pediatrics. 1999; 103:1218-1223.
16. Buffington J, Bell KM, Laforce FM. A target-based model for increasing influenza immunizations in private practice. J Gen Intern Med. 1991; 6:204-209.
17. Bennett NM, Lewis B, Doniger AS, et al. A coordinated community-wide program in Monroe County, New York, to increase influenza immunization rates in the elderly. Arch Intern Med. 1994; 154:1741-1745.
18. Fairbrother G, Hanson KL, Friedman S, et al. The impact of physician bonuses, enhanced fees, and feedback on childhood immunization coverage rates. Am J Public Health. 1999; 89:171-175.
19. Carey TS, Levis D, Pickard CG, et al. Development of a model quality-of-care assessment program for adult preventive care in rural medical practices. Qual Rev Bull. 1991; 17:54-59.
20. National Committee for Quality Assurance. HEDIS 3.0-The Health Plan Employer Data and Information Set. Volume 2: Technical Specifications. Washington, DC: National Committee for Quality Assurance; 1997.
21. Saldarini RJ. Putting prevention research at risk: implementation of the Vaccines for Children programme. Vaccine. 1994; 12:1364-1367.

IT'S TIME TO STEP UP THE MANAGEMENT OF COMMUNITY-ACQUIRED PNEUMONIA

Vincent Idemyor, Pharm.D.
Chicago, Illinois

Community-acquired pneumonia is one of the leading causes of morbidity and mortality in the United States, with an estimated number of 5 to 6 million individual cases per year[1]. In hospitalized patients, death rates as high as 25% have been reported[2]. The cost associated with community-acquired pneumonia is approximately $10 billion dollars annually in the United States[3].

In the 1970s, the pathogens that needed to be targeted in the treatment of community-acquired pneumonia were Streptococcus pneumoniae, Mycoplasma pneumoniae, and Staphylococcus aureus in the case of aspiration pneumonia. Today, the targeted organisms include organisms such as Haemophilus influenzae, Moraxella catarrhalis, Gram-negative bacilli, Chlamydia pneumoniae, and Legionella species. Among these pathogens, Streptococcus pneumoniae (pneumococcus) is still the most common cause of community-acquired pneumonia, with approximately 500,000 cases annually in the United States[4,5]. Fatality rates for bacteremic pneumonia due to Streptococcus pneumoniae are substantial, ranging from 10% to 30%[4,6-8].

For more than 40 years, penicillin G was the mainstay of therapy for Streptococcus pneumoniae. However, within the past decade, antimicrobial resistance to penicillins, cephalosporins, and non-ß-lactam antibiotics have escalated at alarming rates, with Streptococcus pneumoniae resistance rates of 30% to 40% to penicillin[9].

Penicillin resistance is caused by mutations in chromosomal genes, which lead to alteration in penicillin-binding proteins[10]. Alteration of penicillin-binding proteins decreases binding to penicillin and other ß-lactam antibiotics, including ß-lactamase inhibitor combinations and cephalosporins[10]. Resistance to ß-lactam antibiotics increases in parallel with penicillin resistance. Third-generation cephalosporins, i.e. cefotaxime and ceftriaxone, are uniformly active against penicillin-susceptible Streptococcus pneumoniae. Surveys in the United States from 1996-1998 documented high-grade resistance to cefotaxime or ceftriaxone, with 4% to 6.5% of resistant isolates of Streptococcus pneumoniae, with an additional 10% to 14% demonstrating intermediate resistance[9]. Strains exhibiting resistance to cefotaxime are often multiresistant. The other ß-lactam class of antibiotics, the carbapenems, have routinely not been evaluated in most large surveys of antimicrobial susceptibility. However, these agents have excellent activity against Streptococcus pneumoniae, including highly resistant strains[11].

Streptococcus pneumoniae resistance to macrolide antibiotics develop through several mechanisms, including ribosomal methylase changes, macrolide efflux pump alterations, or spontaneous mutations. In the United States, efflux mechanisms account for the majority of macrolide resistance. The dominant risk factor for macrolide resistance is selection pressure from prior antibiotic use. In the United

© 2002. Originally published in the Journal of the National Medical Association, Vol. 94, No. 3, March 2002:178-181. From the Advocate Bethany Hospital and Department of Medicine, University of Illinois College of Medicine, Chicago, Illinois. Request for reprints should be addressed to Vincent Idemyor, MD, 5305 South Drexel Avenue, Chicago, IL 60615.

States, macrolide resistance has increased dramatically within the past decade, with a high-grade resistance rate of approximately 15% or more among the macrolide group of antibiotics[9]. However, the clinical significance of macrolide resistance is controversial because the minimum inhibitory concentrations breakpoints established for serum levels greatly underestimating the concentration of drug achieved at the site of infection[12].

Among the flouroquinolones class of antibiotics, the earlier generation flouroquinolones, e.g., ciprofloxacin and ofloxacin, are suboptimal choices for serious streptococcal infections because of marginal minimum inhibitory concentrations. The newer flouroquinolones, e.g. levofloxacin, gatifloxacin, and moxifloxacin, have improved activity against Streptococcus pneumoniae and a consensus statement for empirical treatment included the newer flouroquinolones as an acceptable option[13].

The concern is that overzealous use of these drugs may drive resistance, thus compromising the effectiveness of this class of antimicrobials as seen from the Canadian Bacterial Surveillance Network data[14].

EMPIRIC THERAPY SUGGESTIONS

Clinicians often times do not know the specific etiology of community-acquired pneumonia in an individual patient at the time of treatment. Even when an organism is isolated, antibiotic susceptibility test results are not usually available to provide the necessary therapeutic guideline. Decisions regarding empiric therapy many times are based on the clinicians experience or clinical practice guidelines. Because testing may yield no etiologic agent, empiric therapy is essential.

Empiric recommendations published by the American Thoracic Society and the Infectious Disease Society of America in the middle to later part of the 1990s are often used. However, the 1993 American Thoracic Society guidelines for treatment of community-acquired pneumonia provided no clear indication of how long antibiotics should be given for treatment. Both the American Thoracic Society and Infectious Disease Society of America have recently revised their empiric recommendations. The acceptable therapeutic algorithm for treatment of inpatient community-acquired pneumonia now include coverage for atypical pathogens[1,18]. Updates at 12-month intervals are needed, as the debate about which therapeutic treatment regimens to use in the management of inpatient community-acquired pneumonia continues.

In 1998, the Centers for Disease Control and Prevention convened a panel to discuss the treatment of community-acquired pneumonia in the era of drug-resistant Streptococcus pneumoniae. The task of these panelists, called the Drug-resistant Streptococcus pneumoniae Therapeutic Working Group (DRSPTWG), was to review scientific data and provide recommendations for treatment. Although the panel recommended strategies for treatment of community-acquired pneumonia, they did not fully address future resistance issues and economic feasibility of therapeutic treatment regimens.

THE ADMISSION TO HOSPITAL DECISION

In the United States, inpatient costs accounts for more than 90% of the total cost of community-acquired pneumonia annually[3], even though almost 80% of the patients with community-acquired pneumonia are treated as outpatients14. It is at times difficult to determine whether a particular patient with community-acquired pneumonia requires admission to the hospital. Because of that, severity of illness scoring systems are often used by some practicing physicians. In 1997, Fine et al.[15], in a cohort study, validated a prediction rule that stratifies patients into five classes with respect to risk of death within 30 days.

The cohort scoring system was intended to be a tool to help in the decision of whether to admit a patient to the hospital. The tool assesses five comorbid medical conditions, such as neoplastic disease, hepatic disease, congestive heart failure, cerebrovascular disease, and renal disease; five physical findings; and seven laboratory findings.

Recently, 19 Canadian hospitals[16] evaluated critical pathway using the pneumonia-specific severity of illness scoring system by Fine and colleagues. Overall, the pathway resulted in an 18% reduction in the admission of low-risk patients, with an average savings of $873 (Canadian dollars) per patient[17]. In the published practice guidelines for the management of community-acquired pneumonia in adults, the Infectious Disease Society of America stated that the

decision to hospitalize a patient or treat as an outpatient is one of the most important clinical decisions to be made by the treating clinician[18].

SUMMARY AND CONCLUSIONS

Optimal therapy for serious Streptococcus pneumoniae infections with intermediate or high-grade resistance to penicillin is controversial. It should be noted that data regarding the efficacy of penicillins or cephalosporins for penicillin-resistant strains are limited. Despite the paucity of clinical trials, most clinicians still agree that penicillins remain the mainstay of therapy for community-acquired pneumonia caused by Streptococcus pneumoniae-susceptible strains.

Macrolide antibiotics are effective for treatment of community-acquired pneumonia caused by susceptible strains of Streptococcus pneumoniae. But resistance to all macrolides, based on current National Committee for Clinical Laboratory Standards breakpoints, should be assumed among isolates with erythromycin resistance.

The late-generation flouroquinolones have a role for treatment of community-acquired pneumonia, however, there is also the potential for evolution of antimicrobial resistance. Performance indicators for community-acquired pneumonia are being established with implementation of protocols for inpatients with pneumonia. These indicators are being monitored by the Center for Medicare and Medicaid Services (CMS) for medicare patients as part of a national project. The indicators also address documentation of influenza and pneumococcal vaccine status in patients. Several other indicators, such as obtaining blood cultures before antibiotic administration, using antibiotics according to current guidelines, and timely administration of antibiotics, will play critical roles in the management of community-acquired pneumonia.

Because of increased incremental costs associated with community-acquired pneumonia, early diagnosis and timely intravenous to oral switch therapy will continue to be emphasized and monitored in those admitted into hospitals, together with the appropriate decision tree-based pneumonia specific severity of illness scoring system.

REFERENCES

1. Neiderman MS, Mandrell LA, Yu V, et al. Guidelines for the management of adults with community-acquired pneumonia. Diagnosis, assessment of severity, antimicrobial therapy, and prevention. Am J Respir Crit Care Med. 2001; 163(7):1730-1754.
2. Community-acquired pneumonia. Outpatient treatment of patients 16 years and older. Institute for Clinical Systems Improvement. Postgrad Med. 2000; 107:246-253.
3. Lave JR, Lin CJ, Fine MJ, Hughes-Cromwick P. The cost of treating patients with community-acquired pneumonia. Semin Respir Crit Care Med. 1999; 20:189-197.
4. Rahav G, Toledano Y, Engelhard D, et al. Invasive pneumococcal infections: a comparison between adults and children. Medicine (Baltimore). 1997; 76:295-303.
5. Ruiz-Gonzalez A, Falguera M, Nogues A, Rubio-Caballera M. Is Streptococcus pneumoniae the leading cause of pneumonia of unknown etiology? A microbiologic study of lung aspirates in consecutive patients with community-acquired pneumonia. Am J Med. 1999; 106:385-390.
6. Pallares R, Linares J, Vadillo M, et al. Resistance to penicillin and cephalosporins and mortality from severe pneumococcal pneumonia in Barcelona, Spain. N Engl J Med. 1995; 333:474-480.
7. Ortqvist A. Pneumococcal disease in Sweden: experiences and current situation. Am J Med. 1999; 107:44S-49S.
8. Carratala J, Marron A, Fernandez-Sevilla A, et al. Treatment of penicillin-resistant pneumococcal bacteremia in neutropenic patient with cancer. Clin Infect Dis. 1997; 24:148-152.
9. Thornsberry C, Ogilvie PT, Holley Jr HP, et al. Survey of susceptibilities of Streptococcus pneumoniae, Haemophilus influenzae, and Moraxella catarrhalis isolates to 26 antimicrobial agents: a prospective U.S. study. Antimicrob Agents Chemother. 1999; 43:2612-2623.
10. Tomasz A. New faces of an old pathogen: emergence and spread of multidrug-resistant streptococcus pneumoniae. Am J Med. 1999; 107(1A):55S-62S.
11. Jones R, Pfaller M. Bacterial resistance: a worldwide problem. Diagn Microbio Infec Dis. 1998; 31:379-388.
12. Amsden GW. Pneumococcal macrolide resistance: myth or reality? J Antimicrob Chemother. 1999; 44:1-6.
13. Bartlett JG, Breiman RF, Mandell LA, et al. Guidelines from the Infectious Disease Society of America: community-acquired pneumonia in adults: guidelines for management. Clin Infec Dis. 1998; 26:811-838.
14. Chen DK, McGeer A, DeAzevedo JC, et al. Decreased susceptibility of Streptococcus pneumoniae to flouroquinolones in Canada. N Engl J Med. 1999; 341:233-239.
15. Fine MJ, Auble TE, Yealy DM, et al. A prediction rule to identify low risk patients with community-acquired pneumonia. N Engl J Med. 1997; 336:243-250.
16. Marrie TJ, Lau CY, Wheeler SL, et al. A controlled trial of a critical pathway for treatment of community-acquired pneumonia. JAMA. 2000; 283:749-755.
17. Palmer CS, Zhan C, Elixhauser A, et al. Economic assessment of the community-acquired pneumonia intervention trial employing levofloxacin. Clin Ther. 2000; 22:250-64.
18. Bartlett JG, Dowell SF, Mandell LA, et al., for the Infectious Diseases Society of America. Practice guidelines for the management of community-acquired pneumonia in adults. Clin Infect Dis. 2000; 31:347-282.

april supplement-with cover.qxd 5/20/2003 12:19 AM Page 33

Hepatitis A Vaccination Among Young African American Men Who Have Sex with Men in the Deep South: Psychosocial Predictors

Scott D. Rhodes, PhD, MPH, University of North Carolina School of Public Health, Chapel Hill, North Carolina
Leland J. Yee, MPH, London School of Hygiene and Tropical Medicine, London, United Kingdom
Kenneth C. Hergenrather, PhD, MRC, MSEd, George Washington University, Washington, DC

Despite recommendations for vaccination against hepatitis A (HAV) of men who have sex with men (MSM), most remain unvaccinated. This study was designed to identify attitudes and beliefs associated with vaccination against HAV using a conventional outreach sample of African American MSM in Birmingham, Alabama.

Of 107 participants, nearly 34% reported being vaccinated against HAV. Over half of the participants reported 10 or more different lifetime male sexual partners, and a third reported having had intercourse with females, as well as, males within the past 5 years. About 10% of the participants reported condom use over half of the time during oral intercourse, and 50% of the participants reported using a condom over half the time during anal intercourse.

In multivariable analysis, predictors of HAV vaccination were a decreased perception of the practical barriers to HAV vaccination (odds ratio [OR], 0.05; 95% confidence interval [CI]: 0.01-0.18, P=0.002); increased health provider communication (OR, 9.89; 95% CI: 2.74-35.65, P=0.02); and increased perceived personal self-efficacy to complete the two-dose series (OR, 7.31; 95% CI: 2.38-22.45, P=0.02).

Our findings underscore the need to increase vaccination through innovative approaches to reduce perceived barriers to vaccination while increasing provider-patient communication and self-efficacy to complete the vaccine series.

Key words: gay ◆ hepatitis ◆ vaccination ◆ African American ◆ homosexual

While the prevalence of hepatitis A virus (HAV) infection is relatively low in the general population within developed nations such as the United States (US),[1] numerous reports have documented outbreaks of HAV among men who have sex with men (MSM).[2-4] With an effective two-dose vaccine available, HAV remains an important vaccine-preventable disease in the United States,[5] and the Centers for Disease Control and Prevention recommend the universal vaccination against HAV of MSM.[6]

Clinical manifestations of HAV are age-related, with increased age at acquisition being associated with more severe disease. For example, only 5-20% of children under 5 years of age develop icteric disease; the majority of these children exhibit many asymptomatic transient infections.[7] However, the occurrence of fatal fulminant hepatitis increases with age at infection,[1] and the occurrence of hepatitis A in older patients as well as those with underlying chronic liver disease (such as chronic hepatitis B or C infection) is associated with increased mortality.[2-5,8]

In addition to clinical morbidity and mortality, HAV exerts an important economic burden. Adults who become ill lose an average of 27 days of work due to the disease. Between 11% and 22% of persons who have hepatitis A infection are hospitalized.[6] Average costs associated with hepatitis A infection range from $1,817 to $2,459 per case for adults.[6] In one common-source outbreak in the US among 43

© 2003. Correspondence and requests for reprints to Scott D. Rhodes, Ph.D., MPH, University of North Carolina School of Public Health, Department of Health Behavior and Health Education, Campus Box 7440, Chapel Hill, N.C. 27599-7440. Telephone: (919) 966-0246; facsimile(919) 966-2921; e-mail: Scott_Rhodes@unc.edu.

persons, the estimated total societal cost was approximately $800,000.[9] In 1989, the estimated annual direct and indirect costs of hepatitis A infection in the US were more than $200 million, equivalent to over $300 million in 1997 dollars.[10] In the US, and in other countries of low endemicity, exposure to HAV tends to be at an older age, resulting in increased morbidity and economic impact from this disease.

Unfortunately, little is know about the predictors of HAV vaccine acceptance. Moreover, specific populations such as African American MSM have been neglected in the behavioral literature with respect to understanding vaccination against diseases such as hepatitis B.[11] In order increase vaccination rates, a thorough understanding of vaccine behavior among different racial and ethnic groups is necessary as an antecedent to developing targeted or tailored intervention strategies. In this study, we explored the psychosocial variables that may affect HAV vaccination acceptance within a conventional outreach sample of young African American MSM. Findings from this study may inform intervention efforts to increase HAV vaccination rates among African American MSM, as well as, inform future interventions designed to enhance vaccination within this population should vaccines against the human immunodeficiency virus (HIV) and hepatitis C become available.

METHODS

Data Collection Procedures

During November 2001, data were collected anonymously in a predominantly African American, "gay" male bar in Birmingham, Alabama, USA. All bar patrons were asked to participate, regardless of gender, by a trained recruiter. In order to ensure informed consent, the recruiter assessed sobriety of potential participants using established criteria.[12] Questionnaires were self-administered and completed in secluded areas of the bars to enhance participants' valid reporting of sensitive behaviors. Participants were compensated $10 for completing the survey. Data collection ended at 11:30 p.m. each night. The data were entered into an electronic database using double-entry procedures to assess and validate accuracy.

Measures

The questionnaire included 64 items. Items measured participants' sociodemographics, including age, race/ethnicity (American Indian or Alaska Native, Asian, Black or African American, Hispanic or Latino, Native Hawaiian/Pacific Islander or Caucasian/white), educational attainment, estimated yearly income, and health insurance coverage.

Sexual risk was measured by items that assessed the frequency of condom use during oral and anal intercourse with a male partner within the past 3 months, the number of sexual partners during the past 30 days and lifetime, and anal-oral sexual contact ("rimming"). Items assessed whether participants had ever received a positive HIV-serological test result and whether participants had ever, or in the past 5 years, been told that they had HIV or other sexually transmitted diseases.

Items measured non-sexual risk behaviors as well, including participant history of injecting drugs or steroids, sharing injecting-drug equipment, and receiving blood or blood products.

Items assessed participant history of HAV awareness, vaccination, testing, and treatment. Because the goal of this study was to examine vaccine uptake and not second dose compliance, vaccination against HAV was measured based on self-report of vaccination, regardless of completion of the two-dose series.

Theory-based, psychosocial predictors, based on the health belief model[13,14] and the social cognitive theory,[15] specifically related to HAV vaccination were measured using 32 items comprising seven scales that have been identified through rigorous psychometric scale development in a study of African American and white MSM.[16] Briefly, measurement development using the diverse sample of 358 MSM followed a two-step process. First, standard procedures of principal component analysis (PCA) with Varimax rotation employed to determine a factor structure for each scale on a slit half sample (n=179). The scree test,[17] eigenvalues,[18] the interpretability of the factors,[19,20] theoretical considerations,[21] factor loadings,[17-20] and Cronbach's coefficient alpha[22] were used to define all factor structures. The remaining split-half ("hold-out") sample (n=179) was used for instrument confirmation analyses using AMOS,[23] a statistical package that is commonly used for structural equation modeling (SEM). Confirmatory factor analysis (CFA) via SEM recently has become one of the primary meth-

ods of choice for measurement development. CFA recognizes the role of theory for establishing a structural model that organizes scale and subscale development. CFA permits evaluating the adequacy of a proposed factor structure.[24-26] The scales, number of items per scale, sample items, and alpha coefficients for the current study sample are presented in Table 1.

A final item assessed whether participants had completed the questionnaire previously. The response categories for each item within the questionnaire used binary, categorical or Likert-scale responses to facilitate readability and administration.

Statistical Analyses

SPSS for Windows 10.1 (Chicago, IL) was used for data analysis. Kolmogorov-Smirnov one-sample test was preformed to test whether the data were normally distributed. All distributions were normal at $P<.05$.

All theory-based scales, measuring the psychosocial predictors, were dichotomized using median split and entered into a multivariable logistic regression model to test the independent contribution of each of the predictors while adjusting for the other predictors in the model.[27] Accordingly, adjusted odds ratios (OR) and 95% confidence intervals were calculated to assess the magnitude of association between theory-based predictors and self-reported vaccination.

RESULTS

Sample Demographics

Of the 120 MSM participants who completed the survey, 107 self-identified as African American or black; 5 self-identified as Hispanic or Latino; 4, as Native American; 4, as white. Of the 107 African American participants, the mean (± SD) age was 24.8 ± 5.93 years, with a range of 18 to 50 years. The majority of participants reported yearly income of $20,000 or more (61.4%), some college or above (57.9%), and having private health insurance (57.9%).

Hepatitis Risk

Nearly 34% (n = 36) reported being vaccinated against HAV. Over half of the participants reported 10 or more different lifetime male sexual partners (n = 69), and fewer than half reported 2 or more different male sexual partners within the past 30 days (n = 43). Nearly a third (n = 32) reported having had intercourse with females as well as males within the past 5 years.

When asked what percent of the time they used condoms during intercourse, 11.3% of the participants reported condom use over half of the time when performing or receiving oral intercourse, and 50% of

Table 1. Description of Scale Measures

Scale Measure and Sample Item	Number of Items	α
Perceived practical barriers to HAV vaccination *Sample: "I don't have time to get vaccinated against hepatitis A."*	5	0.73
Health care provider communication *Sample: "I can talk freely with my doctor or health care provider about my sexual behavior."*	3	0.68
Perceived benefits of HAV vaccination *Sample: "Getting vaccinated against hepatitis A infection would be a good way to protect my health."*	5	0.86
Perceived severity of HAV infection *Sample: "How serious would it be for you to get infected with hepatitis A?"*	4	
Perceived susceptibility to HAV infection *Sample: "People like me don't get hepatitis A."*	5	0.74
Perceived general medical self-efficacy to complete the 2-dose vaccine series *Sample: "How sure are you that you could get 2 shots of the hepatitis A vaccination, if you have a fear of needles or shots?"*	3	0.85
Perceived personal self-efficacy to complete the 2-dose vaccine series *Sample: "How sure are you that you could get the hepatitis A vaccination, if you are embarrassed to talk about sex with a doctor or healthcare provider?"*	7	0.93

the participants reported using a condom over half the time during insertive or receptive anal intercourse. Nearly 60% of participants (n = 62) reported engaging in unprotected anal-oral contact ("rimming").

Over 11% (n = 12) of this sample reported a lifetime history of at least one STD diagnosis, excluding seropositivity for HIV, and 6.5% (n = 7) reported that they had received at least one STD diagnosis within the past five years. Almost 5% (n = 5) reported a positive HIV antibody test result. Almost 6% (n = 6) of the sample reported having received blood or blood products before 1992, and 5.6% (n = 6) reported ever having injected drugs or steroids; only two participants reported ever having shared injecting drug equipment.

ATTITUDES AND BELIEFS ABOUT HAV INFECTION AND VACCINATION

Table 2 displays the odds ratio, 95% confidence interval and significance level between HAV vaccination and the independent contribution of each psychosocial predictor. Of the seven psychosocial predictors entered into the multivariable model, three were associated with HAV vaccination. The predictive power of the model ($x2 = 38.07$; $P = .0001$) was high, correctly classifying 80% of the participants into their self-reported vaccination status categories.

Participants who perceived low levels of practical barriers to HAV vaccination were over 90% more likely to be vaccinated against HAV than those who perceived high levels of practical barriers to HAV vaccination. Similarly, participants who reported high levels of health care provider communication about sexual orientation and risk behaviors were over nine times more likely to be vaccinated against HAV. Participants who reported high levels of personal self-efficacy to complete the two-dose series were seven times more likely to self-report HAV vaccination than those who reported low levels of personal self-efficacy to complete the series.

DISCUSSION

Enhancing awareness and facilitating vaccination among populations at risk for HAV infection are urgently needed. About a third of this sample was vaccinated, and another third reported knowing nothing about hepatitis. Furthermore, many participants reported engaging in behaviors that put them and their sexual partners at risk for hepatitis A infection. The low level of vaccination and the high levels of risk behaviors, such as inconsistent condom use and anal-oral contact ("rimming"),[28] suggest that the failure to vaccinate this high-risk population is a missed opportunity to prevent disease.

Within this sample of African American MSM, lower scores for perceived practical barriers to HAV vaccination were associated with HAV vaccination. Thus, interventions to increase vaccination among unvaccinated MSM may focus on increasing knowledge about hepatitis A infection and HAV vaccination, identifying convenient locations for vaccination administration, and reducing the out-of-pocket expense of vaccination against HAV.

Furthermore, this study, like studies with samples of predominately white MSM exploring predictors of hepatitis B vaccination,[11] found an association between vaccination and health care provider communication about patient sexual orientation and risk. Thus, to increase HAV vaccination among African American MSM, strategies must be developed to facilitate increased provider communication with patients to ensure patient disclosure of risk and accurate risk assessment. Because recommendation by a health care provider is a strong predictor of preventive behavior,[29] providers must inform patients about the efficacy and safety of the vaccine to encourage vaccination among MSM. Environments must be created that build trust and allow risk disclosure. Some providers are beginning to experiment with delivering patient education and interactive risk assessment through computer technology.[30] Such applications may provide "cues for action" for patients to either discuss risks with or seek vaccination from their health care providers.

Interestingly, the perceived benefits of vaccination were not associated with HAV vaccination. This finding may reflect "AIDS fatigue," a phenomenon in which MSM become weary of HIV and AIDS messages through overexposure.[31] This phenomenon has been linked with decreased attention and adherence to HBV vaccination messages. Innovative, sex-positive vaccination promotion efforts may be key to increasing rates of HAV vaccination among MSM.

Perceived personal self-efficacy, which in this case can be defined as one's judgment of one's capacity to become vaccinated against HAV, was also found to be

predictive of vaccination status in the multivariable model. Participants who reported more confidence in overcoming embarrassment of talking about their sexual behavior with providers, overcoming worries about HAV vaccine safety and rumored side effects, and overcoming concerns such as time and money were seven times more likely to report HAV vaccination than those who reported less confidence in overcoming these concerns. Thus, intervention strategies must include components that focus on increasing the self-efficacy of unvaccinated African American MSM. Lay health advisory networks or well-tailored communication campaigns may encourage vaccination against HAV through peer leaders or role modeling. The peer leader approach has been shown to be successful in HIV prevention intervention design among MSM,[32] and could be tested empirically for the promotion of HAV vaccination. Role modeling through multimedia communication campaigns also has been found efficacious with HIV prevention efforts[33] and also may inform strategies to increases HAV vaccination among African American MSM.

LIMITATIONS

The present study is not without limitations. First, the observed associations are based on cross-sectional data. Additional studies using a prospective cohort design will be necessary to evaluate the significance and stability of these findings over time. Furthermore, the results of this study may not apply to the general population of MSM. However, the degree of fit between a sample and a target population about which generalizations can be made is a common challenge in many studies; in fact, nearly all studies of sexual behavior among MSM are based on non-random, self-selected samples.[34]

Furthermore, although we utilized a self-administered format that may minimize response bias, and included techniques found to increase validity of self-reported behavior.[35] These results remain based on self-reported data with their potential limitations.[36]

CONCLUSIONS

Understanding HAV vaccination among African American MSM is not only crucial for the development and evaluation of tailored interventions aimed at increasing vaccination against HAV, but also provides the framework for developing future vaccination strategies for diseases such as HIV and hepatitis C. While we report psychosocial predictors of HAV vaccination based on a sample of African American MSM, a group about whom much behavioral data are lacking,[11] subsequent studies must explore further the potential impact of increased access to heath care; reduced costs for vaccination services; and vaccination opportunities in untraditional venues such as bars, bath houses, coffee shops, gyms, or house parties.

Much is still unknown about the factors that influence MSM vaccination behavior. Focus must be placed on increasing understanding of the factors that affect vaccination acceptance in order to develop innovative and well-tailored strategies to increase vaccination rates among MSM.

Table 2. Characteristics Independently Associated With Self-Reported Hepatitis A Vaccination

Characteristic	Adjusted Odds Ratio	(95% CI)	P Value
Practical barriers to HAV vaccination	.05	(0.01-0.18)	.002
Health care provider communication	9.89	(2.74-35.65)	.02
Perceived benefits of HAV vaccination	1.93	(0.63-5.91)	.45
Perceived severity of HAV infection	2.24	(0.99-5.08)	.21
Perceived susceptibility to HAV infection	.71	(0.32-1.60)	.59
Perceived general medical self-efficacy to complete the 2-dose series	.95	(0.29-3.09)	.95
Perceived personal self-efficacy to complete the 2-dose series	7.31	(2.38-22.45)	.02

Note: 95% CI = 95% confidence interval

ACKNOWLEDGEMENTS

Human subject review and oversight were provided by the Institutional Review Board of the University of Alabama at Birmingham. Manuscript preparation was supported in part by the Community Health Scholars Program funded by the W.K. Kellogg Foundation (to Scott D. Rhodes). The authors thank Derek M. Griffith, PhD, of the University of North Carolina School of Public Health for his critical and insightful review of the manuscript.

REFERENCES

1. World Health Organization. Hepatitis A. Available at: http://www.who.int/emc-documents/hepatitis/docs/whocdsc-sredc2007.html/index.htm. Accessed October 17, 2002.

2. Bell A, Ncube F, Hansell A, et al. An outbreak of hepatitis A among young men associated with having sex in public venues. Commun Dis Public Health. 2001;4:163-170.

3. Henning KJ, Bell E, Braun J, Barker ND. A community-wide outbreak of hepatitis A: risk factors for infection among homosexual and bisexual men. Am J Med. 1995;99:132-136.

4. Leentvaar-Kuijpers A, Kool JL, Veugelers PJ, Coutinho RA, van Griensven GJ. An outbreak of hepatitis A among homosexual men in Amsterdam, 1991-1993. Int J Epidemiol. 1995;24:218-222.

5. Bell BP, Shapiro CN, Alter MJ, et al. The diverse patterns of hepatitis A epidemiology in the United States-implications for vaccination strategies. J Infect Dis. 1998;178:1579-1584.

6. Centers for Disease Control and Prevention. Prevention of hepatitis A through active or passive immunization: Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR Morb Mortal Wkly Rep. 1999;48:1-37.

7. Gingrich GA, Hadler SC, Elder HA, Ash KO. Serologic investigation of an outbreak of hepatitis A in a rural day-care center. Am J Public Health. 1983;73:1190-1193.

8. Koff RS. Hepatitis A. Lancet. 1998;351:1643-1649.

9. Dalton CB, Haddix A, Hoffman RE, Mast EE. The cost of a food-borne outbreak of hepatitis A in Denver, Colo. Arch Intern Med. 1996;156:1013-1016.

10. Hadler SC. Global impact of hepatitis A virus infection: changing patterns. In: Hollinger FB, Lemon SM, Margolis HS, eds. Viral Hepatitis and Liver Disease. Baltimore, MD: Williams and Wilkins; 1991:14-20.

11. Yee LJ, Rhodes SD. Understanding correlates of hepatitis B virus vaccination in men who have sex with men: what have we learned? Sex Transm Infect. 2002;78:374-377.

12. Sy FS, Rhodes SD, Choi ST, et al. The acceptability of oral fluid testing for HIV antibodies. A pilot study in gay bars in a predominantly rural state. Sex Transm Dis 1998;25:211-215.

13. Becker MH. The health belief model and personal health behavior. Health Educ 1974;2:324-508.

14. Rosenstock IM. Historical origins of the health belief model. Health Educ Monogr 1974;2:1-8.

15. Bandura A. Social foundations of thought and action: a social cognitive theory. Englewood Cliffs: Prentice-Hall; 1986:390-453.

16. Rhodes SD, Arceo R. Testing measures predictive of hepatitis A vaccination in a sample of men who have sex with men. Health Educ Res. In press.

17. Cattell R. The meaning and strategic use of factor analysis. In: Cattell RB, ed. Handbook of Multivariate Experimental Psychology. Chicago: IL: Rand McNally; 1966:174-233.

18. Kleinbaum DG, Kupper LL, Muller KE, Nizam A. Applied Regression Analysis and Other Multivariate Methods. 3rd ed. Pacific Grove, CA: Brooks/Cole Publishing, 1998.

19. Pedhazur EJ, Pedhazur Schmelkin L. Measurement, Design, and Analysis: An Integrated Approach. Hillsdale, NJ: Lawrence Erlbaum Associates, 1991.

20. Tabachnick BG, Fidell LS. Using Multivariate Statistics. 4th ed. Needham Heights: MA: Allyn and Bacon; 2001.

21. Bryant FB, Yarnold PR. Principle components analysis and exploratory and confirmatory factor analysis. In: Grimm LG, Yarnold PR, eds. Reading and Understanding Multivariate Statistics. Washington: DC: American Psychological Association; 1997:99-136.

22. Cronbach LJ. Coefficient alpha and the internal structure of tests. Psychometrika 1951;16:297-334.

23. Arbuckle JL, Wothke W. AMOS 4.0: User's Guide. Chicago: IL: SmallWaters Corporation, 1999.

24. Bentler PM. Comparative fit indexes in structural models. Psychol Bull 1990;107:238-246.

25. Bentler PM, Bonett DG. Significance tests and goodness of fit in the analysis of covariance structures. Psychol Bull 1980;88:588-606.

26. Bollen KA. A new incremental fit index for general structural equation models. Sociological Methods and Research 1989;17:303-316.

27. Hosmer DW, Lemeshow S. Applied Logistic Regression. New York, NY: John Wiley & Sons; 1989:82-175.

28. Chin J, ed. Control of Communicable Diseases Manual. 16 ed. Washington, DC: American Public Health Association; 2000:243-251.

29. Goldstein MG, Depue J, Kazura A, Niaura R. Models of provider-patient interaction: applications to health behavior change. In: Shumaker SA, Schron EB, Ockene JK, McBee WL, eds. The Handbook of Health Behavior Change. 2 ed. New York: Springer; 1998:85-113.

30. Rhodes SD, DiClemente RJ, Yee LJ, Hergenrather KC. Correlates of hepatitis B vaccination in a high-risk population: An Internet sample. Am J Med. 2001;110:628-632.

31. Rhodes SD, Hergenrather KC. Exploring hepatitis B vaccination acceptance among young men who have sex with men: facilitators and barriers. Prev Med 2002;35:128-134.

32. Kelly JA, Murphy DA, Sikkema KJ, et al. Randomised, controlled, community-level HIV-prevention intervention for sexual-risk behaviour among homosexual men in US cities. Community HIV Prevention Research Collaborative. Lancet. 1997;350:1500-1505.

33. Centers for Disease Control and Prevention, AIDS Community Demonstration Projects Research Group. Community-level HIV intervention in 5 cities: final outcome data from the CDC AIDS Community Demonstration Projects. Am J Public Health. 1999;89:336-345.

34. Rhodes SD, DiClemente RJ, Cecil H, Hergenrather KC, Yee LJ. Risk among men who have sex with men in the United States: a comparison of an Internet sample and a conventional outreach sample. AIDS Educ Prev. 2002;14:41-50.

35. Fishbein M, Pequegnat W. Evaluating AIDS prevention interventions using behavioral and biological outcome measures. Sex Transm Dis. 2000;27:101-110.

36. Pequegnat W, Fishbein M, Celentano D, et al. NIMH/APPC workgroup on behavioral and biological outcomes in HIV/STD prevention studies: a position statement. Sex Transm Dis 2000;27:127-132.

april supplement-with cover.qxd 5/20/2003 12:19 AM Page 39

INCREASING IMMUNIZATION RATES AMONG AFRICAN-AMERICAN ADULTS

Adult Immunization Consensus Panel

ISSUE

Immunizations have been primarily viewed as a preventive health measure for children, however, there has been no concentrated effort to promote immunizations as a preventive health measure to effectively decrease this national health disparity among African American adults.

OBJECTIVE

To examine the problem of consistently low levels of immunization rates among African Americans compared to those of Whites and other minorities while taking into account, higher rates of certain medical conditions such as cardiovascular and sickle cell disease. These immunization issues were examined to effectively recommend policy, address barriers, best practices, and intervention strategies for the National Medical Association, its physician members and their communities.

CONSENSUS PROCESS

A literature review was conducted with assistance from the Wyeth Ayerst medical library and the National Medical Association's Immunization Clearinghouse examining over 110 pieces of immunization literature from 1980 to 1999, which addressed immunization issues from an African American and/or minority perspective. A draft of the immunization paper was submitted to panel participants to review before the panel was convened, June 24-26, 1999.

The Consensus Panel was also asked to include additional immunization material, which was not included in the first draft, relevant to the immunization issues that were selected for inclusion in the immunization paper.

The panel then devised a short list of the most relevant issues affecting African Americans and recommendations were developed to address key areas, which included:

- Immunization disparity rates;
- Current literature on risk factors for under immunization;
- Barriers to immunization;
- Missed opportunities; and
- Intervention strategies, including the establishment of institutional and physician best practices.

SUMMARY

Racial and ethnic disparities in adult immunization may reflect a differential effect on African Americans when coupled with underlying socioeconomic or cultural differences that can create barriers to health care access and discourage immu-

© 2002. Originally published in "Adult Immunizations: Increasing Immunization Rates Among African-American Adults" as part of the National Medical Association's National Colloquium on African American Health. Request for reprints should be addressed to the National Medical Association, 1012 Tenth Street NW, Washington, DC 20001.

nizations as a preventive health measure. Scientifically based, culturally appropriate intervention strategies need to be implemented by physicians and institutions/organizations to increase immunization rates among African American adults.

PART I: MISSION STATEMENT AND PURPOSE

The National Medical Association (NMA) is the oldest and largest national organization representing African American physicians and health professionals in the United States. Established in 1895, the NMA is the collective voice of more than 22,000 African American physicians and the patients they serve. Since its inception, the NMA has been committed to improving the health status and outcomes of minority and disadvantaged people. While throughout its history the National Medical Association has focused primarily on health issues related to African Americans and medically underserved populations; however, its principles, goals, initiatives and philosophy encompass all sectors of the population.

Today, more than 100 after its founding, the National Medical Association is firmly established as a leader in medicine. The NMA serves as a catalyst for the elimination of disparities in health and the leading force for parity in medicine.

Immunizations have been primarily viewed as preventive medicine tool for use in children, and this has lead to under utilization among African American adults. Although there is growing awareness and numerous strategies have been developed to address under-immunization in adults, there has been no concentrated effort to promote immunization as a preventive health measure among adult African Americans and other minority groups.

Consequently, the NMA is concerned about consistently lower levels of immunization rates of African-Americans compared to those of Whites and other minorities. Of additional concern are higher rates of certain conditions such as diabetes and cardiovascular disease, which coupled with clinical treatment disparities, places African-Americans at higher risk for complications resulting from vaccine-preventable illnesses.

The NMA believes that too few African American adults are immunized. Despite increasing influenza and pneumococcal vaccination levels over the past ten years among adults aged 65 years or greater in all racial and ethnic groups, immunization levels among African American remain significantly below the Healthy People 2000 objective, which was achieved among Whites in 1997. Pneumococcal vaccination levels are especially low among older African Americans, and younger adults with medical conditions placing them at risk for complications from influenza and pneumococcal disease.

Further, little progress has been made in hepatitis B vaccination of adults who are at high risk for infection; hepatitis B among African American adults is higher than among the majority population. These disparities heighten the need to address this critical health problem in the African American community.

Accordingly, in 1998 President Clinton included adult immunization as one of the six key areas to address in the "Initiative to Eliminate Racial and Ethnic Disparities in Health." It was a step in the right direction, but much more must be done to reach the all time high immunization levels that have been achieved among children.

To this end, the NMA has assessed this health disparity in order to recommend proactive steps that can be undertaken by the Association and its membership. On June 24-26, 1999, in Washington, DC, the NMA convened the Adult Immunization Consensus Panel comprised of the top experts on adult immunization in the country. During this panel, we drew on the knowledge of these experts and looked at the following areas:

- the disparity rates for vaccination;
- current literature on risk factors for under vaccination,
- disease conditions and complications;
- barriers to immunization;
- missed opportunities for vaccination; and

- intervention strategies, including the establishment of institutional and physician best practices.

In this paper, we first review information on the burden of vaccine-preventable diseases of adults, current recommendations for vaccination, effectiveness and cost effectiveness of vaccination, racial and ethnic disparities in vaccination coverage levels, barriers to and missed opportunities for vaccination, intervention strategies, and selected demonstration projects. We conclude with NMA recommendations for increasing vaccination of African American adults.

PART II: REVIEW OF ADULT IMMUNIZATION ISSUES, BARRIERS AND OPPORTUNITIES

A. Burden of Adult Vaccine-Preventable Diseases

Vaccine-preventable diseases are responsible for as many as 39,000 adult deaths each year in the U.S. (20,000 from complications of influenza infection, 14,000 from pneumococcal disease, and 5,000 from chronic hepatitis B infection) (CDC, unpublished data). By comparison, childhood immunization programs have drastically reduced the number of vaccine-preventable deaths among children, with fewer than 500 deaths reported each year.[1] Pneumonia and influenza together are the fifth leading cause of death in those aged 65 years and older.[2]

During 11 of 23 annual influenza epidemics from 1972 through 1995 in the U.S., more than 20,000 deaths, 90 percent among persons aged 65 years or more, were attributed to complications of influenza infection such as exacerbation of underlying medical conditions or secondary pneumonia due to bacterium such as Streptococcus pneumoniae (S. pneumoniae).[3] An estimated 110,000 hospitalizations a year are related to influenza.[3]

In addition to the human cost, the health care and lost productivity costs to society have been estimated at $3 billion to $5 billion for an average influenza epidemic, with direct medical costs accounting for 20 percent to 30 percent of the total cost.[4] The estimated cost of pandemic influenza in the United States would be $71 billion to $167 billion.[5]

S. pneumoniae causes 25-35 percent of hospitalizations for community-acquired bacterial pneumonia, and an estimated 50,000 cases of pneumococcal bacteremia and 3,000 cases of meningitis annually in the U.S.[6] Among adults with pneumococcal bacteremia, 60 percent-87 percent also develop pneumonia, and up to 40 percent die. An estimated 14,000 deaths result from severe pneumococcal disease annually. The risk for invasive pneumococcal disease is higher among African Americans compared to Whites. African American adults have a threefold to fivefold higher incidence of bacteremia than Whites, and have twice the incidence of pneumococcal meningitis.[6] Possible reasons for these higher rates among African Americans include lower levels of pneumococcal and influenza vaccination, higher prevalence of certain conditions (e.g., diabetes, heart disease, HIV infection)[7-9] that are associated with higher risk for severe pneumococcal disease, delayed access to care, or higher chance of exposure associated with environmental conditions.

Estimates of influenza-associated hospitalizations and deaths have thus far not been computed by racial or ethnic group. However, higher rates of influenza complications are expected among African Americans compared to Whites because of lower vaccination levels among African Americans and the higher prevalence of certain conditions (e.g., diabetes, heart disease, HIV infection) among African Americans that are associated with higher risk for influenza complications. It is unlikely that there are racial differences in exposure, susceptibility and risk of complications from influenza, controlling for medical conditions.

Influenza and pneumococcal vaccinations have become increasingly important for two reasons. First, prevalence of drug-resistant strains of S. pneumoniae have become more common in the

U.S., with 15 percent to 38 percent of isolates in selected sites nonsusceptible to penicillin in 1997.[10] This emerging antimicrobial resistance further emphasizes the need for prevention of invasive pneumococcal disease by vaccination. Secondly, it is anticipated that another influenza pandemic will eventually occur.[11] The influenza pandemic of 1918 caused 20 million deaths, many of them in younger adults. During this pandemic, the disease affected one in four adults. As a currently under-immunized group, African Americans lack the infrastructure support to promote widespread immunizations in the event of a pandemic. Additionally, existing community beliefs/attitudes about immunizations might hamper the acceptance of mass immunization campaigns for adults.

After influenza and pneumococcal infection, hepatitis B is the third major vaccine-preventable disease among adults. Annually between 1988-1994, an estimated average of 335,000 persons, primarily young adults, were infected with hepatitis B virus.[12] Currently, annual incidence of the disease may be as low as 100,000.[12] For those persons affected by hepatitis B:

- Between 8,400 and 19,000 require hospitalization,
- 6 percent to 10 percent become chronic carriers,
- About 25 percent of chronic carriers develop chronic active hepatitis,
- Each year in the U.S., about 4,000 persons die from hepatitis B-related cirrhosis, and
- 1,000 die from hepatitis B-related liver cancer.

During 1988-1994, the estimated average annual incidence rate of hepatitis B infections among African Americans was four times higher than the rate for Whites.[12]

B. Immunization Recommendations

To reduce the burden of influenza, pneumococcal, and hepatitis B infections, specific immunization recommendations have been developed.[3,6,13,14] For example, annual influenza vaccination and one dose of pneumococcal polysaccharide vaccine are recommended for persons at increased risk for complications from pneumococcal and influenza infections, including all persons aged 65 years or more and younger persons with chronic conditions such as heart disease, lung disease and diabetes. The American Academy of Family Physicians also has recommended annual influenza vaccination of all persons starting at age 50.[15] The Advisory Committee on Immunization Practices (ACIP) is reviewing data on the risk of influenza-related complications among persons aged 50-64 years, the prevalence of high-risk medical conditions among persons in this age group, and the cost-effectiveness of this recommendation.[3] The ACIP also recommends scheduling a prevention visit for every patient at the age of 50 years to assess vaccination status and take other preventive measures.[16] Hepatitis B vaccination is recommended for adults at high risk for exposure through sexual contact, injection drug use, or occupations involving possible contact with human blood.[13]

Additional disease burdens of importance for persons who were not infected or immunized during childhood may be at increased risk for measles, mumps, rubella, and varicella and their complications as adults. Other adults enter special high-risk groups as a result of disease, occupation, behavior, or increasing age; all require immunizations or booster doses not routinely provided in childhood.[17] For example, a booster vaccination against tetanus and diphtheria is recommended every ten years for all adults.

C. Vaccine Effectiveness and Cost-Effectiveness

Influenza Vaccine

The Influenza vaccine has reduced death, hospitalization, and clinical illness in years when vaccine and epidemic strains are similar.[3] Influenza vaccine is up to 90 percent effective in preventing illness in young, healthy adults.[3] Among institutionalized, high-risk older persons, those vaccinated experience a 30 percent to 40 percent reduction

in incidence of illness; a 50 percent-60 percent reduction in hospitalization; and up to 80 percent reduction in death.[3, 18]

The Office of Technology Assessment concluded that vaccination of persons aged 65 years or older would save money and improve health.[19] Optimizing vaccination programs in nursing homes could prevent about 70,000 cases of influenza in a typical epidemic, saving more than $50 million in direct costs.[20] More recently, it has been estimated that vaccination of older adults saved an estimated $30 to $60 in hospitalization costs per $1 spent on vaccination.[21]

Pneumococcal Polysaccharide Vaccine

Estimated effectiveness of pneumococcal vaccine against invasive pneumococcal disease caused by serotypes in the vaccine has ranged from 56 percent to 84 percent.[6] Effectiveness was demonstrated in specific patient groups at higher risk for pneumococcal disease, including persons with diabetes, coronary heart disease, congestive heart failure, chronic pulmonary disease, and anatomic asplenia.

Data on effectiveness against invasive pneumococcal disease are not compelling for certain groups of immunocompromised patients, such as those with sickle cell disease or chronic renal failure. However, these studies are limited by the small numbers of unvaccinated persons with these illnesses.

Vaccination against pneumococcal bacteremia can improve the health of elderly persons at a reasonable cost and would save money if the vaccine were administered under a public program (saving $8.27 per person vaccinated).[22] Vaccination of persons aged (65 years can result in reduced medical expenses; additional years of healthy life; and save society millions of dollars. Pneumococcal vaccination is likely to result in even more cost saving for African Americans because of the higher rates of pneumococcal bacteremia and lower pneumococcal vaccination levels compared to the majority population.

Hepatitis B Vaccine

The overall effectiveness of vaccine in preventing viremic hepatitis B infection is 85 percent to 95 percent among susceptible adults.[23] If a protective antibody response develops after vaccination, vaccine recipients are virtually 100 percent protected against clinical illness.[13] Long-term studies of healthy adults and children indicate that immunologic memory remains intact for at least 10 years, and offers protection against chronic hepatitis B infection, even though anti-HBs levels may become low or decline below detectable levels.[13,24] For children and adults whose immune status is normal, booster doses of the vaccine are not recommended.[17] The possible need for booster doses will be assessed as additional information becomes available.

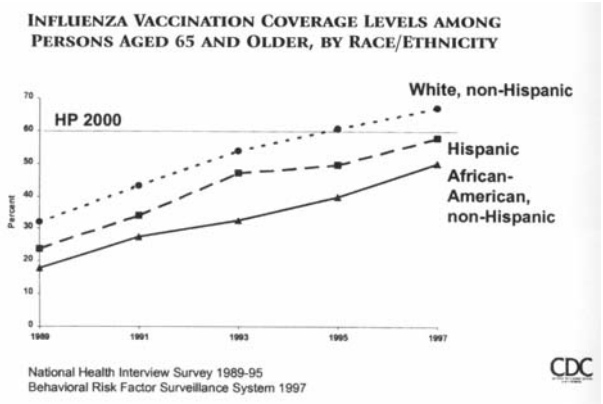
Analysis indicates vaccinating susceptible persons would be cost-saving for populations with annual attack rates above 5 percent and would be cost-effective (or cost saving when indirect costs are included) for populations with attack rates as low as 1 percent to 2 percent.[25] Annual attack rates for high-risk groups are likely to be well above these thresholds.[26]

D. Disparities in Vaccination Levels

Influenza and Pneumococcal Vaccination of Persons Aged >=65 Years

To reduce morbidity and mortality caused by influenza and pneumococcal disease, Healthy People 2000 objective 20.[11] called for at least 60 percent vaccination against these diseases among persons at high risk for complications, including all persons aged >=65 years.[27] From 1989 through 1997, influenza and pneumococcal vaccination levels among non-institutionalized persons aged 65 years or older increased steadily in each racial and ethnic group, but remained significantly lower in each year for African Americans and Hispanics compared to non-Hispanic Whites (Figures 1 and 2).[28-29] In 1997, the influenza vaccination level was 67.2 percent among Whites compared to 50.2 percent among African Americans, with pneumococ-

april supplement-with cover.qxd 5/20/2003 12:19 AM Page 44



cal vaccination levels lower in both groups (47.3 percent for Whites and 29.7 percent for African Americans).[29] Proposed objectives for Healthy People 2010 include a 90 percent coverage target for influenza and pneumococcal vaccination among persons aged 65 years and older.[30]

Using data from the 1995 National Health Interview Survey, these disparities between African Americans and non-Hispanic Whites persisted when stratified by poverty status, level of education, frequency of contact with physicians, sex, and age.[31] In most states where sample sizes were sufficient for reliable estimation after combining 1995 and 1997 data from the Behavioral Risk Factor Surveillance System (26 for influenza and 22 for pneumococcal), non-Hispanic Whites were more likely than non-Hispanic African Americans to report receiving influenza and pneumococcal vaccinations.[31]

The Healthy People 2000 objective 20.[11] also called for at least 80 percent influenza and pneumococcal vaccination of chronically ill or older persons in adult long-term care facilities.27 Using data from the 1995 National Nursing Home Survey, estimated coverage was at least 61 percent for influenza vaccination and at least 22 percent for pneumococcal vaccination.[32] Coverage did not differ by racial/ethnic group.

Influenza and Pneumococcal Vaccination of High-risk Persons aged 18-64 Years

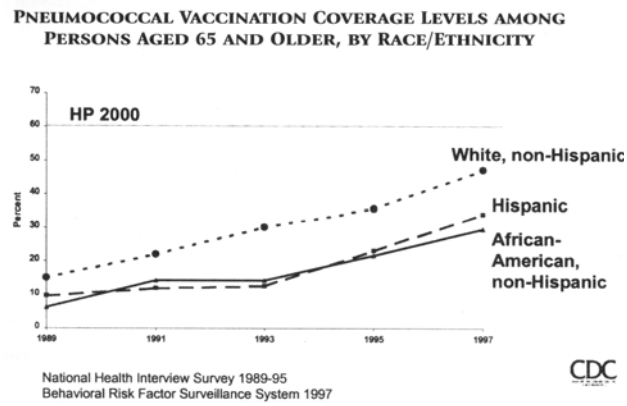
In 1995, vaccination levels among adults under age 65 years with one or more high-risk medical conditions were lower than vaccination levels of persons aged 65 years and older.[31] Among persons aged 50-64 years with one or more vaccine-indicated chronic conditions, non-Hispanic African Americans were significantly less likely than non-Hispanic Whites to report receipt of influenza vaccination (24.5 percent vs. 40.4 percent) or pneumococcal vaccination (11.7 percent vs. 21.5 percent). In younger adults with high-risk conditions, there were no differences by racial/ethnic group.

Hepatitis B Vaccination of High-risk Adults

Healthy People 2000 objective 20[11] called for hepatitis B immunization among selected high risk populations, including at least 90 percent among occupationally exposed workers, and at least 50 percent among injecting drug users in drug treatment programs and men who have sex with men.[27] National data does not exist to estimate hepatitis B vaccination in these and other high-risk groups. At least 70 percent of adults with occupational exposure to hepatitis B virus are estimated to have been vaccinated.[33] However, surveys of young men who have sex with men show high rates of hepatitis B infection and low and only a small proportion of STD clinics, drug treatment programs, and correctional facilities routinely offer hepatitis B vaccination.[35]

Tetanus Toxoid Use in Persons Aged >=18 Years

The Healthy People 2000 objective 21[2] called for 62 percent of adults to be up-to-date for the 10-



year tetanus booster.[27] The proportion of non-Hispanic African Americans in 1995 who reported receiving tetanus toxoid (with or without diphtheria toxoid) during the past ten years decreased significantly with age, from 60.5 percent among those aged 18-49 to 43.9 percent among those aged 50-64 and 36.9 percent among those aged >=65 years.[31] Tetanus coverage levels were significantly higher for non-Hispanic Whites aged 18-49 years (68.9 percent) and aged 50-64 (56.0 percent).

E. Barriers to Adult Immunization

Several reasons have been given to explain under-utilization of vaccines among adults. First, some members of the public and health care providers do not perceive adult vaccine-preventable diseases as a significant public health problems. Second, there are unnecessary fears among patients and providers concerning adverse events following vaccination. Third, unlike childhood immunization, adult immunization indications are selective, with different target groups for different vaccines. Fourth, there are no statutory requirements for adult immunization. Fifth, there are no comprehensive vaccine-delivery systems in the public and private sectors. Sixth, there are limited reimbursement levels for vaccination services and a lack of coverage for adult immunization by third party payers. Seventh, there is a failure to establish organized vaccination programs in settings (e.g. workplace) where adults congregate. Finally, there are missed opportunities to vaccinate adults during contacts with health care providers.[1]

Racial and ethnic disparities in adult immunization may reflect a differential effect of some or all of these factors on members of racial and ethnic minority groups, caused by underlying socioeconomic or cultural differences. These differences can create barriers to health care access and discourage appropriate use of preventive health services on the part of patients (e.g., limited access to care, lack of knowledge and negative attitude toward immunization), providers (e.g., considering immunization of adults and other preventive services as low priority within their practice, differential treatment of patients), and organizations (e.g., constraints of the practice setting, lack of organized program for delivering preventive services).

Patient-related Barriers

There are a number of potential patient-related attitudinal barriers to adult immunization, which include:

- A general lack of awareness that vaccines are necessary (e.g., provider has not recommended vaccination);
- There is a feeling that there are minimal health risks from vaccine-preventable diseases;
- Doubts about vaccine efficacy;
- Misperceptions about vaccine side effects (e.g., believing influenza vaccination can cause influenza);
- A dislike or fear of needles;
- Minimal concern for preventive health measures; and
- A distrust of health care providers, particularly among homeless, illegal aliens, or the poor coupled with health care providers of a different racial or ethnic group.

In addition, socioeconomic conditions such as lower levels of income and education; unemployment and living in impoverished areas can also create barriers to vaccination by limiting access to quality care. When patients lack adequate health insurance; or a usual source of care; have limited transportation, and rely on hospital emergency departments for acute medical care they tend to have lower vaccination rates. These factors accentuate attitudinal barriers to vaccination.

Among Americans aged 65 years or older, Medicare has reduced many barriers to vaccination. Medicare provides influenza and pneumococcal vaccination at no cost to beneficiaries enrolled in Part B coverage. Members of racial and ethnic minority groups report contact with the health care system as often as do non-Hispanic Whites, yet African Americans have lower influenza and pneumococcal vaccination levels, even among those with more frequent contact.[31] In

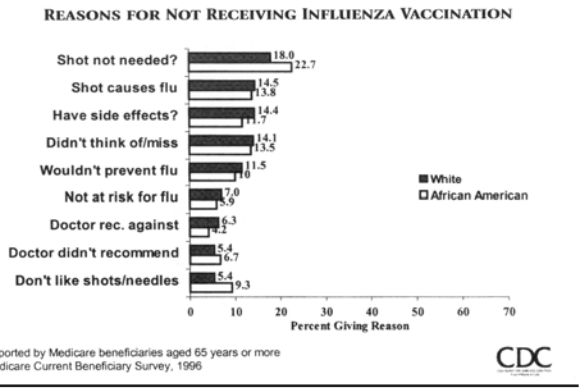
april supplement-with cover.qxd 5/20/2003 12:19 AM Page 46

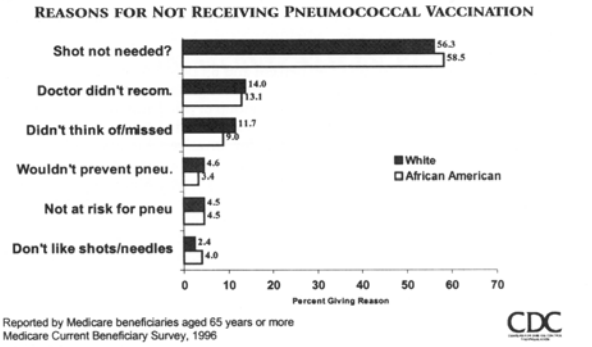
1996, a nationally representative sample of Medicare beneficiaries was asked to provide reasons for not receiving influenza and pneumococcal vaccinations.[36] Although African Americans in the sample were less likely to report receipt of vaccination, the reasons they reported for lack of vaccination were similar to those reported by non-Hispanic Whites (Figures 3 and 4) . Among persons of all racial and ethnic groups combined, of those not receiving the pneumococcal vaccine, 57 percent reported not knowing they needed the vaccine, 13 percent stated that a doctor had not recommended the vaccine, and 11 percent did not think of it or missed it. Of those not receiving recent influenza vaccination, 19 percent reported not knowing they needed the vaccine, and 39 percent had misconceptions regarding vaccine safety or efficacy (thinking it could cause influenza or other side effects, or would not prevent influenza).

Provider-related Barriers

A doctor's recommendation for vaccination can have a strong influence on a patient's decision to be vaccinated, even among persons with negative attitudes toward vaccination.[37-40] Recent surveys of physicians have indicated that most were aware of and agreed with vaccination recommendations, but the main reason many cited for not delivering vaccines was oversight.[41-43] This indicates the need for organized programs for vaccination delivery, which would minimize missed opportunities to vaccinate when a patient visits the healthcare provider for other problems.

Primary care providers at an ambulatory care





clinic serving predominantly indigent African Americans had adequate knowledge of pneumococcal vaccine overall, and over half reported that patients accepted their recommendations for vaccination most of the time.[43] Other potential barriers to provider delivery of immunization services include: uncertainties about high risk groups that require immunization[44]; difficulty determining a patient's vaccination status[42, 44]; low priority for immunization[44]; requirements for written consent; low reimbursement for delivery of vaccination services creating physician disincentive; fears of adverse events following vaccination and related liability concerns; and beliefs that patients should be educated by mass media campaigns.

Because older African Americans have frequent contact with health care providers, it is possible that disparities in vaccination levels could in part result from lower quality of care. For example, in one study in New York City, physicians with a predominately African American or Hispanic population were less likely to recommend influenza and pneumococcal vaccination for patients aged 65 and older compared to physicians with a predominately White patient population (47 percent vs. 74 percent for influenza; 27 percent v. 54 percent for pneumococcal).[45] A shortage of primary care physicians resulting in higher patient loads and constraints in the practice setting, may contribute to lowered quality of care provided to African Americans living in urban or rural poverty areas.[46] Results from a recent study of adults belonging to a managed care organization showed that African Americans were much less likely than Whites to say their doctors involve them in health care deci-

sions.[47] Although African Americans are much more likely to have a minority physician than Whites, the majority are treated by white physicians[48,49]. Another study showing lower rates of referral for cardiac catheterization when patients were African American provides other evidence for subtle forms of racial discrimination in the health care delivery system.[50]

F. Missed Opportunities

Adults reporting more frequent contacts with the health care system are more likely to report vaccination, reflecting increased opportunities for vaccinations to be recommended by providers or requested by patients.[31] Williams et al. identified many opportunities to provide vaccines to adults that were being missed, despite availability of safe and effective vaccines.[51] Health care providers often fail to take advantage of opportunities to vaccinate during office, clinic, and hospital contacts and fail to organize programs in medical settings that ensure adults are offered the vaccines they need. More than one third of persons aged 65 years or more, or younger adults at increased risk for complications from influenza or pneumococcal infection, reported five or more contacts in the past year. However, except for persons aged 65 years or more receiving influenza vaccine, the majority had not been vaccinated against influenza or pneumococcal disease.[31] Also, influenzavaccination levels are higher than levels of pneumococcal vaccination. These data indicate missed opportunities by providers to offer vaccination services.

Because previous hospitalization is a risk factor for subsequent serious pneumococcal infection, administration of influenza and pneumococcal vaccines to inpatients has been recommended.[3,6] However, among Medicare patients hospitalized for pneumonia in 12 western states in 1994, opportunities to provide pneumococcal and influenza vaccines were missed for up to 80 percent and 65 percent, respectively, of eligible persons.[52] Among a group of primarily indigent African American adults treated for invasive pneumococcal disease at a teaching hospital, up to one third of the cases could have been prevented if the pneumococcal vaccine had been administered during previous encounters with the hospital.[53]

Data show that opportunities to vaccinate are missed despite older African Americans having multiple doctor visits during the year. Target vaccination groups are shown to have visited the doctor five or more times during the year without receiving influenza or pneumococcal vaccines. African Americans when compared to their White counterparts were under immunized given both groups had the identical following indicators:

- seeing a physician a similar number of times during the year;
- the same educational level;
- had medical insurance; and
- had a medical home.

Missed opportunities also have been identified for administration of other vaccines, such as hepatitis B, measles, rubella, and tetanus toxoid.[51]

G. Intervention Strategies

This pattern of missed opportunities has contributed to continued under-utilization of vaccinations among adults despite initiatives to improve vaccination levels. In 1990, the National Coalition for Adult Immunization issued the Standards for Adult Immunization, endorsed by the National Foundation for Infectious Diseases, the CDC, the NMA, and other agencies.[54] Beginning in 1994, national and state-based campaigns were initiated by the Health Care Financing Administration to increase influenza and pneumococcal coverage among Medicare beneficiaries.[55] In 1994, the National Vaccine Advisory Committee recommended the following to improve adult immunization: 1) improve public and provider education; 2) institute major changes in clinical practice; 3) increase financial support by public and private insurers; 4) improve surveillance of vaccine-preventable diseases and vaccine production and delivery; and 5) provide support for research on

vaccine-preventable diseases, new and improved vaccines, immunization practices, and international programs for adult immunization.[1] The Department of Health and Human Services subsequently issued an Adult Immunization Action Plan outlining a proposal for collaboration among federal agencies, state and local agencies, health professional organizations, purchasers and providers of health-care, vaccine companies, and the public, to increase adult vaccination levels.[56]

In 1997, utilization of vaccines among adults had improved but remained sub-optimal, and racial and ethnic disparities persisted. To further improve vaccination levels and eliminate disparities, scientifically based and culturally appropriate intervention strategies are needed. The independent, nonfederal Task Force on Community Preventive Services has completed a systematic review of 17 types of interventions designed to increase vaccination levels, and made recommendations for use of these interventions.[57] Of those 17 interventions, the boxed information above represents the strongly recommended interventions relevant to adult populations

These provider-based interventions can be used to increase pneumococcal vaccination levels to the same standard or higher as those that have been achieved for the influenza vaccination by facilitating delivery of pneumococcal vaccination when patients visit their healthcare provider for an annual influenza vaccination.

Recommended interventions included vaccination requirements for college attendance and home visits by health care workers.[57] There was insufficient evidence for the Task Force to recommend community-wide education alone; clinic based education only; client or family incentives; client-held medical records; or provider education alone. Further research is needed to assess the effectiveness of these interventions.

Planning for implementation of these Task Force recommendations in a specific community must take into account: observed problems; community preferences; community priorities; feasibility; activities currently being performed; current levels of vaccination coverage; causes of under immunization; and information regarding vaccine-preventable disease rates.[57] These strongly recommended interventions are primarily provider-based. However, increasing community demand for vaccination may be a useful additional strategy. This is particularly true, if lack of knowledge among clients regarding the need for vaccination contributes to low coverage, and if increased knowledge will lead clients to demand vaccination from their providers who otherwise might not offer it. Enhancing access to vaccination services may also be useful to facilitate optimal timing of influenza vaccination, or for segments of the population with limited access to the health care system. This can be accomplished by offering vaccinations in non-traditional settings such as emergency departments, community centers, shopping malls, supermarkets, pharmacies and churches. Significant proportions of African

Recommended Interventions

1. Client reminder/recall systems: reminding clients that vaccinations are due (reminder) or late (recall).
2. Provider reminder/recall: use of client charts, computer-generated messages, or mail messages to remind those who administer vaccines that individual clients are due or overdue for specific vaccinations.
3. Assessment and feedback for vaccination providers: Retrospectively evaluating the performance of providers in delivering vaccinations to a client population and giving this information to providers.
4. Standing orders: Nonphysician personnel prescribe or deliver vaccinations to client populations by protocol without direct physician involvement at the time of the interaction;
5. Reducing out-of-pocket costs: Paying for vaccinations or administration or providing insurance coverage, as with Medicare Part B.
6. Multi-component interventions including education and one of above strategies: Provide knowledge to target population and/or providers, along with at least one other activity to improve vaccination coverage.
7. Expanding access in medical or public health clinical settings when used as part of multi-component intervention: Reducing distance from target population, increasing or changing clinic hours, delivering vaccinations in clinic settings not previously used, such as emergency departments, inpatient units or subspecialty clinics, or reducing administrative barriers to obtaining vaccination services within clinics.

Americans are church members and are likely to take the advice and recommendations of their clergy.[58]

Adult Immunization Consensus Panel

- **Walter W. Williams, M.D., M.P.H. (Chair)**
Centers for Disease Control and Prevention, Atlanta, Georgia
- **Norman Baylor, Ph.D.**
Food and Drug Administration, Rockville, Maryland
- **Virginia Caine, M.D.**
Marion County Health Department, Indianapolis, Indiana
- **Richard D. Clover, M.D.**
University of Louisville School of Medicine, Louisville, Kentucky
- **George Counts, M.D.**
National Institute of Allergy and Infectious Disease, Rockville, Maryland
- **Gary C. Dennis, M.D.**
98th President, National Medical Association
- **James Singleton**
Centers for Disease Control and Prevention, Atlanta, Georgia
- **Monica Sweeney, M.D., M.P.H.**
Bedford Stuyvesant Family Health Center, Brooklyn, New York

BIBLIOGRAPHY

1. Fedson DS. Adult immunization: summary of the National Vaccine Advisory Committee Report. JAMA 1994; 272:1133-7.
2. National Center for Health Statistics. Health, United States, 1998, with socioeconomic status and health chartbook. Hyattsville, Maryland: US Department of Health and Human Services, Public Health Service, CDC, National Center for Health Statistics, 1998:212.
3. CDC. Prevention and control of influenza: recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 1999; 48 (no. RR-4).
4. Schoenbaum SC. Economic impact of influenza. The individual's perspective. Am J Med 1987; 82 (6A):26-30.
5. Meltzer MI, Cox NJ, Fukuda K. The economic impact of pandemic influenza in the United States: priorities for intervention. Emerg Infect Dis [serial online] 1999 Sep-Oct [cited 1999 Sep 13];5(5):[17 screens]. Available from: http://www/cdc/gov/ncidid/EID/ eid.htm
6. CDC. Prevention of pneumococcal disease: recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 1997; 46 (no. RR-8).
7. CDC. Trends in prevalence and incidence of self-reported diabetes mellitus -- United States, 1980-1994. MMWR 1997; 46:1014-8.
8. CDC. Changes in mortality from heart failure -- United States, 1980-1995. MMWR 1998; 47;633-7.
9. Karon JM, Rosenberg PS, McQuillan G, Khare M, Gwinn M. Petersen LR. Prevalence of HIV infection in the United States, 1984 to 1992. JAMA 1996 Jul 10; 276 (2): 126-31.
10. CDC. Geographic variation in penicillin resistance in Streptococcus pneumoniae -- selected sites, United States, 1997. MMWR 1999; 48:656-61.
11. Influenza pandemic preparedness plan for the United States (clearance draft). Working Group on Influenza Pandemic Preparedness and Emergency Response. August 1997.
12. Coleman PJ, McQuillan GM, Moyer L, Lambert SB, Margolis HS. Incidence of hepatitis B virus infection in the United States, 1976-1994: estimates from the National Health and Nutrition Surveys. JID 1998; 178:954-9.
13. Mahoney FJ, Kane M. Hepatitis B vaccine. In: Plotkin SA, Orenstein WA, eds. Vaccines, 3rd ed. Philadelphia: W.B. Saunders Company; 1999: 158-182.
14. American College of Physicians, Guide for Adult Immunization, 3rd ed. Philadelphia: American College of Physicians; 1994.
15. American Academy of Family Physicians. Summary of policy recommendations for periodic health examination, November 1996, Revised March 1999. Kansas City: American Academy of Family Physicians, 1999 [online]. Available from: http://www.aafp.org/exam/index.html. Accessed May 11, 1999.
16. CDC. Notice to Readers -- Assessing adult vaccination status at age 50 years. MMWR 1995; 44:561-3.
17. CDC. Update on adult immunization: recommendations of the Immunization Practices Advisory Committee (ACIP). MMWR 1991; 40 (no. RR-12).
18. Patriarca PA, Weber JA, Parker RA, et al. Efficacy of influenza vaccine in nursing homes: reduction in illness and complications during an influenza A (H3N2) epidemic. JAMA 1985; 253:1136-9.
19. Riddiough MA, Sisk JE, Bell JC. Influenza vaccination: cost effectiveness and public policy. JAMA 1983; 249:3189-95.
20. Patriarca PA, Arden NA, Koplan JP, Goodman RA. Prevention and control of type A influenza infections in nursing homes: benefits and cost of four approaches using vaccination and amantadine. Ann Intern Med 1987; 107:732-40.
21. Nichol KL, Margolis KL, Wuorenma J, Von Sternberg T. The efficacy and cost effectiveness of vaccination against influenza among elderly persons living in the community. NEJM 1994; 331:778-84.
22. Sisk JE, Moskowitz AJ, Whang W, et al. Cost-effectiveness of vaccination against pneumococcal bacteremia among elderly people. JAMA 1997; 278:1333-9.
23. Hadler SC, Francis DP, Maynard JE, et al. Long-term immunogenicity and efficacy of hepatitis B vaccine in homosexual men. NEJM 1986; 315:209-14.
24. Wainwright RB, Bulkow LR, Parkinson AJ, et al. Protection provided by hepatitis B vaccine in a Yupik Eskimo Population -- results of a 10-year study. J Infect Dis 1997; 175:674-7.

25. Mulley AG, Silverstein MD, Dienstag JL. Indications for use of hepatitis B vaccine, based on cost-effectiveness analysis. NEJM 1982; 307:644-52.

26. National Center for Health Statistics. Healthy People 2000 Review, 1998-99. Hyattsville, Maryland: Public Health Service. 1999:198.

27. Public Health Service. Healthy People 2000: National health promotion and disease prevention objectives -- Full report, with commentary. Washington, DC: US Department of Health and Human Services, Public Health Service, 1991: DHHS publication no. (PHS) 91-50212:521.

28. CDC. Influenza and pneumococcal vaccination coverage levels among persons aged >=65 years -- United States, 1973-1993. MMWR 1995; 44:506-507,513-515.

29. CDC. Influenza and pneumococcal vaccination levels among adults aged >=65 years--United States, 1997. MMWR 1998; 47:797-802,818.

30. Public Health Service. Healthy People 2010: Draft for public comment. Washington, DC: US Department of Health and Human Services, Public Health Service, 1998

31. Singleton JA, Greby SM, Wooten KG, et al. Influenza, pneumococcal and tetanus toxoid vaccination of adults -- United States, 1993-1997. MMWR 1999 (in press)

32. Greby SM, Singleton JA, Sneller VP, Strikas RA, Williams WW. Influenza and pneumococcal vaccination coverage in nursing homes, U.S., 1995 [Abstract No. 021]. 32nd National Immunization Conference Abstracts, Atlanta GA 1998, p. 11

33. Mahoney FJ, Stewart K, Hu H, Coleman P, Alter MJ. Progress toward the elimination of hepatitis B virus transmission among health care workers in the United States. Arch Intern Med 1997; 157:2601-5.

34. Centers for Disease Control and Prevention. Undervaccination for hepatitis B among young men who have sex with men -- San Francisco and Berkeley, California, 1992-93. MMWR 1996; 45:215-7.

35. Mast EE, Williams IT, Alter MJ, Margolis HS. Hepatitis B vaccination of adolescent and adult high-risk groups in the United States. Vaccine 1998; 16 (Suppl):S27-9.

36. CDC. Reasons for not receiving influenza or pneumococcal vaccinations reported by Medicare Beneficiaries, Medicare Current Beneficiary Survey, 1996. MMWR (in press).

37. CDC. Local data for local decision making -- selected counties, Connecticut, Massachusetts, and New York, 1997. MMWR 1998; 47:809-13.

38. CDC. Adult immunization: knowledge, attitudes and practices -- DeKalb and Fulton counties, Georgia, 1988. MMWR 1988; 37:657-61.

39. Nichol KL, MacDonald R, Hauge M. Factors associated with influenza and pneumococcal vaccination behavior among high-risk adults. J Gen Intern Med 1996; 11:673-7.

40. Williams WW. Hawaii Pneumococcal Disease Initiative: surveys of consumer and physician knowledge, attitudes, and practices. 26th National Immunization Conference Proceedings, 1992 National Immunization Program.

41. Noe CA, Markson LJ. Pneumococcal vaccination: perceptions of primary care physicians. Prev Med 1998; 27:767-72.

42. Metersky ML, Mennone JZ, Fine JM. Factors inhibiting use of the pneumococcal polysaccharide vaccine: a survey of Connecticut physicians. Conn Med 1998; 62:649-54.

43. Shevlin J, Dodson K, Thomas D, Offutt G, Jacobsen T, Ray S. Primary care providers' knowledge, attitudes, and practices regarding pneumococcal vaccination in a public teaching hospital [Abstract]. In: Abstracts of the 33rd National Immunization Conference, Dallas, TX: CDC, 1999.

44. George AM. Don't ask-don't vaccinate: physician perspectives on barriers to adult immunization [Abstract]. In: Abstracts of the 33rd National Immunization Conference, Dallas, TX: CDC, 1999.

45. Gemson DH, Elinson J, Messeri P. Differences in physician prevention practice patterns for white and minority patients. J Community Health 1988; 13:53-64.

46. Komaromy M, Grumbach K, Drake M, Vranizan K, Lurie N, Keane D, Bindman AB. The role of black and Hispanic physicians in providing health care for underserved populations. NEJM 1996; 334:1305-10.

47. Cooper-Patrick L, Gallo JJ, Gonzalex JJ, Vu HT, Powe NR, Nelson C, Ford DE. Race, gender, and partnership in the patient-physician relationship. JAMA 1999; 282:583-9.

48. Moy E, Bartman BA. Physician race and care of minority and medically indigent patients. JAMA 1995; 273:1515-20.

49. Gray B, Stoddard JJ. Patient-physician pairing: does racial and ethnic congruity influence selection of a regular physician? J Community Health 1997; 22:247-59.

50. Schulman KA, Berlin JA, Harless W, et al. The effect of race and sex on physicians' recommendations for cardiac catheterization. NEJM 1999; 340:618-26.

51. Williams WW, Hickson MA, Kane MA, Kendal AP, Spika JS, Hinman AR. Immunization policies and vaccine coverage among adults: the risk for missed opportunities. Annals Intern Med 1988; 108:616-25.

52. CDC. Missed opportunities for pneumococcal and influenza vaccination of Medicare pneumonia inpatients - 12 Western States, 1995. MMWR 1997;46:919-23.

53. Shevlin J, Offutt G, Thomas D, Farley M, Ray S, Whitney C. Missed opportunities to vaccinate African Americans against invasive pneumococcal disease [Abstract]. In: Abstracts of the 33rd National Immunization Conference, Dallas, TX: CDC, 1999.

54. CDC. Health objectives for the nation - public health burden of vaccine-preventable diseases among adults: standards for adult immunization practice. MMWR 1990; 39:725-9.

55. Orenstein WA, Tilghman J. A closer look at adult immunization in the United States [commentary]. The Milbank Quarterly 1996; 74:309-16.

56. U.S. Department of Health & Human Services. Adult immunization action plan: report of the workgroup on adult immunization. Atlanta: CDC, 1997 [online]. Available from: http://www.cdc.gov/od/ nvpo/adult.htm. Accessed May 21, 1999.

57. Centers for Disease Control and Prevention. Vaccine-preventable diseases: improving vaccination coverage in children, adolescents, and adults. A report on recommendations of the Task Force on Community Preventive Services. MMWR 1999; 48 (No. RR-8):1-15.

58. Jones J. Project with the Congress of National Black Churches. Flu Pneus: 1998 Influenza/Pneumococcal Campaign Vol 98-3:12. Health Care Financing Administration.

april supplement-with cover.qxd 5/20/2003 12:19 AM Page 51

PROMOTING PREVENTION OF VIRAL HEPATITIS IN THE AFRICAN AMERICAN COMMUNITY

Viral Hepatitis Consensus Panel

EXECUTIVE SUMMARY

Issue

Although viral hepatitis (A, B, and C) disproportionately affects the African American community, African Americans routinely underutilize immunization, screening, and treatment services. Particularly at issue is the dearth in services to African American youth who often have multiple risk factors for contracting viral hepatitis. Immunizations have been primarily deemed a preventive tool for children; this misconception has lead to increased vulnerability among black adolescents and adults for these preventable and treatable diseases. The NMA believes that too few African Americans are aware of their susceptibility to the hepatitis A, B, and C viruses (HAV, HBV, and HCV). In addition, their underutilization and limited access to the vaccine for HAV and HBV, coupled with the often early onset of behaviors that increase a person's risk of contracting viral hepatitis exemplify the need to promote prevention in the African American community.

Objective

To examine the prevalence of viral hepatitis among African American youth and adults, to identify the social, cultural, and structural barriers to immunization and screening services among African Americans, and to recommend relevant policy changes to close the gap in prevention, immunization, and treatment services rendered to the African American community.

Consensus Process

A literature review that examined contemporary knowledge of viral hepatitis, including issues of prevalence among African Americans, was conducted. A draft paper was submitted to the hepatitis consensus panel to review and expand upon when it convened in June, 2001. The consensus panel created a list of topics to elaborate on, including a broader focus of the three primary forms of viral hepatitis; keeping in accord with current NMA immunization recommendations; coinfection with Human Immunodeficiency Virus (HIV)/Acquired Immune Deficiency Syndrome (AIDS), chronic liver diseases, sexually transmitted disease, educational and disease prevention programs.

I. INTRODUCTION

The National Medical Association (NMA) is the oldest and largest national organization representing African American physicians and health professionals in the United States and the Caribbean. Established in 1895, the NMA is the collective voice of more than 25,000 African American physicians and the patients they serve. Since its inception, the NMA has been committed to improving the health status and outcomes of minority and disadvantaged people. Throughout its history, the National Medical Association has focused primarily on health issues related to African Americans and medically underserved populations, however, its principles, goals, initiatives, and philosophy encompass all sectors of the

© 2002. Originally published in "Promoting Prevention of Viral Hepatitis in the African American Community: Consensus Report of the National Medical Association" as part of the National Medical Association's National Colloquium on African American Health. Request for reprints should be addressed to the National Medical Association, 1012 Tenth Street NW, Washington, DC 20001.

population.

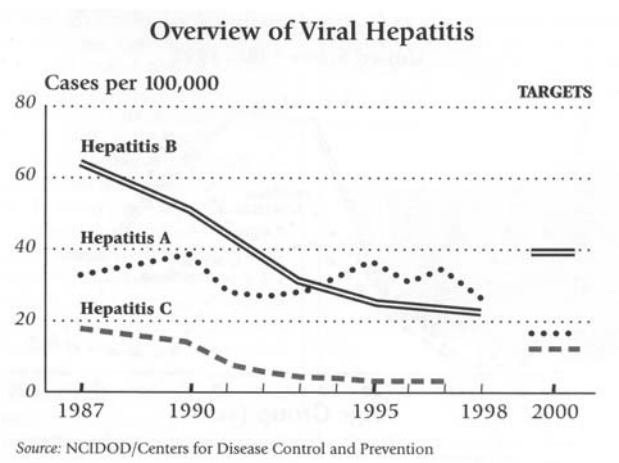
At its inception, the National Medical Association's objective was:

"Conceived in no spirit of racial animosity, fostering no ethnic antagonisms, but born of the exigencies of the American environment, the National Medical Association has for its purpose, the bonding together of men and women of African descent, for the mutual cooperation and helpfulness, who are legally and honorably engaged in the cognate practice of medicine and surgery."

More than 100 years later, the National Medical Association has become firmly established in a leadership role in medicine, and serves as a catalyst for the elimination of disparities in health and the leading force for parity in medicine and health care for all Americans.

Immunizations have been primarily viewed as a preventive medicine tool for children; this misconception has lead to underutilization among African American adolescents and adults. The NMA believes that too few African American youths through adults are aware of their susceptibility to the hepatitis A, B, and C viruses (HAV, HBV, and HCV). In addition, their underutilization and limited access to the vaccines for HAV and HBV, coupled with the often early onset of behaviors that increase a person's risk of contraction of viral hepatitis exemplifies the need to promote prevention in the African American community.

Although there are many factors associated with the spread of the most common forms of viral hepatitis, hepatitis A, B and C, no single contributing risk factor accounts for the spread of hepatitis in the African American community.



This paper reviews contemporary issues about viral hepatitis A, B, and C, current hepatitis immunization strategies, improving adolescent and adult protection from viral hepatitis, and eliminating disparities in hepatitis in the African American community. In addition, recommendations from education to research are presented as proactive steps to overcome these disparities.

Adolescence and young adulthood are times of experimentation. They are stages of life often marked by surges in risky behavior, such as illegal drug use, unprotected sex with multiple partners, and other unsafe practices that heighten a youth's chances of contracting infections and lifelong illnesses, including hepatitis A, B, and C.

II. OVERVIEW OF HEPATITIS A, B AND C

A person is not inherently immune from contracting viral hepatitis infection. Viral hepatitis affects people of all ages, sexual orientation and ethnicities. However, certain risk factors and certain socioeconomic factors do make some people more susceptible to be exposed to hepatitis A, B, and C.

Hepatitis A

Although hepatitis A (HAV) reached its highest incidence rate in 1971 at 28.9 cases per 100,000 people, it has gained attention as an important public health issue in many regions of the world, including the United States, where it accounts for an estimated 50 percent of the reported cases of acute viral hepatitis. HAV is primarily spread by the fecal-oral route. This occurs most commonly by person to person transmission in households and extended family settings and during sexual contact. Transmission of HAV also occurs in child-care centers, among men who have sex with men and among illicit drug users. Fecal contamination of food or water, international travelers to areas

april supplement-with cover.qxd 5/20/2003 12:19 AM Page 53

where sanitation is poor and HAV is highly endemic are at increased risk for contracting the disease. An estimated half of the cases of this disease has no recognized risk factors. Hepatitis A is a preventable disease through a widely available and effective vaccine.

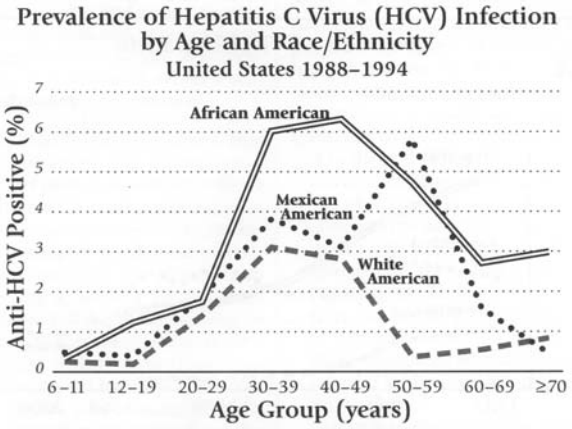
Sanitation improvements have successfully reduced the number of reported hepatitis cases in the United States, having dropped to 4.1 per 100,000 people by 2000. An unfortunate side effect of this success is that while relatively fewer children are infected, more adolescents and young adults are susceptible to infection and more severe disease. Hepatitis A virus infection in older individuals causes much greater morbidity than in children.

Hepatitis B

Worldwide, more than 350 million people are chronically infected with HBV. Hepatitis B is most common in sub-Saharan Africa, Asia, the Mediterranean, and parts of South America. Bloodborne and sexually transmitted, the disease is commonly spread almost unrestricted from infected mother to infant and through household contact in these regions.

In the United States, the incidence of hepatitis B has declined by more than 70 percent. By 2000, the CDC has reported 90 percent of 19-36 month old children have been fully immunized with three doses of hepatitis B vaccine. Although decreases in cases of hepatitis B have been observed in most high-risk groups, HBV transmission and the morbidity associated with acute hepatitis B continues to occur among older adolescents and young adults. HBV infections continued to rise up to a 37 percent increase in 1995--primarily among adolescent and college-age youth. Most of these infections result from sexual transmission and at least 50 percent could have been prevented if hepatitis B vaccine was given as recommended. The vaccine is rarely offered in settings that provide healthcare to older adolescents or adults.

Hepatitis C



Source: Third National Health and Nutrition Examination Survey, Centers for Disease Control and Prevention

Unlike hepatitis A and hepatitis B, there is no vaccine to prevent hepatitis C infection; therefore, prevention efforts must rely heavily on behavioral modification. As the nation's most chronic bloodborne infection, chronic hepatitis C infection is estimated to affect an estimated 3 million Americans. According to the Centers for Disease Control and Prevention (CDC), 70 percent of those infected will develop long-term liver disease.

In congressional testimony, former Surgeon General C. Everett Koop, M.D., called hepatitis C, "a disease these millions will carry for a decade or more--possibly spreading to others--while it develops into a serious threat to their health." Hepatitis C is spread primarily through contact with infected blood and can cause cirrhosis, liver cancer, or liver failure. Hepatitis C is the major reason for liver transplants in the United States, accounting for 1,000 procedures annually. This disease is also responsible for 8,000-10,000 deaths yearly.

Further exacerbating the problem in the United States is the variance of viral hepatitis rates by race. For example, the prevalence of HBV infection among African American adolescents is three to four times greater than among Whites, according to the CDC. In addition, more African Americans tend to contract the chronic form of hepatitis C, which can lead to cirrhosis or liver cancer. Further, African American and other minority populations may be less likely to have access to routine medical care, making their expe-

rience a near-crisis situation that deserves far more attention than has been given to date.

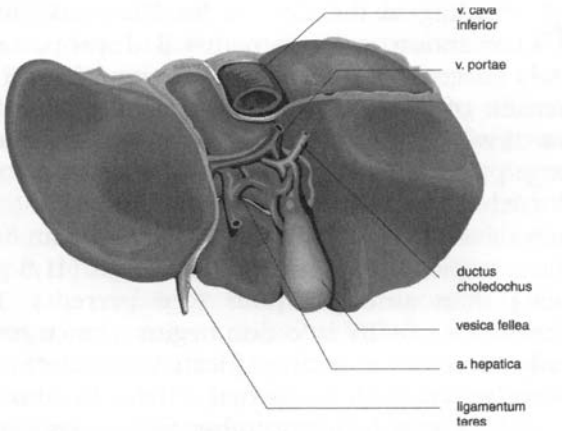
Currently, immunization programs for hepatitis A and hepatitis B heavily emphasize infant vaccination, which offers an ideal method of controlling these diseases both logistically and financially. However, ignoring the high rates of infection among teenagers, college-age students, and unimmunized adults, and in particular, failing to comprehensively address the more serious problem among African Americans is a missed opportunity to accelerate the eradication of viral hepatitis in the United States. Furthermore, in the case of hepatitis C, failing to heighten awareness of those at increased risk to the virus, and education in prevention through behavior modification, represent additional deficits in adequately addressing viral hepatitis.

As a catalyst for eliminating this disparity among African Americans, the National Medical Association is recommending several steps to create a comprehensive adolescent/adult vaccination infrastructure, one that makes prevention and treatment among minority, high-risk populations a priority in the elimination of viral hepatitis.

Hepatitis and the Liver

The liver is the largest organ of the body and performs the greatest number of functions to assist the body in performing properly. The liver acts as a filter and purifies the blood, converts food to energy, produces proteins, detoxifies and excretes substances that would be poisonous to the body. Development of the liver continues up to the age of one year, when it reaches the ability to function at an adult level.

When a hepatitis virus enters the blood stream it passes through to the liver and its cells are damaged. Hepatitis, identified by inflammation of the liver, can ultimately lead to liver damage, cirrhosis or liver cancer. Exposure to drugs and hepatitis viruses causes liver cells to die and be replaced with scar tissue identified as cirrhosis. An estimated 20 percent of untreated persons with chronic



hepatitis C develop cirrhosis over a period of time. Liver transplantation is the accepted form of therapy when chronic hepatitis becomes life threatening, usually because of complications from cirrhosis.

Although there are many types of liver diseases, viral hepatitis, cirrhosis, and liver cancer are among the most significant. Symptoms of liver disease include:

- Jaundice, or an abnormal discoloration (or yellowing) of the skin and eyes;
- Nausea, vomiting and/or a decrease in appetite;
- Abdominal pain and swelling;
- Bloody, gray or yellow stools;
- Fatigue; and
- Loss of sexual drive and/or performance.

Avoiding risk factors associated with contracting hepatitis is also a means of keeping the liver well and functioning properly.

III. HEPATITIS RACIAL AND ETHNIC DISPARITIES

According to the Centers for Disease Control, acute hepatitis B disproportionately affects African Americans, accounting for 65 percent of all cases of acute viral hepatitis compared with 22 percent among Whites. Data from a large population-based seroprevalence study conducted during 1988 to 1994 confirms that the prevalence of HBV infection is more than four times higher among

African Americans (11.9 percent) than among Whites (2.6 percent). Furthermore, the prevalence of HBV infection begins to increase in early adolescence among African Americans possibly related to high-risk sexual activity. In addition to risky sexual behavior, other factors associated with infection include illicit drug use, foreign birth and low education levels.

An estimated three million African Americans belong to labor unions and work in high-risk occupations that may increase exposure to the hepatitis viruses. African Americans frequently are employed as nurses, home health aids, and food service workers. These occupations can offer increased risk for exposure to blood, tainted food, water and feces.

The National Center for Health Statistics' National Health and Nutrition Examination Survey examined the blood of 2,591 people age six months to 74 years to determine the presence of serologic markers for HBV infection. Among White participants, a prevalence of 3.2 percent was determined among African Americans, 13.7 percent. Other research has shown a link between hepatitis B infection and a prior syphilis infection. In general, African American prevalence rates are three to fourfold greater than among Whites.

HCV infection affects people of all ages and races, but the highest incidence of acute hepatitis C is found among persons 20-39 years, with males slightly predominant. African Americans and Whites have similar incidence of acute disease; persons of Hispanic ethnicity have slightly higher rates. However, unlike the racial pattern of acute disease, African Americans have a substantially higher prevalence of HCV infection than do Whites.

As recently reported by the National Institute on Drug Abuse (NIDA), the impact of viral hepatitis on the African American community is devastating. The confluence of HIV/ AIDS, drug abuse, and hepatitis C has become a public health nightmare, and the proportion of persons infected with either or both of these diseases in minority communities, where the poorest and most vulnerable are at risk through intravenous drug use. Poverty is an insidious barrier that prevents African Americans more access to quality health care, which could boost immunization rates for Hepatitis A and B. All too often, African Americans find themselves attempting to navigate an inflexible system that rarely considers their cultural, ethnic, and social differences. Even more disturbing is the high rate of African American youths and adults in isolated locations (such as correctional settings and drug treatment centers). These people often go unimmunized, although they present several risk factors. HCV prevalence among prison inmates is three to five times greater than in the general population, according to the CDC. These and other missed opportunities must be recognized and seized before the disease can be eliminated in the United States.

African Americans account for 99 percent of those affected with Sickle Cell Anemia, a condition often requiring blood transfusions, a therapeutic regimen for those suffering from Sickle Cell Anemia. Persons who received a blood transfusion prior to 1992 may be at increased risk of HCV infection.

Although there has been a fourfold decline in new cases of hepatitis C in the United States since 1989, identified cases of chronic HCV infection are rising, particularly in African Americans. Based upon a national seroprevalence survey conducted during 1988 to 1994 the highest observed prevalence of HCV infection among all racial and ethnic groups was among African American men 40 to 49 years of age. This group had a prevalence of 9 percent, according to the CDC. Researchers also report that similar to HBV, prevalence of HCV infection increases at an earlier age in African Americans and, as a result, African Americans are infected longer than other racial groups.

These general findings help crystallize some of the suspicions about racial differences of this disease. However, prospective studies that focus on complications, natural history, therapy and prevention involving African Americans and hepatitis C

are still needed to confirm or disprove these questions. Additionally, treatment of viral hepatitis also remains a problem. Access to therapy is even more difficult for minority populations, and targeted research may alleviate this disparity.

What is known at this point is sobering. According to the CDC, the mortality associated with HCV is expected to triple in the next ten years in all racial groups. Studies show that African Americans not only have the highest rates of chronic Hepatitis C, but also a higher mortality rate from liver disease than Whites. Once infected with HCV, the chance of chronicity is greater in African-Americans (86 percent) than in Whites (68 percent).

New data from the American Association for the Study of Liver Diseases suggests that African Americans have strikingly lower response rates to treatment with interferon for chronic hepatitis C than other ethnic groups. This study included 380 White, 40 African American, 40 Hispanic, and 10 Asian patients with chronic hepatitis C than other ethnic groups. After 24 weeks of treatment with interferon, only 5 percent of African Americans had undetectable levels of HCV RNA, compared with 33 percent of Whites, 28 percent of Hispanics, and 40 percent of Asians.

Research suggests African Americans are more likely to be infected with genotype1b. The Patients Network, Inc., has stated that chronic hepatitis C patients' response rates to treatment with interferon are predicated by viral genotype and baseline virus levels. It was further stated that HCV patients with a genotype of 2 or 3 respond better than patients with genotype 1. No concrete explanation exists for the difference but further studies may be able to confirm the findings and indicate the need for more aggressive combination therapy for African Americans.

Dr. F. Blaine Hollinger, Professor of Medicine, Virology and Epidemiology at Baylor College of Medicine, considers race an important factor to consider. African Americans have more resistant HCV than Whites. Future clinical trials using interferon and ribavirin may assist in determining whether combination therapy is more effective for African Americans. Additionally, research is needed to determine all factors that lead to this disparity in response rates.

The high prevalence of viral hepatitis, poor vaccination coverage, and difficulty treating disease among African Americans is illustrative of the greater disparities in overall health between African Americans and other minorities versus Whites. The strides made in improving African American health outcomes throughout American history have been continuously eroding in the past few decades. Health policies and programs that once enhanced access for the most vulnerable populations have run their course in terms of popularity. In addition, events have conspired to further hinder necessary improvements in African American health, including reductions in coverage due to welfare reform, lack of medical insurance by the working poor, underemployment among African Americans, and the growing penetration of managed care that often hinders access.

Fewer African Americans are attending medical schools. Because statistics show that African American physicians are five times more likely to treat African American patients, and four times more likely to treat poor and underserved populations, essential resources are being lost to African Americans who desperately need immunizations and treatment services.

Even more exemplary of the lack of adequate coverage for vaccination among African American youth and adults, is that even among those who visit doctors' offices, too many do not receive needed vaccinations, often because the provider fails to advise patients' of their risk, or simply the availability of the vaccines.

From a public health perspective, the gold standard of health status and outcomes are measures of longevity, mortality, and infant mortality. Evidence of inequalities in these measures among African Americans, from viral hepatitis to many other fronts in health, is longstanding. Study after study shows that African American mortality rates have yet to come close to those of Whites. This

pattern of racial divergence has important implications for the future of the nation's health care policy agenda and resource allocations.

Historically, national policy and funding have traditionally followed the concerns of the majority population, rather than the public health problems of the underserved and disenfranchised. As our awareness of health status inequities grows--well illustrated by the varying rates of viral hepatitis infections and the seriousness of the disease among African Americans--these inequities must find their way into mainstream institutions. Policy and spending must shift toward parity in health to eliminate hepatitis disparities.

Viral Hepatitis Consensus Panel

- **Rodney Hood, M.D. (Chair)**
  President, National Medical Association, La Mesa, California
- **Vladimir Berthaud, M.D., MPH, FACP**
  Director, Division of Infectious Disease, Meharry Medical College, Nashville, Tennessee
- **Dennis A. Brooks, M.D., MPH, MBA**
  Assistant Professor Pediatrics, Johns Hopkins University, Baltimore, Maryland
- **L. Natalie Carroll, M.D.**
  Chair, Board of Trustee, National Medical Association, Houston, Texas
- **Jay Cowan, M.D. (Secondary Reviewer)**
  President, NMA Manhattan Central Medical Society, New York, New York
- **Warren B. Dailey, M.D.**
  Family Practitioner, Private Practice, Houston, Texas
- **Samuel Daniel, M.D. (Secondary Reviewer)**
  North General Hospital, New York, New York
- **Beverly M. Gaines, M.D.**
  Pediatric Section Chair, National Medical Association, Louisville, Kentucky
- **Rachel Johnson**
  President, Student National Medical Association, Washington, DC
- **John S. Moran, M.D., MPH, (Secondary Reviewer)**
  Medical Epidemiologist , Epidemiology and Surveillance Division, Centers for Disease Control & Prevention, Atlanta, Georgia
- **Thelma King Thiel**
  President and Chairperson, Hepatitis Foundation International, Cedar Grove, New Jersey
- **Chaka Burgess (Staff)**
  National Medical Association, Washington, DC
- **Cheryl Dukes (Staff)**
  Immunization Program Coordinator, National Medical Association, Washington, DC
- **Ivonné P. Fuller, NRPP, MPA (Staff)**
  Director, Health Disparities, National Medical Association, Washington, DC

REFERENCES

1. AAMC, 2000. Minority Graduates of U.S. Medical Schools; Trends, 1950-1998. Washington, DC, Author.

2. American Academy of Pediatrics, Committee on Infectious Diseases. "Immunization of adolescents: Recommendations of the advisory committee on immunization practices, the American Academy of Pediatrics, the American Academy of Family Physicians, the American Medical Association (RE9711)." Pediatrics. 1997, 99:479-488.

3. Bartman, B.A., Moy, E., and D'Angelo, L.J., 1997, "Access to ambulatory care for adolescents: The role of a usual source of care." Health Care Poor and Underserved, 8:214-226.

4. Berge, J.J., Drennan, D.P., Jacobs, R.J., Jakins, A., Meyerhoff, A.S., Stubblefield, W., and Weinberg, M. "The cost of hepatitis A infections in American adolescents and adults in 1997. CDC. Update: Recommendations to prevent hepatitis B virus transmission." MMWR. 1995;44:574-575.

5. Block, S.H. 1996. "Managed care: Minorities and the poor." Medicine and Health, Rhode Island 79:266-268.

6. Bonnyman Jr., G.G, 1999. "Muddled care, managed care. Health Affairs (Millwood)18:264-265. Review of Andrulis, D.P., and Carrier, B. "Managed care in the inner city: The uncertain promise for providers, plans, and communities."

7. Byrd, W.M., 1990. Race, biology, and health care: Reassessing a relationship." Health Care Poor and Underserved 1:278-292.

8. Byrd, W.M. and Clayton, L.A. 1992. "An American health dilemma: A history of blacks in the health system." J Natl Med Assoc 84:189-200.

9. CDC, Epidemiology and Prevention of Vaccine-Preventable Diseases. 5th ed. January 1999;210-245.

10. CDC. Hepatitis Surveillance. Report No. 56. April 1996.

11. CDC. "Hepatitis B vaccination of adolescents--California, Louisiana, and Oregon, 1992-1994." MMWR. 1994;43:605-609.

12. CDC. "General recommendations on immunization: Recommendations of the Advisory Committee on Immunization Practices." MMWR. 1994;43.

13. CDC. "Undervaccination for hepatitis B among young men who have sex with men-San Francisco and Berkeley, California, 1992-93." MMWR. 1996;45:215-217.

14. Chang M-H., Chen C-J., Lai M-S., et al, "Reduce the risk of primary liver cancer by preventing chronic hepatitis B infection." N Engl J Med. 1997; 336(26),1855-1859.

15. Coleman, P.J., McQuillan G.M., Moyer, Lambert, S.B., Margolis, H.S. "Incidence of hepatitis B virus in the United States, 1976-1994: Estimates from the National Health and Nutrition Surveys." Journal of Infectious

Diseases. 1998;178:954-9.

16. Curtis, Leslie. NDDK Workshop Examines hepatitis C in African Americans. Washington, DC: National Institutes of Health, 2000.

17. Di Bisceglie, A., Hepatology, 1997;26(Suppl 1);34S-38S.

18. Dimsdale, J.E. 2000. "Stalked by the past: The influence of ethnicity on health." Psychosom Med 62:161-170.

19. ETR Associates. A Review of Adolescent School-Based Hepatitis B Vaccination Projects. Atlanta: Centers for Disease Control.

20. Gemson, D.H. Elinson, J., Messeri, P. "Differences in physician prevention practice patterns for white and minority patients." Journal of Community Health, 1988;13:53-64.

21. Hadler, S.C., Francis, D.P., et al. "Long-term immunogenicity and efficacy of hepatitis B vaccine homosexual men. N Engl J Med. 1986;315:209-14.

22. Hepatitis Central: Issued by Patients Network, Inc., Hepatitis C Therapy Should be Individually Tailored: Starting Virus Levels, Genotype Predict Response to Interferon Treatment, Philadelphia, May 8, 2000, PRNewswire.

23. Keefe, E.B., "Vaccination against hepatitis A and B in chronic liver disease." Viral Hepatitis. 1999; 5:77-88.

24. Kollar, L.M., Rosenthal, S.L., Biro, F.M., "Hepatitis B vaccine series compliance in adolescents." J Ped Infectious Disease. 1994;13:1006-1008.

25. Komaromy, M., Grumbach, K., and Drake, M., "The role of Black and Hispanic physicians in providing health care for underserved populations." N Engl J Med 1996; 334:1305-1314.

26. Krieger, N. "Analyzing socioeconomic and racial/ethnic patterns in health and health care." Am J Public Health 1993;83:1086-1087.

27. Lancman, H., Pastore, D. R., Steed, N., et al. "Adolescent hepatitis B vaccination." Archives of Pediatrics & Adolescent Medicine Online 2000;154. Available at http://archpedi.ama-assn.org.

28. Lawrence, M.H., Goldstein, M.A. "Hepatitis B immunization in adolescents." Journal of Adolescent Health 1995;17:234-243.

29. Lee M-S., Kim D-H., Kim H., et al, Int J Epidemiol 1998;27;316-319.

30. Leiyu, S. "Experience of primary care by racial and ethnic groups in the United States." Med Care 1999;37:1068-1077.

31. Livingston, I.L., ed. Handbook of Black American Health: The Mosaic of Conditions, Issues, Policies, and Prospects. Westport, Connecticut: Greenwood Press, 1994.

32. Mahoney, F.J., Kane, M. "Hepatitis B Vaccines." Plotkin, S.A., Orenstein, W.A., eds., Vaccines, 3rd ed. Philadelphia: W.B. Saunders Company, 1999: 156-182.

33. Mahoney, F.J., Stewart, K., Hu, H., Coleman, P., Alter, M.J., "Progress toward the elimination of hepatitis B virus transmission among health care workers in the United States." Archives of Internal Medicine. 1997;157:2601-2605.

34. Malone, T.E., and Johnson, K.W. Report of the Secretary's Force on Black and Minority Health. Washington, DC: U.S. Department of Health and Human Services, 1986.

35. Moore, R.D., Stanton, D., Gopalan, R., and Chaisson, R.E. "Racial differences in the use of drug therapy for HIV disease in an urban community." N Engl J Med 1994;330:763-768.

36. Lee, M-S, Kim, D-H, Kim, H., Lee, H.S., Kim, C-Y., Park, T.S., Yoo, K-Y., Park, B-J., and Ahn,Y-O., "Hepatitis B vaccination and reduced risk of primary liver cancer among male adults: a cohort study in Korea." Original article published by Oxford University Press.

37. Moy, E., Bartman, B.A., "Physician race and care of minority and medically indigent patients." Journal of the American Medical Association, 1995;273: 1515-1520.

38. National Center for Health Statistics. Health, United States, 1998, with Socioeconomic and Health Chartbook. U.S. Department of Health and Human Services, Hyattsville, Maryland, 1998: 212.

39. National Medical Association. Racism in Medicine and Health Parity for African Americans: "The Slave Health Deficit." Washington, DC: Author. 2001:16,18.

40. National Medical Association. Adult Immunizations: Increasing Immunization Rates Among African-American Adults. Washington, DC: Author. 2000;9:19-20.

41. Society for Adolescent Medicine. Position Statement on Hepatitis B Immunization. Available online http://www.adolescenthealth. org/html/publications.html.

42. Society for Adolescent Medicine. "A position paper on school-based health clinics." Journal of Adolescent Health Care. 1988;9:526-530.

43. Staat, M.A., MD, MPH, Tang, Y-L., Fresia, A.E., Halsey, N., MD, Kacergis, J., and Zenilman, J., MD, Susceptibility to Vaccine-Preventable Disease Clinic Population, Johns-Hopkins University School of Medicine, Baltimore City Health Department.

44. U.S. Department of Health and Human Services. The Initiative to Eliminate Racial and Ethnic Disparities in Health. Available online at http://raceandhealth.hhs.gov.

45. Voekler, R., "Ethnicity and hepatitis C." Journal of the American Medical Association. 1998;280(24): 2067.

46. Willner, I.R., MD, Uhl, M.D., MD, Howard, S.C., MD, Williams, E.Q., MD, Riely, C.A., MD, Waters, B., MD, "Serious hepatitis A: An analysis of patients hospitalized during an urban epidemic in the United States." Annals of Internal Medicine, Jan. 1998.

ACKNOWLEDGEMENTS

We acknowledge with thanks and appreciation to the contributing authors who made possible the Immunization Supplement: Randell Maxey, MD, PhD; Jeanette M. Trauth, PhD; Richard K. Zimmerman, MD, MPH; Donald Musa, MA; Hugh Mainzer, MS, DVM; Jean F. Nutini, MA; Sonja S. Hutchins, MD, MPH; Jessie Sherrod, MD, MPH; Roger Bernier, MPH, PhD; J. James Cotter, PhD; J.D. Bramble, PhD; Viktor E. Bovbjer, PhD; Carol B. Pugh, PharmD; Donna K. McClish, PhD; Gary Tipton, MD; Wally R. Smith, MD; Vincent Idemyor PharmD; Scott D. Rhodes, PhD; Leland J. Yee, MPH; Kenneth C. Hergenrather, PhD, MRC, MSEd; Panel Members from the Adult Immunization Consensus; and Panel Members from Viral Hepatitis Consensus. Principal Investigator Dennis Brooks, MD; Ivonné Fuller, Director, Grants Management, Research, and Professional Affairs; and Project Director, Cheryl Dukes, also offered invaluable assistance to the NMA's Immunization - A Family Affair programs.

This publication is based upon work supported by the Centers for Disease Control and Prevention (CDC). Any opinions, findings, conclusions or recommendations expressed in this publication are those of the authors and do not necessarily reflect the views of the CDC.

The NMA thanks the CDC for its continued funding of our Cooperative Agreement for physician immunization education.

Additional support of this supplement was made possible in part by an educational grant from Aventis-Pasteur.