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ADEQUACY OF IMMUNIZATION FOR CHILDREN BY AGE TWO YEARS

presented by

Kathleen D. Ambrose

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of the requirements for

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Rachel F. Schuffman
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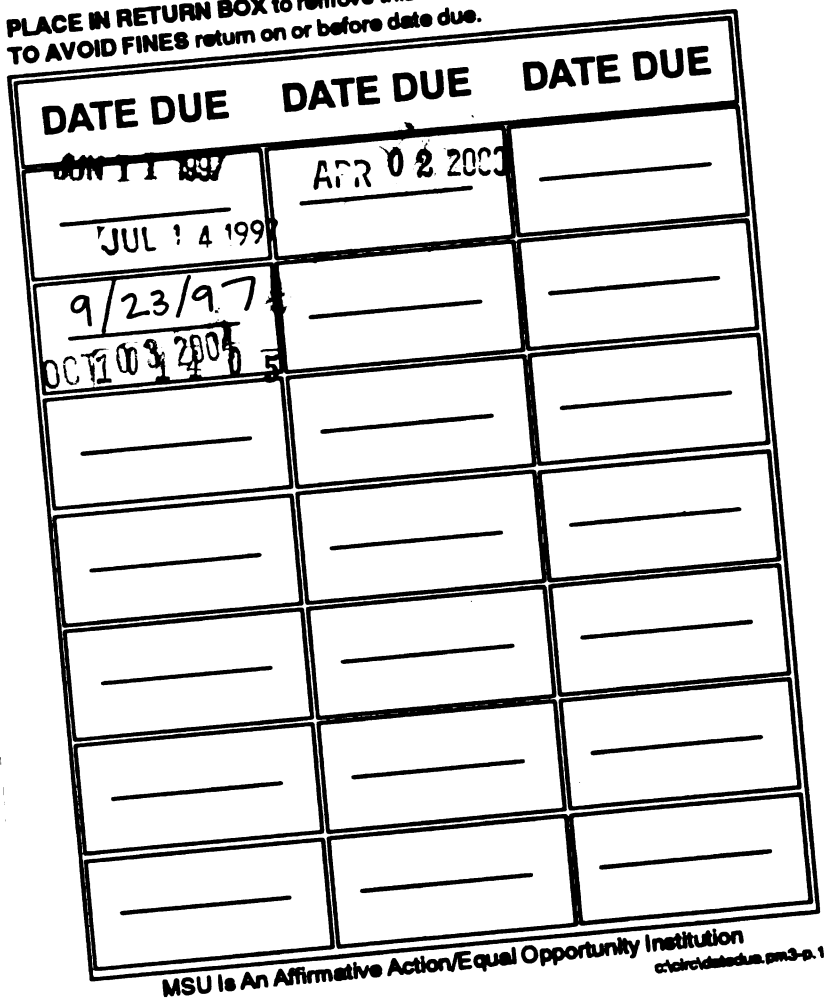

ADEQUACY OF IMMUNIZATION FOR CHILDREN BY AGE TWO YEARS

By

Kathleen D. Ambrose

A THESIS

Submitted to
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ABSTRACT

ADEQUACY OF IMMUNIZATION FOR CHILDREN BY AGE TWO YEARS

By

Kathleen D. Ambrose

This study explored the level of adequacy of immunizations for children two years of age. The Starfield model was adapted to evaluate levels of adequacy using a non-probability, convenience sample (N=94) of records of two year old children who received their immunizations through a public health care facility between December, 1990 and June, 1992. This study found that there remain unacceptably low levels of immunizations with only 65% starting on time, no one receiving all immunizations as recommended by the American Academy of Pediatrics, and only 45% receiving all immunizations by age two years.

To my family for all their sacrifices and help in reaching my dream

ACKNOWLEDGEMENTS

I would like to thank my mentor and chairperson, Rachel Schiffman, for all the years of help, understanding, encouragement, and occasionally prodding to complete this thesis. I would also like to thank my other committee members, Barbara Given and Patty Peek for their ongoing support and feedback, and for the time they devoted to reviewing the many versions of this thesis.

I would also like to acknowledge Chiung-Ying Cheng, without whom I would still be writing the analysis program.

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INTRODUCTION

Despite the vast amount of data on behaviors which will benefit their health, Americans continue to engage in behaviors destructive to their health. These behaviors include smoking, drug abuse, alcohol abuse, the overuse of fats and salts, and minimal participation in illness prevention health care measures.

The fact that people do not engage in health behaviors as recommended has been discussed frequently and documented consistently (Becker, 1974; Becker & Maiman, 1975; Eraker, Kirscht, & Becker, 1984; Kaplan & Simon, 1990; Montano, 1986; Sackett & Snow, 1979). A common element among these authors is that adequacy of health care is directly influenced by adherence to a recommended health practice and ultimately involves the client's willingness and ability to be an active participant in his or her own health care.

To be maximally effective, disease prevention and health promotion behaviors should start early in life. Sixteen years ago in Healthy People: The Surgeon General's Report on Health Promotion and Disease Prevention (U.S. Department of Health, Education and Welfare (DHEW), 1979), disease prevention was established as a primary strategy for improving the health of U.S. citizens. Disease prevention continues to be a goal for all health care providers and is one of the central goals of the Clinical Nurse Specialist in the primary health care setting. One of the earliest and

most effective illness prevention health care measures is the immunization of children.

Since the late 1980's and early 1990's, there is evidence of a decrease in obtaining immunizations for children (Cutts, Zell, Mason, Bernier, Dini, & Orenstein, 1992; Schlenker, Bain, Baughman, & Hadler, 1992). Outbreaks of measles involving predominantly unvaccinated, preschool-age children contributed to almost half of all cases recorded during the nationwide upsurge in measles between 1989 and 1990 (Centers for Disease Control (CDC), 1990a, 1990b). Extensive outbreaks of measles and pertussis continued to be reported through 1993 and 1994 (CDC, 1993a, 1993b, 1993c, 1994).

More than a decade ago the decline in appropriate immunizations was noted (Wehrle & Wilkins, 1981) and only recently has a focused effort begun to improve the United States immunization record. In the last five years, health care organizations have refocused their efforts and resources to immunizing children. The year 1990 saw the establishment of the Public Health Service's Interagency Committee to Improve Access to Immunization Services (ICI). In June of 1991, then President Bush, and Secretary of Health and Human Services, Louis Sullivan, M.D., announced efforts to improve immunization of preschoolers (Meehan, 1991). In response to this commitment at the Executive level, the ICI developed a coordinated plan to improve access to immunization services. Fourteen goals were

established with 120 action steps for improving immunization services nationwide. Their main focus was threefold: 1) increasing coordination among Federal health, income, housing, education, and nutrition programs; 2) reduction of policy and management barriers that limit access to delivery systems; and 3) strengthening the delivery infrastructure (ICI, 1992).

June of 1992 saw the Aetna Foundation and Merck Vaccine Division commit $75,000 to a campaign to reach children in rural areas (Meehan, 1992). In February of 1993, President Clinton spoke to parents and health care providers at an immunization clinic in Alexandria, Virginia. He asserted that the system which does not provide for guaranteed childhood immunizations nor has a mechanism for distributing and tracking immunizations for children is unacceptable in the United States (Robinson, Sepe, & Lin, 1993). President Clinton earmarked immunizations as an essential benefit in his National Health Care program. The President's budget for fiscal year 1993 included a 24.5 million increase for the continued ICI program implementation (Robinson et al., 1993).

As recently as October, 1994 the U.S. Department of Health and Human Services implemented the Vaccines for Children (VFC) program, to provide free vaccine to children at participating private and public health-care provider sites. Those children who are eligible include those on Medicaid, those without insurance, those whose insurance

does not cover vaccinations, and American Indians/Alaskan Natives (Morbidity and Mortality Weekly Report (MMWR), 1994b).

Preschool children under two years of age remain the group at highest risk for morbidity and mortality, if not immunized as recommended (Ad Hoc Working Group for the Development of Standards for Pediatric Immunization Practices, 1993; CDC, 1991b, 1991c; Janghorbani, Parizi, & Ghorbani, 1993). Schlenker and Fessler (1990) concluded that there is a clear continued risk of morbidity and mortality for the very young who have not received adequate immunizations. This group experiences the highest morbidity and mortality rates if vaccine preventable childhood diseases are contracted (CDC, 1991b, 1991c; Cochi, Broome, & Hightower, 1985; Cochi & Ward, 1991).

The American Academy of Pediatrics (AAP) (1988) recommends immunizations begin at two months of age, with nearly 90% of immunizations received before 2 years of age. The United States has established the objective of immunizing 90% of children from infancy up to 24 months of age by the year 2000 (U.S. Public Health Service, 1990).

There is a substantial body of knowledge related to immunizations in the United states. Most of the research focuses on three prevalent themes: 1) factors related to differences in immunization acquisition; 2) development of safer vaccines, particularly for pertussis; and 3) risks versus benefits of immunizations in children. Very little

information is available on immunization patterns prior to school age.

Appropriate direction for health care resources may be identified through data collection and analysis of immunization patterns. This may be done through a retrospective analysis of the health records of a selected group of preschool-age children. By understanding these patterns the Clinical Nurse Specialist may devise methods to achieve more adequate immunizations of children and decrease morbidity and mortality from childhood illnesses for the very young.

Study Purpose and Research Questions

The purpose of this study was to investigate the adequacy of immunization of children by age two years. This study addressed the questions:

1. What percentage of children in a selected population obtain complete care, adequate care, inadequate care with respect to all immunizations by age two years as recommended by the AAP?
2. For each series of immunizations, what percentage of children received complete care, adequate care, and inadequate care?
3. What patterns of immunization are evident for those children receiving adequate or inadequate care with respect to initiation of immunizations and the spacing of those immunizations by age two years?

4. What are the differences by race in the percentage of complete, adequate, and inadequate care for all immunizations?

Definitive conclusions about how and to what extent the barriers affect immunizations cannot be made because of the study's limitations. However, based on existing literature on barriers to preventive care, lower percentages of complete and adequate care would be expected for immunization perceived as more dangerous, specifically the DPT series, and in non-white ethnic groups.

THEORETICAL FRAMEWORK

The Starfield Model

The variables used in this study were adapted from Starfield (1992). The Starfield Model was developed to explain the interaction of structure, process, and social and physical environment of the primary health care system and how this interaction relates to outcome of the clients' health status.

Starfield's (1974, 1991, 1992) model for evaluating primary care emphasizes measuring adequacy by analyzing structure and process elements which influence those desired outcomes. This model acknowledges that the reasons people do or do not follow medical advice is multifaceted and not just because a patient is "noncompliant".

The following describes the Starfield model. The main variables of the Starfield Model are structure, process, outcome, and social and physical environmental influences on

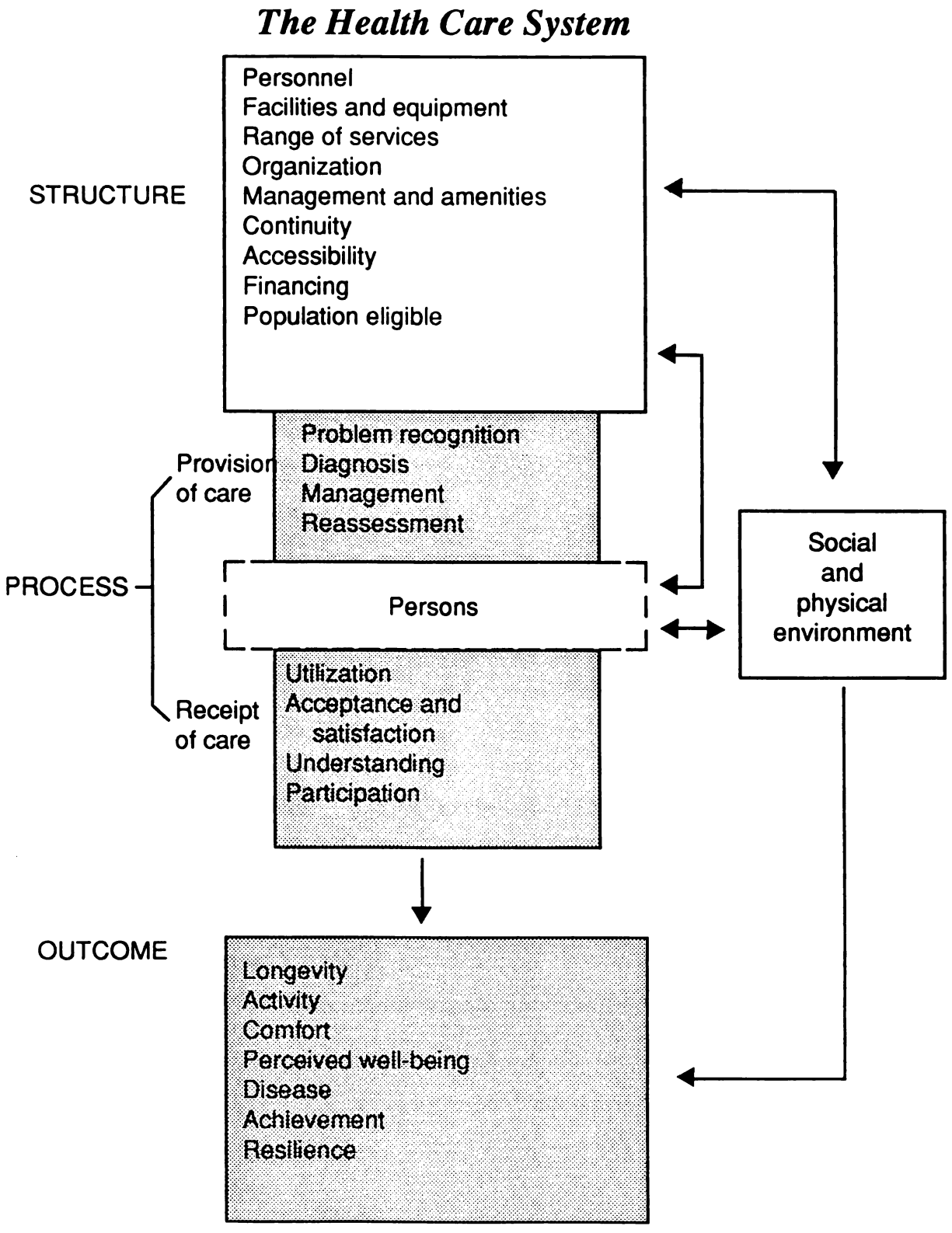
these variables (Figure 1). The dynamic interactions of the three variables and their sub-elements are operationalized by Starfield using the Donabedian (1966) components of structure, process and outcome. The health of individuals is determined by genetic structure heavily modified by social and physical environment, by behaviors that are culturally or socially determined, and by the nature of the health care provided. The interaction of these variables determines the whether the desired health status, or outcome, will be achieved.

In Starfield's model, nine sub-elements compose the structure variable. The sub-elements primarily refer to the health care structure. These components are: 1) personnel; 2) facilities and equipment; 3) range of services; 4) organization of services; 5) management and amenities, and governance of the health care system; 6) mechanisms for providing continuity of care; 7) mechanisms for providing access to care; 8) arrangements for financing; and 9) population eligibility.

Process is twofold. First, process is the provision of care by the provider (problem recognition, diagnosis, management, reassessment). Second, process requires the receipt of care by the patient (utilization, acceptance, satisfaction, understanding, participation).

Outcome is the sum of the patient health behaviors and health status, influence by the process, and social and physical environment in which the individual and the health

Figure 1. Starfield Model. A Basis for Evaluating Primary Care (Starfield, B., 1992).



care provider exist. Starfield conceptualized health status as the outcome, having the components longevity, activity, comfort, perceived well-being, disease, achievement, and resilience. All components are viewed longitudinally along a spectrum.

The social and physical environment defines the elements within the society, culture and environment which influence the structure, process and outcome. These elements include anything which may be a modifying factor, from superstitions and fears, to natural disasters, socioeconomic conditions to values and beliefs.

Conceptual Definitions of Study Model Variables

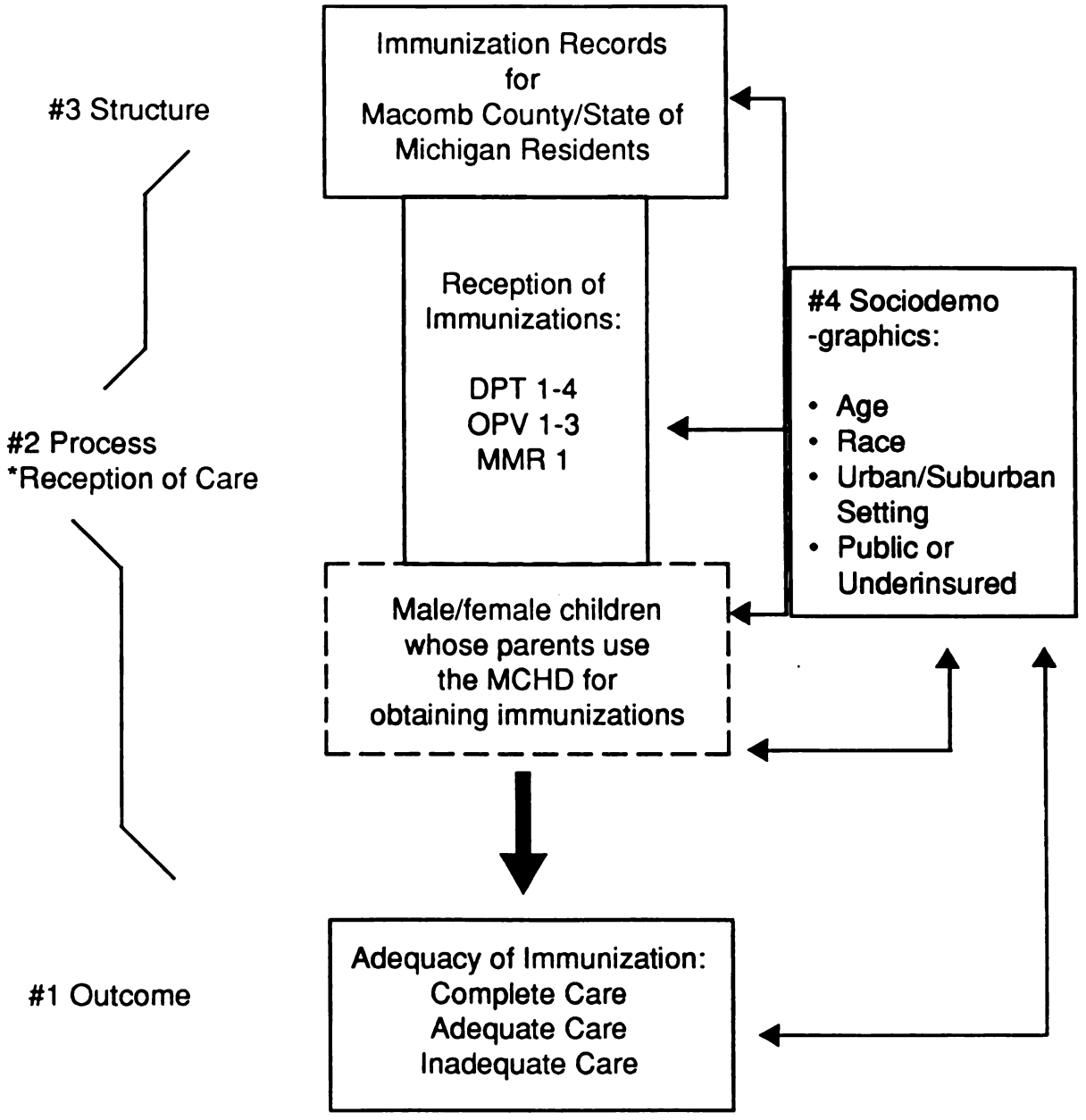
The primary variable of Starfield's model utilized in this investigation was outcome (1), as illustrated in Figure 2. Process (2), structure (3), and social and physical environment (4) were variables interacting with and affecting the outcome.

Outcome

As illustrated by the model in Figure 2, outcome (1) is defined as the measurable adequacy of immunization obtained for the sample: Complete care, Adequate care, and Inadequate care.

Adequate health care for children is a primary strategy for improving the health of U.S. citizens. Illness prevention health care measures are essential in emphasizing health promotion (Fontanarosa, 1994). Adequacy of health care for children involves engaging in activities which will

Figure 2. Adequacy of care through immunization for children age 2 years utilizing the public health system.



Adapted from Starfield Model: A Basis for Evaluating Primary Care. (Starfield, B. 1992).

result in positive health for the child. These activities include obtaining treatment when ill, routine evaluation of health status through well-child visits, establishing a comprehensive health supervision relationship among parents, child, and health care provider, and participation in the illness prevention health practice of immunizing children at an early age.

Health is a condition of wellness determined by the subjective view of the individual. Health is seen as something positive, something of value for the individual. Health is maintained and influenced by multifaceted factors including the individual actively seeking health care activities which keep or make that person well. Immunization of children is a health seeking behavior.

A series of immunizations is defined as the sequence and number of recommended vaccinations for an individual childhood disease. In the United States, children are routinely vaccinated against nine diseases: diphtheria, hemophilus influenza type b (Hib), hepatitis B, measles, mumps, pertussis, poliomyelitis (paralytic), rubella, and tetanus (MMWR, 1994a, 1994b, 1994c). Vaccines have been developed for these nine diseases in response to the devastating effects and high numbers of deaths from the contraction of these disease.

The American Academy of Pediatrics (1988) views the process of immunization as a key step in promoting the health of patients and their families. Also, with

increasing concerns over the cost of health care and the treatment of the ill individual, immunizations are viewed as a cost effective means to prevent the population from becoming ill, thereby reducing the drain on ever shrinking health care resources.

Immunization is a illness prevention health care process which conveys protection to an individual for a specific disease. As health care providers, Clinical Nurse Specialists have a role in providing preventive care which has a proven efficacy in reducing of morbidity and mortality. Research and historical analysis have demonstrated that immunizations of young children markedly decreases morbidity and mortality from these diseases (MMWR, 1994a).

Control and elimination of all childhood diseases has been a primary goal in public health care for decades in providing adequate care for the very young, and continues to be so today (Michigan Department of Public Health, 1993a, 1993b).

The common childhood communicable diseases of diphtheria, measles, mumps, pertussis, poliomyelitis (paralytic), rubella, and tetanus were studied in this research. Hemophilus influenza (Hib) and hepatitis B vaccination were not studied. Hib vaccine, though recommended, was not mandatory in Michigan during the period studied. Further, the hepatitis B vaccine has been

recommended only since 1991 (CDC, 1991a). Records selected for this study included those beginning December 1990.

Process

Process (#2, Figure 2) refers to the obtaining of immunization by the clients. Since parents determine when, where and if a child obtains immunizations, they are included in the process. For this study, the process was limited to whether documentation supported immunizations were obtained or not obtained. The steps through which the parent and child go to obtain immunization, missed opportunities for immunizations, and the barriers and facilitators to acquiring immunizations, were not addressed in this investigation, though they are components of the process through which immunizations are obtained.

Structure

Starfield defines structure as the mechanisms for providing continuity of care. For this study the structure components (#3, Figure 2) were the complete immunization records for those selected subjects who have access to the Macomb County Health facility. Immunization records are now entered into and compiled by computer. Printouts of these records were used, rather than the individual client charts. The model variable is dependent on accuracy of both the computer program and the data entry and retrieval.

Social and Physical Environment

Social and Physical Environment (#4, Figure 2), are race, sex, age, insurance, and delineation of population

i.e., area in which patients live (urban, suburban, rural). Delineation of the population is the defined service area of the health provider. Included were the sociodemographic and health characteristics of the community being serviced.

Review of Literature

Cutts et al. (1992) state that by the 1980's, more than 95% of school aged children were completely immunized. However, they identify an important gap in the U.S. immunization program. While children had "caught up" on their immunizations by first grade, young children were not being immunized on time. Adequate school age immunization was found to be an inadequate preventative measure to eliminate childhood diseases such as measles and Hemophilus influenza. They identify three factors critical to successful immunization program, one of which is measurable objectives that are continuously evaluated. This requires timely checks at various points in the child's life, not merely one check when entering school.

As part of its Healthy People 2000 initiative, the U.S. Public Health Service (1990) set the objective of at least 90% of American children to complete the basic immunizations series by the age two years (Bates, Fitzgerald, Dittus, & Wolinsky, 1994; Malloy, 1992). The Michigan Department of Public Health estimates that about 40% of Michigan's children under the age two years are not fully immunized (Kerr, 1993). As reported in MMWR (1994c), the 1993 National Health Interview Survey (NHIS) reported 67.1% of

the children surveyed had all of recommended immunizations series by age two years. This was an increase from 1992 (55.3%), but far short of the 90% objective.

According to Schlenkler and Fessler (1990), in 1989 the Wisconsin Division of Health reported that 93% of all school children were immunized. There were, however, no data on vaccine coverage for the most seriously affected group of children, i.e., those less than five years of age. Children under five years accounted for 75% of all hospitalizations and 100% of those who died from the 1989 outbreak of measles. Schlenker and Fessler's retrospective studies done in that same geographic area indicated that only 35.7% of children had all appropriate immunizations by age two years. This rate was even lower for Hispanics and African Americans at 32% and 28%, respectively.

Pertussis Surveillance reports to the Centers for Disease Control (CDC) confirmed an increase in pertussis cases of seventeen percent since 1986, with an average incidence rate of 1.4 cases per 100,000 population. Age specific rates were highest among children less than one year of age. Percentages of hospitalization and complications (e.g. pneumonia, seizures, and encephalopathy) were highest in children under six months of age. Fifty-four percent of the children who died were also less than six months old. Of the patients aged three months through four years, 63% were not appropriately immunized for

pertussis; 34% had not received any doses of pertussis vaccine (MMWR, 1990).

Prospective and retrospective studies in 16 statewide populations showed that 82% of children had received MMR vaccinations while only 57% had received all indicated immunizations by the end of their second birthday (Bernier, 1991). Zell, Dietz, Stevenson, Cochi, and Bruce (1994) reported that vaccination levels at the second birthday were far below the 90% objective set by the U.S. Public Health Service for the year 2000. The Zell et al., (1994) study utilized the AAP recommended 4:3:1 series, i.e., by 15 to 18 months of age 4 of the DPT series, 3 of the OPV series, and 1 of the two MMR vaccinations had been completed. The 4:3:1 series is recommended for completion prior to 24 months of age (USPHS, 1990). Of the children studied, 11% to 58% (median 44%) were fully vaccinated. Completed series levels at school age were 71% to 96% (median 87%). One of the 21 cities studied was Detroit, Michigan. The percent of children age-appropriately immunized was less than 10%. The percent of children up-to-date at 24 months of age with any dose of the 4:3:1 series was 28%.

The National Vaccine Advisory Committee (NVAC) (1991) did an in-depth analysis of the problems and barriers to obtaining immunizations. They concur with the CDC (1991c, 1991d) that the principal reason for measles epidemics and outbreaks of other diseases for which there are

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immunizations is failure to provide vaccine to children at the recommended age.

Public opinion regarding vaccine safety, religious prohibitions against the use of immunizations, low income and educational levels, and inadequate public awareness of the benefits of immunizations provide barriers to the immunization of children (Bates et al., 1994; Cherry, 1990; Eichelberger, Gotschall, Herta, Feely, Harstad, & Bowman, 1990; NVAC, 1991; Zimmerman & Giebink, 1992).

Even with empirical evidence to substantiate that with immunization, morbidity and mortality from childhood diseases can be reduced by greater than 90% for children less than one year of age (Mason, 1992), there remains controversy over the safety of the vaccines themselves. The most controversial vaccine is the DPT because of the association with severe neurological sequelae and death. Sensationalism of cases where children were believed to have had adverse reactions to the DPT vaccine continue to fuel the controversy.

Early studies by Kulenkampff, Swartzmann, and Wilson (1974) reported that whole-cell pertussis vaccine caused severe and permanent brain damage once in every 310,000 doses. These studies supported the public's concerns over the cost to benefit ratio of immunizing children. However, meticulous reexamination of the data from this study by multiple investigators and professional organizations has resulted in the conclusion that whole-cell vaccine either is

not associated with an increased risk of permanent neurological damage or the magnitude of any increased risk is so small as to be virtually unmeasurable (Shapiro, 1992). These studies have for the most part been met with public distrust or disbelief.

While there is legitimate concern that the "sensationalism" described may contribute to a decrease in parents obtaining immunizations for their infants, publicity can also increase immunizations rate for children. There has been a resultant increase in MMR immunization and a decrease in measles cases in response to an increase publicity campaign to immunize children against measles particularly among children aged 0-2 years. For the first time since measles reporting began in 1912, no measles cases were reported to the CDC (1994) for three consecutive weeks, from November 7 to November 27, 1993.

In summary, literature supports immunizations as a highly successful means of protecting children against infectious disease. Unfortunately, despite the proven benefits of vaccines, children in this country are still suffering and dying needlessly from preventable childhood diseases (Robinson & Bart, 1993). A continued need exists for investigation of adequacy of immunization for the very young in order to better focus resources necessary to decrease morbidity and mortality for those children greatest at risk.

METHODS

Design

This study was a retrospective review of immunization records.

Sample

This investigation utilized a convenience sample of 94 immunizations records acquired from the Macomb County Health Department (MCHD) immunization records database. The population from which the sample was drawn was a mixture of urban and suburban, low to low middle class families.

A minimum of thirty to a maximum of one hundred immunizations records were requested from the MCHD of those currently entered in their computer database. The exact program utilized used by the health department to retrieve data was not available to this researcher. Ninety-six subjects were sampled for the study by the MCHD. Data was provided on demographics with an identification number which could be matched to the immunizations records. However, only ninety two had matching immunization records. Two additional complete immunization records had been provided without matching identification number nor sociodemographics except birth dates. These two records were included because they met selection criteria. A total of ninety-four immunization records were analyzed.

The following were the criteria for record selection:

1. Birth dates from 12-1-90 through 6-30-92.

2. All records of children immunized at MCHD were eligible regardless of the children's status as MCHD clients.

Setting

The setting used was the Macomb County Health Department clinic located in the city of Mount Clemens, Michigan. The site was selected because it serviced a significant population of children age two years or younger and is the central immunization site for Macomb County.

Operational Definitions of Variables

Adequacy of Care

Adequacy of care was defined by the number of immunizations the child had received at the time of the record review. The immunization schedule as recommended by the American Academy of Pediatrics (AAP) (1988) and the U.S. Department of Health and Human Services (USDHHS) (1991a, 1991b, 1991c) was the standard for care utilized in this study (Figure 3).

The variable, adequacy of care, was operationalized with three levels: 1) Complete Care--4 DPT immunizations, 3 OPV immunizations, 1 MMR received and correctly spaced within 30 days of AAP recommended schedule; 2) Adequate Care--All immunizations received by age two years, but not properly spaced within 30 days of recommended AAP schedule; and 3) Inadequate Care--Less than all of the recommended immunizations within 30 days of age two years or all immunizations not completed by two years of age.

Figure 3. AAP immunization schedule.

	DPT	OPV	MMR
2 months	X	X	
4 months	X	X	
6 months	X		
9 months			
12 months			X** or
15 months	X* or	X* or	X**
18 months	X*	X*	

* Many experts recommend the vaccines at 18 months.
** In some areas, this dose of MMR may be given at 12 months.

*** American Academy of Pediatrics recommends that this dose be given to middle school or junior school.

(Adapted from: Measles, Mumps, and Rubella,(USDHHS, 1991b, p. 5 and Guidelines for Health Supervision II, American Academy of Pediatrics, 1988)).

Parameters for each immunization variable were defined utilizing three levels: 1) obtained on time, properly spaced; 2) obtained by age 2 years, but not properly spaced; 3) not obtained by age 2 years. This was done to allow analysis of each series of immunization in order to determine if any differences existed between immunizations.

Proper Spacing of Doses

Criteria for properly spaced doses, according to the AAP, were defined as follows: the first DPT dose had to be given at or after 42 days (6 weeks) of age; the second and

third doses given after a minimal interval of 28 days. The fourth dose given at least 184 days after the third dose. A child who received the fourth DPT at 15 to 18 months (plus or minus 30 days) would be categorized as correct spacing. For OPV, the first dose had to be given at or after 42 days (6 weeks) of age; the second and third doses each given after a minimum of 42 days from the last dose. Any MMR given on or after the first birthday but before, or at 18 months, was defined as being properly spaced. When information on the month and year were available but not the date, the 15th was designated as the date (Zell et al., 1994).

Those immunization records which contained information on the fourth DPT, third OPV and first MMR, but which did not have data on preceding immunizations were classified as either adequate care or inadequate care based on the date the immunization was obtained relative to date of birth. Any other immunization for which there was no date was deemed not obtained and was reflected as inadequate care. This assumed the latter immunizations would not have been given without evidence of prior immunization; however, they may not have been obtained at the facility. No conclusions could be drawn in these cases regarding spacing of prior immunizations.

Data Collection Procedure

The Macomb County Health Department (MCHD) generated the immunization data sheets of those children who received

immunizations through their facility with birthdates between 12/1/90 through 06/28/92, and whose immunization records were entered in the MCHD database.

In addition to the immunization data, these records contained the date of birth, sex, and race for most of the cases. Limited data on insurance was also available. This data was not routinely collected on immunization clients.

The immunization records themselves were used as the data collection instrument. Each record was assigned a case number in sequential order from 1 to 94. Sex, race, and insurance data was gathered from the separate data sheets by matching the MCHD ID numbers.

Statistical Analysis of Data

Data analysis was done with the SPSSX/PC+ computer program. Frequency, percentage, mean, and cross tabulation with Chi Square statistics were used, as appropriate, to describe the study results.

Analysis of the data included the following:

1. Percent of children sampled who obtained complete care, adequate care, and inadequate care by age two years for all immunizations.
2. Percent of children sampled who obtained complete care, adequate care, and inadequate care by age two years for each series of immunization.

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3. Mean number of days from date of birth to date of starting immunizations and between subsequent immunizations for those children receiving adequate and inadequate care.
4. Percent of children sampled who obtained adequate care and inadequate care in the proper spacing for all immunizations.
5. Percent of sample receiving complete, adequate, and inadequate care for all immunizations by race.

Cross tabulation with Chi Square analysis for question four was performed to determine if these was any statistically significant differences.

Study Limitations

There were four limitations to this study. First, a convenience sample was utilized from a public health care clinic in a urban/suburban setting which may not be representative of the population as a whole. Data were limited to those children receiving immunizations at the Public Health Department. Children who receive their immunizations at a public health facility may be different from the population as a whole. Therefore, results could only be discussed in terms of this study and are not to be generalized to the population as a whole. Second, the reasons parents did not immunize their children "on time" was not available. Therefore, conclusions regarding these reasons is beyond the scope of this study. Third, data collection was done through computer records. No attempt

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was made to verify this information through other sources, or to investigate the possibility that additional immunizations were obtained through other providers. Finally, the sample group was limited to those subjects which had been entered into the MCHD database. Since this database was relatively new, there is the possibility that all subjects who receive immunizations through that facility for the time period parameters were not listed on the database. A preferable method of sampling would have been the random sampling method. The random sampling method assures that each member of a chosen study population has an equal chance of being included in the study. This increases the likelihood that the sample will be diverse. Through a diverse subject population, as accurately as possible, the natural variability of the overall population may be represented (Brink & Wood, 1988).

Study Assumptions

The following assumptions were identified for the purpose of this investigation:

1. Immunizations against childhood disease are reasonably safe and efficacious.
2. The immunization schedule as recommended by the American Academy of Pediatrics and the United States Department of Health and Human Services is a valid standard for prevention of childhood diseases.

3. High immunization levels in the general population benefit those immunized and the population in the United States as a whole by decreasing the risk of morbidity and mortality.
4. The data source used was accurate.
5. Those seeking immunizations at a public health department facility are primarily those with public insurance or those who do not have insurance benefits which pay for immunizations.

Protection of Human Rights

The rights of the individuals from whom records were utilized in this study were protected in accordance with the guidelines developed by the University Committee on Research Involving Human Subjects (UCRIHS) at Michigan State University. Approval was obtained from the Michigan State University Human Subjects Review Committee prior to initiating data gathering (Appendix A).

Permission was also obtained from the Macomb County Health Department Medical Director, and the Director of Family Health Clinics (See Appendix B). No data was used that might have identified individuals nor was any identifying data removed from the health care site. Once the immunization records were matched with the sociodemographic data using the MCHD ID numbers, each subject was reassigned a number 1 to 94 which were used in the analysis. No names, addresses, or other identifying data were ever provided to connected identification numbers

to individuals. All data were entered into a database for SPSSX by this investigator alone. Confidentiality of the information was maintained.

RESULTS

Study findings are presented and interpreted in this section. First, there is a discussion of the sociodemographic findings. Second, the four research questions are answered followed by a discussion of the findings. Third, in a discussion section, implications of the study findings in terms of the CNS's role in the primary health care setting are presented. Finally, topics for future research are proposed.

Sociodemographics

As illustrated in Table 1, the majority if the sample were white (81.9%) and female (52%). The sample was found not to be representative of the state of Michigan by race, but was so by sex (MDPH, 1993a).

The years of birth were 1990 through 1992 with the majority (68%) from the years 1991. There was a fairly even distribution among the months with February containing the most (16%), and among the days with the 6th, 9th, and 12th containing the most (7%). Insurance information was limited since this characteristic is not consistently compiled by the MCHD. Only eleven subjects (11.7%) had information on insurance. Of this group, 64% were public insurance (Medicaid). Of the other 36%, no insurance plan provided coverage for immunizations.

Table 1

Sociodemographic Characteristics of Sample

Characteristic	N	Percent
SEX:		
Male	42	45%
Female	49	52%
Missing Data	3	3%
RACE:		
Black	3	3%
White	77	82%
Other	9	10%
Missing Data	5	5%

Research Questions

The four research questions posed in this study were based on interest in the immunizations of children at highest risk of morbidity and mortality from childhood diseases, i.e., those two years and younger. The outcome in this study was the level of care received with respect to immunization by age two years: complete, adequate, or inadequate.

Question 1. What percentage of children in a selected population obtain complete care, adequate care, inadequate care with respect to all immunizations by age two years as recommended by the AAP?

As illustrated in Table 2, the percentage of children receiving complete care for the study group was zero; adequate care, 45%; inadequate care, 55%. If records were

Table 2

Frequency and Percent of Adequacy of Care for All Immunization Series Combined

Variable	Adequacy of Care	Frequency	Percent
All series	Complete	0	0
	Adequate	42	45
	Inadequate	52	55

partially missing, the data for that subject was incorporated into the inadequate care group unless records on the fourth DPT, third OPV, and first MMR were available. If information was available on the fourth DPT, third OPV, and first MMR, the subject was incorporated into either adequate or inadequate based on the dates the immunizations were received. This could be done because the MCHD requires documentation that previous immunizations have been received before they document an immunization as specific in the series. Records of immunizations received at other facilities were not part of the MCHD data base, just the records of those immunizations received at the health department.

From the data on all immunizations combined, the study sample did not meet the goal of 90% adequate care by age two. This sample was inadequately immunized by age two years.

Question 2. For each series of immunizations, what percentage of children received complete care, adequate care, and inadequate care?

For each series of immunization, the percentage of children who received complete or adequate care is illustrated in Table 3. Again there were no cases of complete care for the DPT series and OPV series. The MMR series had 23% who received complete care. There was a 17-21% difference in percentages between the DPT and OPV immunization series and the MMR series with respect to adequate immunization by age two years. Sixty-seven percent of the sample received the MMR either as complete care (23%)

Table 3

Frequency and Percent of Adequacy of Care for Each Immunization Series

Immunization Series	Adequacy of Care	Frequency	Percent
DPT	Complete	0	0
	Adequate	43	46
	Inadequate	51	54
OPV	Complete	0	0
	Adequate	47	50
	Inadequate	47	50
MMR	Complete	22	23
	Adequate	41	44
	Inadequate	31	33

or adequate care (44%). Only 46% for the DPT and 44% for the OPV had achieved adequate immunization by age two years.

Adequate levels of immunizations were not being reached by age two years for the majority of subjects in this sample, for either the DPT or OPV immunization series. The majority of children were receiving adequate immunization for the MMR immunization. No series achieved the goal of 90% adequate coverage by age two years.

Question 3. What patterns of immunization are evident for those children receiving adequate or inadequate care with respect to when immunizations are started and the spacing of those immunizations by age two years?

Table 4 reports the findings for each individual immunization. For the DPT and OPV where more than one immunization is required the following patterns were observed. First, 65%-66% of cases in this study group started their immunizations as recommended by the AAP. Second, with each subsequent immunization, the percentage dropped, particularly with the last immunization. The decreases paralleled each other for these two series, with the third OPV decreasing to 26% at the same time the fourth DPT decreased to 25%. Only 23% of the sample started the first MMR as recommended by the AAP, though an additional 44% had "caught up" by age two years.

This data support that the resurgence of childhood diseases such as measles and pertussis, arises, in part, from a failure to achieve adequate immunity through adequate

Table 4

Frequency and Percent of Adequacy Level for Individual Immunizations

Immunization	Adequacy Level	Frequency	Percent
DPT1	By AAP	61	65
	By 2 yrs.	16	17
	> 2 yrs	02	02
	Missing	15	16
DPT2	By AAP	49	52
	By 2 yrs.	26	28
	> 2 yrs.	03	03
	Missing	16	17
DPT3	By AAP	38	40
	By 2 yrs.	20	29
	> 2 yrs.	06	06
	Missing	23	25
DPT4	By AAP	23	25
	By 2 yrs.	20	21
	> 2 yrs.	19	20
	Missing	32	34
OPV1	By AAP	62	66
	By 2 yrs.	16	17
	>2 yrs.	02	02
	Missing	14	15
OPV2	By AAP	48	51
	By 2 yrs.	27	29
	> 2 yrs.	03	03
	Missing	16	17
OPV3	By AAP	21	26
	By 2 yrs.	26	28
	> 2 yrs.	23	25
	Missing	24	26
MMR1	By AAP	22	23
	By 2 yrs.	41	44
	> 2 yrs.	31	33
	Missing	0	0

immunization of children at early age. Further, an inadequate percentage of children begin immunizations on time with an ever decreasing number achieving even adequate coverage for any of the immunizations.

Question 4. What are the differences by race in the percentage of complete, adequate, and inadequate care for all immunizations?

Illustrated in Table 5 are the cross tabulation and Chi-Square analyses of the adequacy of care for all series of immunizations by race. Again, no sample subject fell into the complete care category with 46.8% of all white subjects, 33% of all black children, and 44.4% of all other races receiving adequate care. Forty-one point six percent (41.6%) of the combined black and other races (5 of 12 subjects) received adequate care (not illustrated in table). Because of the small number of non-white subjects little can be said of race in this study. The differences are not statistically significant, though with a larger population of non-white subjects this might change. However, a greater percent of non-white subjects received inadequate care as compared with white subjects in this sample.

DISCUSSION

Since not one case fell into the Complete Care category, this investigator looked at the criteria for that level. They were consistent with the AAP guidelines. The percentage of adequate care is lower than those reported by the CDC (1994) for the years 1992 and 1993 (55.3 and 67.1%,

Table 5.

Cross Tabulation of Adequacy of Care for All Immunization Series by Race

	Race			
Care Level	Black	White	Other	Row Totals
Complete				
N	0	0	0	0
%	0	0	0	0
Adequate				
N	1	36	4	41
%	33.3	46.8	44.4	46.1
Inadequate				
N	2	41	5	48
%	66.7	53.2	55.6	53.9
Column total				
N	3	77	9	89*
%	3.4	86.5	10.1	100

Note. The word "black" is used to refer to African Americans.

*5 cases of 94 did not have information on race.

X^2 (2, N = 89) = 0.895, p > .05

adequate care), though slightly better at 45% than previously reported 31.7% (Schenkler et al., 1992).

Approximately 10% of immunizations records included dates for the fourth DPT, third OPV, and first MMR without complete records of preceding immunizations' dates. The possibility exists that, if all immunization data were known, some of these subjects may have received all immunization on time, as recommended by the AAP, thereby

increasing the number of subjects in the Complete Care group. Further, an increased percentage of cases in the inadequate group may have occurred erroneously since subjects whose records contained missing data may have completed their immunizations by two years of age through another facility. There was no means to track children to validate this possibility without direct contact with the child's parent.

Lack of consistent, meaningful documentation of immunization records is an ongoing problem for the health care provider. The Macomb County Health Department has recognized this as a problem and has begun computerizing their immunization records. Based on gaps in the sample records, incorporating dates provided by the parent/guardian for previously received immunizations into their computer records would improve the accuracy of the records and improve the ability to analyze the adequacy of care for the clients.

Only 45% of the study sample received adequate immunizations by age two years. The reasons for children not receiving immunizations has been well documented in the literature and included missed opportunities, expense, inadequate access to health care provider, lack of insurance coverage for preventive health care (i.e., under-insured), religious belief contrary to medical recommendation, and adverse reactions to previous immunizations (NVAC, 1991; Orenstein, Atkinson, Mason, & Bernier, 1990; Wood, Hayward,

Corey, Freeman, & Shapiro, 1990). Some of these barriers would apply to those children receiving immunizations at the MCHD. There are limited hours for receiving immunizations, the facility is located in the city, making it less accessible to the rural areas of Macomb County. There are often long waiting lines to receive immunizations, and based on anecdotal remarks from clients, some parents retain the stereotype that the health department is only for the poor and are therefore hesitant to use the service for immunizations. Also, people dislike public health facilities because they are often impersonal, noisy, crowded, with long lines, long waits and inconvenient hours. The MCHD has done much in the last few years to improve access and convenience, and is working with primary care providers in the area to increase immunizations in children. MCHD have developed satellite immunization locations, and improved the care provided at each facility.

The concern is the continued poor coverage for the highest risk group. The percentage of adequate immunization (45%) is still well below the goal of 90% or greater, and more closely resembles levels of underdeveloped countries such as Africa, Asia, and Latin America where less than half of the children were appropriately vaccinated by age 24 months (Cutts, 1993). These figures are lower than the 59% reported by the CDC for 1992, and the 72% reported for 1993. The DPT series percentage was also less than previous studies (Schenkler et al., 1992) where study groups shared

similar sociodemographics to the present study. Percentages were better when compared to a more rural group (Clements, Wilfert, MacCormack, Weigle, & Denny, 1990) where 32.9% of children had received required number of immunizations for age two years. The MMR series had lower percentages than percentages found in other studies (68-84%) (Ewert, Thomas, Chun, Enguidanos, & Waterman, 1991; Schenkler et al., 1992). However, the CDC (MMWR, 1994c) report for 1992 was lower (55.3%) than this study findings and approximately the same for 1993 (64.8%).

The results of adequacy of care are similar for the DPT and OPV series. This may be because these two series are scheduled to be given at the same time. Since only one MMR is required by age two, parents may find obtaining that immunization easier, plus side effects from the MMR vaccine are minimal. This is supported by the results of this study where 23% received MMR on time, yet 44% "caught up" by age two years.

With the increased publicity from recent measles outbreaks in Michigan and the adverse publicity in recent years for the DPT vaccine, one might expect the DPT to have substantially lower adequacy level than either the OPV or MMR. By age two years this is true with 46% receiving adequate care for DPT series, 50% for OPV series, and 66.7% for the MMR. However, when examining each immunization over time the DPT and OPV parallel each other with regards to percentage starting on time, and the decrease of those

receiving immunizations as scheduled. The MMR also has similar percentages of subjected receiving the first MMR as scheduled to the DPT given at the same time. This may be expected because these immunizations are given at the same time. Further, this may indicate that those who obtain immunization for their children do not generally omit one series over another, and over time the publicity, pro or con, does not affect a substantial number of those receiving immunizations.

While higher percentages of non-white subjects received inadequate care, there were no statistically significant differences among races for this study group and results were limited because of the small sample of non-white subjects. However, lower levels of adequate immunizations for non-white groups is consistent with other studies, though economic status has been demonstrated to have a more significant effect on immunization percentages than race (Bates et al., 1994). The concern remains that even with redoubled efforts by government and health care providers, children age two years and under remain woefully under immunized.

Practice Implications for the Clinical Nurse Specialist

Three major implications for the CNS arise from the study data. First, children age two years and under remain under protected from communicable, preventable diseases. Second, there is a need to identify target groups of children who are poorly immunized to increase immunization

starting at the earliest possible opportunity. This must include improving the numbers of children staring immunizations on time and maintaining immunization schedules over time. Finally, the Starfield model can be applied to illness prevention health care measures, to evaluate outcomes of programs aimed at improving immunizations of young children.

An integral part of advance clinical practice in the primary health care setting for the CNS involves engaging clients in illness prevention and health promotion practices such as immunizing young children. The CNS must incorporate the role of patient advocate, counselor, educator, researcher, and clinician in illness prevention and health promotion activities.

As advocate, the CNS conveys research findings to clients in an objective way so they may make informed decisions regarding their care. Focus must be on the safety of the child, but benefits and risks must be presented so the parent becomes an active partner in the decision to immunize.

Further, advocacy involves disseminating findings to government agencies and legislative bodies responsible for funding immunization programs. System changes can be made by lobbying, support of professional organizations, assisting in the development of legislation focused on starting and keeping immunizations on time during the first two years of life.

As counselor, the CNS advises clients about the importance of early immunization of their child(dren). Since the highest at risk group is the 2 year and under, the CNS must address this importance prenatally, at birth, and throughout the child's early development. The CNS incorporates into practice routine counseling for expectant parents as part of prenatal classes, and new parents with a visit at the time of delivery (hospital or home) to advise parents when to begin immunization of the newborn. Butz, Funkhouser, Caleb, and Rosenstein (1993) identified that those who do not seek prenatal care, do not seek preventive care for their young. The challenge will be improving immunizations for at-risk groups by developing and sustaining health promotion and illness prevention behaviors (Keller, 1993).

As educator, the CNS is accountable for developing educational programs based in current standards, guidelines and research findings. This involves educating not only individuals, but society, health care providers, and target populations at highest risk for inadequate immunizations. This includes providing information on when and when not to delay immunization for illness, and developing local programs to provide information in the high risk target areas. The CNS could access the community through programs presented through church groups, boy and girl scout groups, school health education classed, and, particularly, teen pregnancy programs. Since one of the high risk group are

the poor and poorly educated, including education on immunization for pregnant teenagers who are often in both categories, is a high priority. Studies indicate that children who receive health supervision visits are more likely to be fully immunized (Gemperline, Brockert, & Osborn, 1989; Hodes, Timms, & Gill, 1990; Jackson, 1993; Marsh & Channing, 1987). A follow up home visit program by the CNS for clients in this and other high risk groups, such as low-income non-white groups, could be developed where immunizations are actually administered at home. This could be coordinated with well-baby care and ongoing parenting education and through existing prevention programs.

The role of researcher is an integral part of advanced practice in nursing. The CNS utilizes research findings to guide practice. For the adequacy of immunization in children two years of age and younger, this involves developing improved ways of measuring the effectiveness of illness prevention programs and further research to investigate barriers to adequate immunization. The Starfield model has been demonstrated as a research tool to evaluate current effectiveness of programs aimed at improving immunization adequacy, and to measure the effectiveness of nursing intervention to improve adequacy.

As clinician, the CNS judges the necessity of immunization and the appropriateness of timing, plans the immunization schedule when clients are not on time, either

directly or indirectly administers the immunizations, and is responsible for documentation of immunizations.

The CNS could develop a program through a team approach involving the obstetrician or nurse midwife prenatally and the primary care provider (PCP) postnatally. The obstetrician or nurse midwife could begin parental education on the importance of immunization, including what are and are not contraindications for immunizing. At birth, the infant's PCP would reenforce the education and provide the initial immunizations. A callback or "tickler" file would start on all newborns to automatically schedule the appropriate immunizations at the appropriate time. For further continuity, the records could be computerized with a printout generated with the entire record, signed by the PCP. This would act as a legal document of immunizations and would be used for entry into school later in the child's life. Similar programs are available in Veterinary medicine to verify immunization of dogs and cats in order to obtain licensing. Why not for children? Eventually, a computer program could link immunization records state and/or nationwide with data transfer by consent as with any other client record.

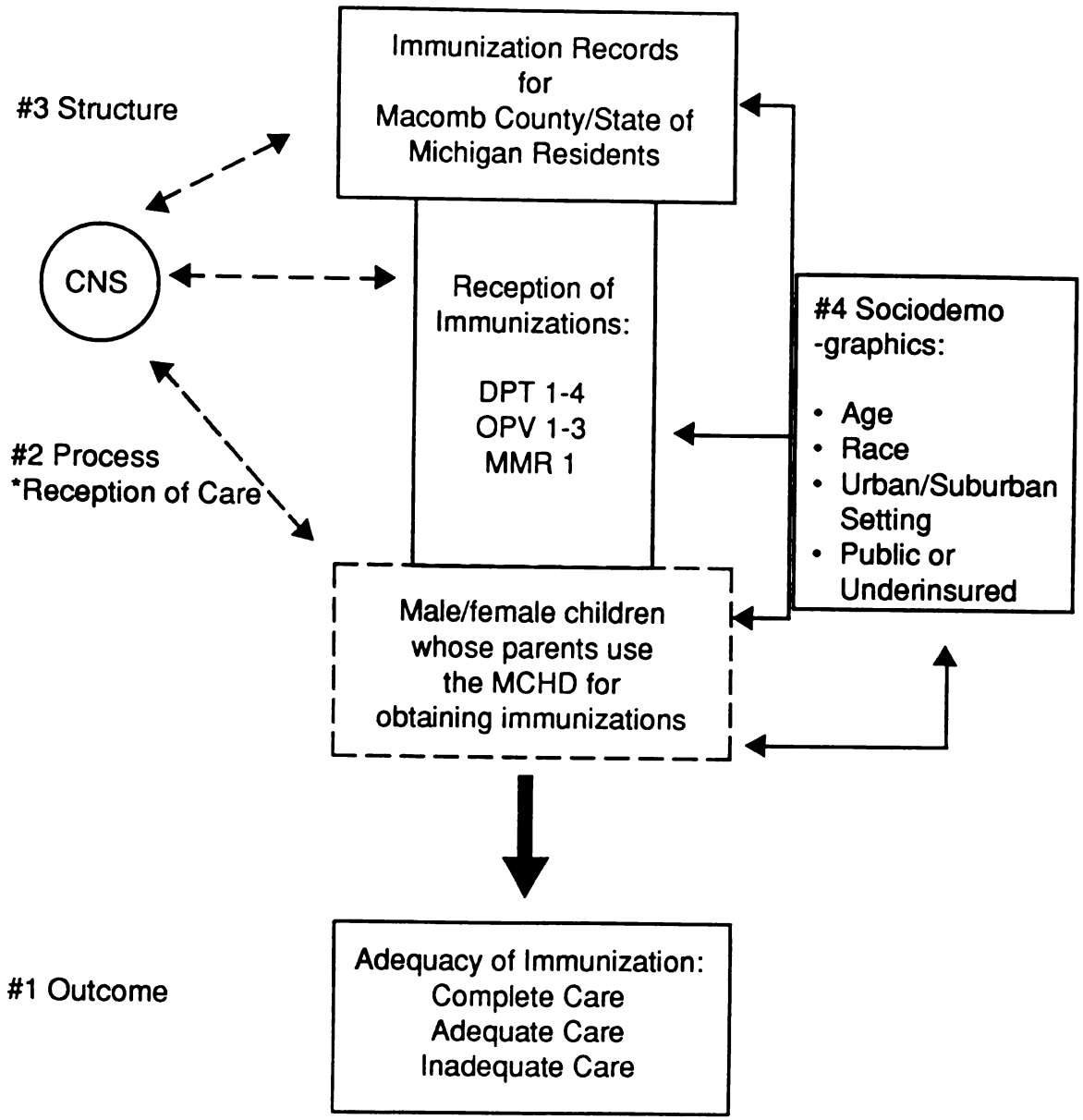
A major component in delayed immunizations, which the Clinical Nurse Specialist addresses in the role of clinician, is missed opportunities (Brown, Melinkovich, Gitterman, & Ricketts, 1993; NVAC, 1991; Zimmerman & Giebink, 1992). According to the NVAC (1991), two types of

missed opportunities are of particular importance: 1) a child brought to a center for immunization is not vaccinated because of inappropriate contraindications such as a minor illness, or not all immunizations are given; and 2) a child in need of vaccination has contacted the health care provider for other reasons, but immunization status is not assessed and not offered. The CNS must follow established recommendations and guidelines for immunization administration and avoid unnecessary delays. At each visit with the health care provider, a child's immunization status should be assessed and documented. Knowledge of true contraindications versus relative and non-contraindications are essential to accurate clinical practice. These guidelines are available through the USDHHS (1994) booklet, Guide to Contraindications to Childhood Vaccinations, and should be used as the basis for deciding when to withhold immunizations.

The results of this study identify, in the context of the Starfield model, three areas where the CNS can affect the system to increase the desired outcome of improved complete and adequate care. These are shown in Figure 4.

The CNS can develop consistent, computer based records for immunizations that are easily accessed and transferred to other health care providers. The computer program must be able to interface with programs currently under development in Michigan at the state level. With improved record keeping and easier access to data, research into

Figure 4. Adequacy of care through immunization for children age 2 years utilizing the public health system. (Revised)



Adapted from Starfield Model: A Basis for Evaluating Primary Care. (Starfield, B. 1992).

barriers, target groups, adequacy of immunizations will be more accurate and timely. This will allow early and effective interventions to improve adequacy of immunizations.

The CNS may affect outcome through improving reception of immunizations. This may be simply by focusing resources in his/her own practice to increase adequacy of immunization for the clients in the practice. Also, educating and counselling parent on benefits versus risks of immunizing their children may increase practice percentages of complete and adequate levels of care for immunizations. This may be achieved through one on one interaction, or by developing programs within the individual practice for the parents' education and children's reception of immunizations.

Also, consistent use of practice guidelines for children behind in the immunizations process would improve the reception of care. Some public health care facilities have their own guidelines developed from research findings. These, however, are not always available to the primary care provider, nor are guidelines in literature easily culled out from the findings. Distribution of the CDC guidelines to primary care providers, especially family practitioners, would improve consistency in the care of young children. Evaluation of these programs and guidelines should follow implementation. The Starfield model could be utilized in the evaluation process.

Future Research

This investigation opens several possibilities for future research. These include the following: 1) accessing a more diverse sample of immunization records to improve variability and decrease homogeneity; 2) determining through a subsample of these records, if missing data indicate the child did not receive the immunization, or that the immunization was obtained elsewhere. This could be done by interviews with parents, or having parents supply all their children's records; 3) frequent, concurrent examination of records along with parent interviews to determine what contributes to the low immunization rates, and what occurs to prevent on time immunizations; and 4) analysis of immunization records at earlier and more frequent intervals.

This sample was homogeneous with regards to race and socioeconomic levels. Utilizing a larger, random sample of immunization records from a variety of health care settings would improve the variability, reliability and the generalizability of this study. This may help determine if there is a statistically significant difference by race or economic status as have been found in other studies.

Further, by taking a subset of records with missing data, an investigator could contact the parents requesting both verification of data and any additional immunization records they have from other sites where the child received an immunization. Through this verification of data, the investigator may determine if missing data was because

immunizations were not obtained, or obtained elsewhere and if so, were they obtained at a complete care, adequate care or inadequate care level.

A concurrent study of immunizations records at frequent intervals may illuminate how and why immunizations get and stay off track. This may lead to the development of effective interventions which could be evaluated quickly. This could be done through analysis of the barriers and facilitating factors which prevent or allow immunizations to be obtained at the complete or adequate care levels. The Starfield model could be used to determine if there were an improvement in immunization percentages, but further adaption of that model, or use of another model, may be necessary to determine reasons immunizations are not obtained as recommended for the high risk group of two years of age and under.

SUMMARY

The result of this study have several implications for the CNS whose practice includes young children. Immunization of the two year and under population remains unacceptably low, and is a contributing factor to outbreaks of preventable childhood diseases, increasing the morbidity and mortality rates for this group.

There was a no significant difference in immunization at the adequate care level found among races, but non-white groups still received higher percentages of inadequate care. The reason no difference was found among races may be that

the sample of non-white subjects was very small, or that since the sample population is from the same economic level, race may not play a significant factor within economic groups.

This study has increased the knowledge base available to the advanced practice nurse. However, it was not able to address the important area of why immunization rates remain low even with large resources being invested and multiple programs developed to increase immunization of very young children. This and other proposed research topics are left to other future investigations to determine.

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APPENDIX A

UCRIHS APPROVAL

MICHIGAN STATE
UNIVERSITY

August 23, 1994

TO: Kathleen D. Ambrose
15399 Hough Rd.
Allenton, MI 48002

RE:

IRB#:	94-413
TITLE:	ADEQUACY OF IMMUNIZATION FOR CHILDREN BY AGE TWO YEARS
REVISION REQUESTED:	N/A
CATEGORY:	1-E
APPROVAL DATE:	08/23/94

The University Committee on Research Involving Human Subjects'(UCRIHS) review of this project is complete. I am pleased to advise that the rights and welfare of the human subjects appear to be adequately protected and methods to obtain informed consent are appropriate. Therefore, the UCRIHS approved this project including any revision listed above.

RENEWAL: UCRIHS approval is valid for one calendar year, beginning with the approval date shown above. Investigators planning to continue a project beyond one year must use the green renewal form (enclosed with the original approval letter or when a project is renewed) to seek updated certification. There is a maximum of four such expedited renewals possible. Investigators wishing to continue a project beyond that time need to submit it again for complete review.

REVISIONS: UCRIHS must review any changes in procedures involving human subjects, prior to initiation of the change. If this is done at the time of renewal, please use the green renewal form. To revise an approved protocol at any other time during the year, send your written request to the UCRIHS Chair, requesting revised approval and referencing the project's IRB # and title. Include in your request a description of the change and any revised instruments, consent forms or advertisements that are applicable.

PROBLEMS/ CHANGES: Should either of the following arise during the course of the work, investigators must notify UCRIHS promptly: (1) problems (unexpected side effects, complaints, etc.) involving human subjects or (2) changes in the research environment or new information indicating greater risk to the human subjects than existed when the protocol was previously reviewed and approved.

If we can be of any future help, please do not hesitate to contact us at (517) 355-2180 or FAX (517) 432-1171.

Sincerely,

David E. Wright

David E. Wright, Ph.D.
UCRIHS Chair

DEW:pjm

cc: Rachel F. Schiffman

OFFICE OF
RESEARCH AND GRADUATE STUDIES

University Committee on Research Involving Human Subjects (UCRIHS)

Michigan State University
225 Administration Building
East Lansing, Michigan
48824-1046

517/355-2180
FAX 517/432-1171

APPENDIX B

Macomb County Health Department Approval

CLINIC SERVICES
469-5372
ENVIRONMENTAL HEALTH
469-5236
PERSONAL HEALTH SERVICES
469-5520

MACOMB COUNTY HEALTH DEPARTMENT

43525 ELIZABETH
MOUNT CLEMENS, MICHIGAN 48043
(810) 469-5235 • FAX (810) 469-5885

DANIEL C. LAFFERTY
Director/Health Officer

KEVIN P. LOKAR, M.D.
Medical Director

April 26, 1994

Kathleen Ambrose, RN, FCNS
Romeo Family Practice
64580 Van Dyke, Suite C
Romeo, MI 48095

Dear Ms. Ambrose:

This correspondence is to confirm approval of your request to use Macomb County Health Department immunization record data in your graduate research project.

The completed form that you requested is enclosed. As indicated on the form, data will be provided to you without individual identifying information.

I will plan to hear from you early next month. At that time we can discuss your data request in more detail.

If you have any questions, please contact my office at 469-5511.

Sincerely,

Kevin P. Lokar, M.D., M.P.H.
Medical Director

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Attachment