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# Group Well Child Care: An Analysis Of Cost

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Group Well Child Care: An Analysis of Cost

A Thesis Submitted to the  
Yale University School of Medicine  
in Partial Fulfillment of the Requirements for the  
Degree of Doctor of Medicine

by  
Hiromi Yoshida  
2011

## **Abstract**

GROUP WELL CHILD CARE: AN ANALYSIS OF COST. Hiromi Yoshida, Ada M. Fenick, Marjorie S. Rosenthal. Section of General Pediatrics, Department of Pediatrics, Yale University, School of Medicine, New Haven, CT.

Group well child care is an innovative way to conduct health supervision visits that may allow pediatricians to better serve the needs of patients and their families. Outcomes of child development, maternal mental health, and emergency department utilization in group care are similar to those of individual care. Group well child care will be sustainable in practice only if it is cost neutral or cost saving.

The objective of this project was to examine the optimal arrangement of a group well child visit (WCV) by varying the combinations of healthcare providers and group size to ensure that the visit was cost neutral or cost saving when compared to an individual WCV.

We created economic models using administrative data and Bureau of Labor statistics to evaluate the costs of an individual WCV delivered by an APRN, a resident physician, and an attending physician and 3 different group WCV models. The three group visit models were: 1. APRN model facilitated by an APRN, with a nurse and social worker; 2. Resident physician model facilitated by a resident physician, with assistance from an attending physician, nurse, and child life specialist; and 3. Attending physician model facilitated by an attending physician with a nurse. We varied physician salary and fixed other healthcare provider salaries.

Using the respective individual WCV cost as a breakeven point, we performed sensitivity analyses on group size (number of parent-child dyads) and length of time each ancillary healthcare provider could participate in the group visit to determine the ideal combination of factors that would make a group visit model cost neutral with an individual WCV.

The cost of an individual WCV conducted by an APRN was \$20.51, one by a resident physician was \$17.81, one by an attending physician with a low salary was \$15.58, and one by an attending physician with a high salary was \$20.49. We achieved cost-neutrality in the group model at four parent-child dyads in the APRN model; we achieved cost-neutrality at three, four, five, and six dyads in the resident physician model with, respectively 30, 45, 60 and 90 minutes of attending supervision; and we achieved cost-neutrality at four dyads in the attending model with a low salary, and at five dyads in the attending model with a high salary.

In conclusion, group well child care can be delivered by APRNs, resident physicians, and attending physicians in a cost neutral manner by optimizing group size and contributions made by nurses, social workers, and child life specialists. Future research should further explore the clinical benefits that group well child care offers so that a cost-benefit or cost-effective analysis can be conducted.

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## **Introduction**

### **Well Child Care**

Well child care is an essential service that pediatricians offer to promote children's health and development. A well child visit (WCV) allows health care providers to conduct four important components of preventive care: 1. monitor the growth and development of a child, 2. conduct disease screenings, 3. provide anticipatory guidance and 4. administer immunizations(1, 2). Additionally, a WCV provide a forum for pediatricians to screen for parental psychosocial problems, to provide social support and to increase communication with the parents(3, 4). WCVs provide an opportunity to form a therapeutic alliance between the patient/family and the doctor, to build the family's confidence in being able to care for their child and to have the family view the doctor as a resource for health information and advice(5).

### *Benefits of Well Child Care*

Receiving high quality primary care is associated with improved infant mortality rates for low birth weight babies and lower per patient costs for healthcare(6). Children who attend the recommended number of preventive visits have a reduced risk of emergency department visits and of avoidable hospitalizations regardless of race, level or poverty, or health status(7).

Furthermore, having a "usual source of care," where the patient has the same healthcare provider over multiple visits or returns to the same clinic location over several visits, is associated with better quality of care(8), greater patient satisfaction, lower

utilization of emergency room for non-urgent conditions, and lower overall costs of care(9). Children seen in community health clinics who have a usual source of care are almost twice as likely to receive age-appropriate preventive care and anticipatory guidance compared to children who do not have a usual source of care (10, 11)These findings suggest that well child care benefits not only the well being of children and their families, but also the healthcare system as a whole.

## **Current System**

### *Attendance and Length of Visit*

The current system recommends 6 WCVs during the first 12 months of life and the timing is largely based around immunization schedules(12). A general pediatrician spends 22-33% of her work hours conducting WCVs. For children 0-12 months, WCVs comprise 57% of all ambulatory visits(12-14). Though WCVs constitute a large part of a pediatrician's practice, families report attending only 2.2 WCVs and 1.7 urgent visits during the child's first year and 0.98 visits during the second year when 3 visits are recommended(12). Eighty-two percent of children receive an adequate number of WCVs (at least 3 visits) by 7 months of age. However, this measure falls to 77% of children receiving an adequate number of WCVs (at least 5 visits) by 24 months of age. This percentage remains consistent across time periods when comparing the 1988 National Maternal and Infant Health Survey to the 1999 National Survey of America's Families(15).



A study done in Monroe County, New York demonstrates inequities in access to care. Researchers compared the rate of children under the age of 2 receiving the recommended number of visits between 130,000 children in privately insured managed care and 17,000 children enrolled in Medicaid. Only 49% of privately insured and 36% of publicly funded children under the age of 2 received the recommended number of visits and 2% of private and 12% of children on Medicaid in the same age group received absolutely no care(16).

An average WCV lasts 10-18.3 minutes(12, 17) making it challenging for the physician to build good rapport with the parent and child, to complete a physical exam and to discuss recommended WCV topics. Examining each of the four recommended components of well child care reveals that all of them can be improved.

#### *Developmental and Psychosocial Surveillance*

According to one national survey, 43% of parents of children 4 to 35 months old report no developmental surveillance by their physicians and only 41% of parents of children 0 to 36 months old received developmental assessments(18). Furthermore, only 17% of parents recall assessment of psychosocial well-being and safety and only half of children identified “at risk for developmental problems” received follow-up(19). An average of 1 minute per visit is devoted to discussing behavioral developmental issues(20), too short to complete a screening test or delve into specifics of any question or issue.

### *Disease Screenings*

Screening for lead levels and anemia are recommended within the first year of life. According to chart reviews and parental survey, rates of lead screening range from 10-27% and rates for anemia screening range from 39-45% for children under 24 months(21-23). Interestingly, while parent and chart review data reveal low rates, a survey of pediatrician reports that 53% of them conduct universal lead screening for all their patients aged 9-36 months, 39% screen some, and 8% screen none(24), suggesting that there is a discrepancy in the reported rates of screening depending on the source.

### *Anticipatory Guidance*

Ninety-four percent of parents report one or more unmet needs for parenting guidance, education, and/or screening by their healthcare provider(25). In a parent survey that examined six anticipatory guidance topics of newborn care, crying, sleep patterns, encouraging learning, discipline (for parents of children ages 6-36 months) and toilet training (for parents of children ages 18-36 months), 37% of parent report that they did not discussed any of the topics with their healthcare provider(11). People with limited access to care – lower income, less education, no insurance, nonwhite racial/ethnic groups – are overrepresented in the 37% who did not discussed any of the topics.

On the clinician side, 81-86% of pediatricians report always counseling about at least one preventive health topics during a visit. Diet and nutrition are discussed most often (62-71%), while firearm safety are discussed least often (15-25%)(26).

Once again, the provider side has a higher rate of reporting that a well child care component is provided. A possible explanation is that the traditionally didactic format of

an individual well child visit is not the best of model for parents to retain information. Providers and parents are in agreement about topics discussed during a well-child visit, but parental recall dwindles as the number of topics discussed increases(27).

### *Immunizations*

Receiving immunizations on a timely basis is an important preventive health measure not only on an individual level, but also at a public health level. There is significant overlap between the immunization schedule and WCV timing, leading to the expectation that most children would be appropriately immunized. However, only 51.5% of children under 13 months are up-to-date with their immunizations ( $\geq 3$  doses of diphtheria-pertussis-tetanus vaccine,  $\geq 3$  doses of poliovirus vaccine,  $\geq 3$  Hib Vaccine, and  $\geq 1$  dose of a measles-containing virus) with the rate improving to 81.5% by 24 months(28).

### **Obstacles to Ideal Well Child Care Visits**

It is clear that the structure of well child care must be re-examined to improve the delivery of healthcare to children and especially to those with limited access to care. Numerous barriers exist to providing comprehensive pediatric care including lack of time, reimbursement, and resources. Several are discussed in detail below.

### *Time Constraints and Information Overload*

In a survey that looks at primary care doctors' attitudes towards time, money, and health issues, 53% of pediatricians report "having enough time to provide counseling to parents(29)." However, there is an exorbitant amount of health advice that needs to be delivered to families. According to the American Academy of Pediatrics (AAP) there are 162 discrete health advice directives that should be relayed to parents(30). It would take an average clinician approximately 35 minutes per child per year to provide the United States Preventive Services Task Force's strongest recommendations, which include counseling on topics such as nutrition and safety(31); this does not include all of the health advice directives of the AAP nor the time it takes to address parental concerns and conduct the physical exam. Assuming that the average infant makes it to 2.2 WCVs lasting 15 minutes each, there is simply not enough time to do everything, let alone to do it well.

### *Reimbursement and Resources*

While there is a major drive to increase the discussion of psychosocial issues and the use of developmental assessments in WCVs, reimbursement and resource constraints limit accessibility to these services. In general, there is low reimbursement for preventive services and essentially no reimbursement for certain developmental services(12). In addition, physicians are unable to bill or be reimbursed separately for assessments and the WCVs, making it difficult to offer these services.

Another issue is that the clinician may be unfamiliar with developmental diagnostic instruments, due to lack of time and/or training. There is a shortage of

available specialists for referral, diagnosis, and treatment of psychological and developmental disorders(32). Additionally, there is a limited supply of non-physicians, such as nurse practitioners and physician assistants, who can currently provide WCVs.

### *Physician Confidence and Skill*

Among the reasons for the inadequate amount of anticipatory guidance provided in WCVs are lack of physician training and lack of physician confidence that advice will be useful (11). Pediatricians are concerned that parents may not be interested in talking about certain topics with physicians. The importance of an issue to the physician and physician's confidence in specific topics are the most significant predictors – even more than physician attitudes towards time and reimbursement – of whether or not prevention counseling is provided(29).

### *Insurance and Usual Source of Care*

Having insurance is one of the most important predictors of receiving anticipatory guidance(10, 11). In the 1999 National Survey of America's Families, 76% of privately insured and 85% of publicly insured children met WCV recommendations, compared to 68% of uninsured children(33). Contrary to expectations, parents of children receiving public insurance, compared to those with private insurance, reported higher rates of both anticipatory guidance and developmentally related surveillance of family and community issues(34).

According to the National Survey of Early Childhood Health completed in 2000 for children aged 4-35 months, only 46% of children had a usual source of care. The

publicly insured, Hispanic, and non-English speaking sectors were less likely to have a usual source of care than other groups(35). Getting children insurance and establishing continuity and therefore creating an effective therapeutic relationship will offer the potential of overcoming racial, ethnic, and language barriers and may lead to an improved method of systematized tracking and outreach systems(36).

## **Recommendations for Change**

### *Parents*

Parents bring their children to WCVs not only to ensure their child's physical well being, but also to establish a source of care and gain reassurance about their child's development. Most parents recognize that they need advice on raising children and want information exchange on child development and parenting(37). Parents want to receive approval of their parenting skills and confirmation that they are doing what they are expected to do(12). The authority and voice of a pediatrician still has influence over parents(37).

Regarding WCVs, many families, and especially low-income families, are concerned about limited access, due to time and transportation constraints, as well as poor behavioral and developmental services. In a study that examines low-income parents' views on the redesign of well child care, several suggestions are made to improve the care their children are receiving. One is to provide alternative providers so that parents and children can receive better counseling, especially on child behavioral and developmental issues. Another is to offer alternative locations so that it would be more

convenient for children to get to the visit. Also, providing care at a day care or home would provide more context for the healthcare provider and can potentially lead to better relationships between the healthcare provider and family. Other suggestions include having different visit formats, such as a group visits, and using different modes of technology and communication (internet, e-mail, text, phone) to provide specific aspects of well child care(38).

### *Physicians*

Physicians also acknowledge that changes must be made to improve the quality of well child care in this country. When reflecting on WCVs, pediatricians most value the doctor-patient relationship that can only be built through multiple visits with the same clinician. They also want to direct more attention to developmental and behavioral concerns and to provide better support to families in those areas(39). Only 46% of pediatricians agree that there is enough time to perform developmental assessments and a mere 16.3% agree that there is enough time to address a family's psychosocial problems(40). Other areas of improvement include creating better coordination of community resources with pediatric offices and better infrastructure to improve surveillance, referrals, and patient education(39).

To combat these shortcomings, clinicians have numerous ideas for innovations. Suggestions include changing the organization of the practice to improve the delivery of WCV by collecting pre-visit information via questionnaires while families are in the waiting room. Other ideas include adding weekend or evening clinic to improve access to care, increasing responsibility for mid-level providers and nurses and providing social

worker or legal services at the clinic. Pediatric clinics can also schedule fewer, but longer WCVs to cover more material, limit the physical exam for the first two years to leave more time for discussion, conduct group WCVs(39) and hold immunization or vision screening clinics separately(12).

Further innovations involve improving relationships with resources already available within the community, improving relationships with school-based clinics run by mid-level providers and developing resources such as community mental health phone consultation system that can improve access to care. Connecting families, especially those in poverty, with legal advocacy services and child development and parenting specialists will also lead to better outcomes(41). Small changes such as naming specific visits in the first two years may help convey to the parent the purpose and importance of each WCV and help pediatricians prioritize the information they have to communicate during the visit. It also allows the parent to prepare questions related to the topic of the visit(12).

With improvements in information technology, numerous upgrades can be made to the practice of well child care. Starting with appointment scheduling, using a same-day appointment system, such as an Advanced Access model(42), may allow the parent and patient more flexibility, leading to better WCV attendance and immunization rates. Appointment reminders can be made through e-mails and families can also correspond with the clinic via e-mail. Patient screenings and education can be done online and accessed by the clinician prior to the child's next visit leading to better utilization of the actual visit. Nonclinical sources of information may be useful for parents since 74% of parents already gather childrearing information from books, magazine, TV and



videos(11). Electronic medical records will allow for straightforward access to information. These IT improvements may make it easier to organize regional or national efforts to improve healthcare, such as creating national registries on obesity or ADHD, so physicians may compare treatment and promote quality improvement. It may also allow for state-wide case management systems, leading to better social support for families(39).

### **Innovative Models**

Many ideas have been proposed to improve the delivery of developmental services and to increase the efficiency of office visits to improve overall well child care. There are many pilot studies with positive outcomes. Starting with interventions that may be easiest to implement, use of questionnaires before and after visits to screen for developmental disabilities show benefits without increasing financial or time costs(43). Studies that offer parenting groups to families report that families gain confidence in parenting skills and benefit from social networking within the groups, which decrease feelings of social isolation. Parents in the classes are also better at accessing relevant information on child and health and parenting than parents who only receive guidance in their WCVs(44, 45).

Offering “tiered visits,” allotting more time and more frequent visits to high risk families, identified by observing physical, behavioral, developmental, or family conditions(39), demonstrates positive results. The intervention group used contraceptives more (69% versus 47%), parents smoked less (27% versus 54%), had safer, more stimulating environment for their children and the children were less likely to be injured

(2% versus 7%). The intervention also improved WCV attendance (57% versus 37%) and decreased the time families received federal financial assistance by 4 months(46).

Providing additional services such as social workers and child development specialists has delivered mixed results. A study that attempted to increase access to and utilization of WCVs through case management and home visitation concluded that such a program was not an effective way to increase the number of WCVs(47). However, the Healthy Steps for Young Children program, which enhanced tradition pediatric care for children aged 0-3 years by including a child development specialist, demonstrated positive results. The specialist had more time to discuss preventive issues, conduct home visits, provide a telephone info line for developmental and behavioral concerns and create linkages to community resources. Families received more preventive and developmental services, attended more WCVs and were more satisfied with their visits. Families in the Healthy Steps program also showed better nutritional practices, developmental stimulation, disciplinary techniques and sleeping position than those in the control group(48).

International examples may also help guide methods that pediatricians in the United States can implement to improve their practices. In Australia, the Netherlands and Sweden, well child care services for acute, chronic, and behavioral/developmental problems are often provided by different clinicians and within different service systems – one physician is not responsible for all three aspects of care. Pediatricians are treated more as specialists and therefore are not expected to provide all portions of pediatric care in all ten countries studied (Australia Canada, Denmark, England, France Germany, Japan, Netherlands, Spain, and Sweden). All the countries have universal healthcare and

therefore a different payment scheme, which may lead to better WCV attendance, and many offer varied locations for care – clinics, schools, and daycares(49).

### **Group Well Child Care**

Group well child care incorporates several of the suggestions for innovation, such as increasing visit length, emphasizing discussions surrounding developmental and behavioral issues, and having social workers and/or child life specialists present to offer additional services that physicians may not be best equipped to provide.

Group well child care is a model of providing preventive visits that has been present in the literature since the late 1970s(50). In lieu of a one-on-one, 15-minute visit with a pediatrician, parents of similarly aged children are placed into groups of 6 to 8 and have a 90 to 120 minute visit with their healthcare provider. Additional providers, such as nurses, social workers, and child life specialists, may also be present to enhance the visit. During the session, there is an individual component where the physical exam is performed, however the majority of the visit occurs in a group setting. The 60 minutes dedicated to discussing developmental and behavior issues allows for more in-depth discussion(51). The nature of having 6 to 8 parents and one health care provider creates an environment where it may be easier for the provider to engage in shared decision-making and not didactic teaching; this may, in turn, enhance adherence to medical advice(52).

This model may increase social support and interaction within the group. The group can offer social support for mothers, which can improve the quality of mother-

child interactions and lead to a more secure attachment of the infant to their mother(53). Parents can share information regarding local community activities and services. The group set-up can also provide reassurance to the parent since they can observe children of the same age and learn about similarities and differences in their children's temperaments and behavior. From the child's perspective, the group visit may help associate the clinic with a more pleasant experience than viewing it simply as a place to receive vaccinations(17).

The longer visit increases time for health education, so the provider has more time to provide anticipatory guidance. The clinician can also offer parenting education to enhance the visit, have the opportunity to model behaviors and provide direct teaching and immediate feedback. As an added financial benefit, insurance companies pay for preventive healthcare, but not parenting classes, so this allows for the provider to be compensated for their time and the parents to benefit from the additional content. The provider can observe both parent-child interactions and child-child interactions in a relatively unstructured situation and obtain information that would be difficult to gather in an individual visit(17). The format may also prevent physician burn out by eliminating repetition of delivering preventive care recommendations that is associated with decreased physician satisfaction(14).

Studies demonstrate that the group format allows for greater discussion of recommended topics than individual visits and introduces other topics that are of interest to the parents(52). The content also covers more personal issues in a baby's daily care. Parent-child dyads attend more visits (3.4 visits for group dyads versus 2.9 visits for individual visits) and parent satisfaction is comparable to individual visits(17). In a

randomized trial of group versus individual care, maternal outcomes were the same; specifically, measures of competence, social isolation, functional measures for high risk women (younger than 20 years old, Medicaid recipients, less than a high school education, history of substance abuse, history of abuse as a child) were the same among mothers whose children were randomized to group WCVs compared to those randomized to individual WCVs(54). Associations were found between increased WCV attendance and decrease in avoidable hospitalizations, reduction in emergency department use and improved child health outcomes(55).

### **Cost Analysis**

While there are documented benefits to group WCVs, there have been no reports in a peer-reviewed journal about the costs of instituting a group model in a pediatric primary care setting. Implementation of a group model requires several healthcare providers, infrastructure to support the visit, and parents who want to receive this form of well child care. For a group model to be sustainable in practice, it must be cost neutral or cost saving.

In a study of a cost analysis of group *prenatal* care, if all women who plan to deliver in a small, rural, critical access hospital opt into a group care model run by a physician, a baseline financial breakeven point of 305 deliveries per year decreases to 302. If the group care provider shifts from a physician to a lower cost provider, such as a certified nurse midwife, the breakeven point decreases from 305 delivers per year to 218(56). These results demonstrate that group prenatal care can lead to lower overall

costs depending factors such as the specific healthcare provider and acceptance rate of group care. It also highlights the importance of conducting a cost analysis and considering the costs of group care against non-financial benefits of group care before implementing a group model.

While a cost analysis of group prenatal care exists, there are no published studies looking at costs of group well child care. We created theoretical models of individual and group visits with different healthcare providers, based on the protocol used in the group well child care study conducted at the Yale New Haven Pediatric Primary Care Center in partnership with Yale University and the Centering Healthcare Institute, to determine the various combinations of providers and group size that would be required to deliver group care in a cost neutral manner when compared to individual visits. This study can then be combined with clinical outcome data from group well child care visits to conduct a cost-benefit or cost-effective analysis, which can help healthcare organizations determine if group well child care is a feasible and beneficial model of care.

## **Statement of Purpose**

The purpose of this thesis is: 1. to calculate the costs of an individual WCV delivered by an APRN, a resident physician, and an attending physician, respectively, and of three corresponding group WCV models and 2. to determine if a group visit can be cost neutral or cost saving when compared to an individual well child visit by varying combinations of healthcare providers, group size, and physician salary. The three group models are: 1. APRN model facilitated by an APRN, with a nurse and social worker; 2. Resident physician model facilitated by a resident physician, with assistance from an attending physician, nurse, and child life specialist; and 3. Attending physician model facilitated by an attending physician with a nurse.

We hypothesize that it will be possible to calculate the costs of a WCV and to provide group WCVs in a cost neutral manner in all three models, thereby creating a sustainable approach to providing group well child care.

## **Methods**

We constructed several models to compare the costs of conducting a group WCV to the costs of conducting an individual WCV. In our models we varied the type of healthcare providers at the visit, length of time the providers were present, group size and physician salaries.

### **Individual Well Child Visit Model**

In the individual well child visit, the mother-child dyad receives one-on-one care by the primary healthcare provider. At the beginning of the visit, the dyad is brought to the examination room by the nurse who then collects the vital signs. Then the primary healthcare provider addresses parental concerns, performs the physical exam and provides appropriate anticipatory guidance. At the end of the visit the nurse returns to administer required vaccinations.

Based on scheduling at the Yale-New Haven Primary Care Center and local norms, we estimated the duration of an individual well child visit conducted by an APRN to be 20 minutes, one by a resident to be 30 minutes with the attending physician contributing 5 minutes to the visit, and one performed by an attending to be 15 minutes. We added 10 minutes of nursing time to each type of visit to account for the time it takes to bring the patient into the room, obtain vitals, and give vaccines (Table 1).



Table 1. Individual Well Child Visit: Contributions Made by Different Providers

<b>Type of Visit</b>	<b>Time in Minutes</b>	<b>Type of Provider</b>
APRN Visit	20	APRN
	10	Nurse
Resident Visit	30	Resident
	5	Attending
	10	Nurse
Attending Visit	15	Attending
	10	Nurse

### **Group Well Child Care: Basic Model**

In the group well child care model, the dyads receive care in a group setting. The nurse prepares the room for the visit and escorts each dyad to a large room equipped with an examination table and tools. In the center of the room is a circle of chairs that surrounds mats where the children can play.

Each group visit lasts approximately 90 minutes. During the first 30 minutes of the session, each dyad engages in three activities: 1. Mothers participate in self-care and baby-care activities such as weighing themselves and their babies with the assistance of the nurse. Mothers record and chart their baby's growth, their own weight, and their own blood pressure in the medical record; 2. Each dyad has individual time with the clinician. The clinician performs a physical exam on each baby and reviews the health assessment with the mother and other family members present at the visit. Individual questions are

addressed and, with the permission of the mother, discussion of issues that the healthcare provider believes would be of interest to the whole group are postponed until the group portion of the visit; 3. Mothers and other family members complete handouts and self-assessment sheets that will facilitate discussion during the next 60 minutes of the visit. If a social worker or child life specialist is available, they assist families with this activity and answer any questions that arise.

After each dyad completes all three activities, all dyads and healthcare providers come together to the circle for a facilitative discussion. During this time, questions asked and postponed during individual care time are addressed, in addition to the typical anticipatory guidance topics and subjects of importance for family well being (contraception, domestic violence, etc.). When a visit requires vaccinations or blood work, the nurse provides them at the end of the visit.

A typical overview of the content of a group well child care visit is show in Table 2 and a comparison of a group visit to an individual visit is presented in Table 3. Table 4 lists the healthcare providers that are present in each group model, which are described in the next section.

Table 2. Group Well Child Care Visit: Basic Model

<b>Group Well Visit Session</b>	
<b>Beginning of Visit</b>	Nurse brings families into group visit room
<b>First 30 Minutes</b>	1. Self-care and baby-care activities 2. Individual time with clinicians (physical exam and health assessment) 3. Complete handouts and self-assessment sheets
<b>Next 60 Minutes</b>	Facilitative discussion (anticipatory guidance, family well being)
<b>End of Visit</b>	Vaccinations and blood work as indicated

Table 3. Comparison of Individual versus Group Well Child Visit

<b>Activity</b>	<b>Individual</b>	<b>Group</b>
Nurse takes baby's vitals	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Self-care and baby-care activities	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Individual time with clinician	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Complete self-assessment sheets	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Facilitative group discussion	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Anticipatory guidance	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Vaccination and blood work as indicated	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Table 4. Healthcare Providers Participating in Each Group Well Child Visit Model

	<b>APRN Model</b>	<b>Resident Physician Model</b>	<b>Attending Model</b>
<b>Providers Present</b>	APRN	Resident Physician	Attending Physician
	Nurse	Attending Physician	Nurse
	Social Worker	Nurse	
		Child Life Specialist	

*Group Well Child Care: APRN Model*

This model is based on the protocol used in the group well child care study conducted at the Yale New Haven Pediatric Primary Care Center in partnership with Yale University and the Centering Healthcare Institute. In this model, the APRN is the principle healthcare provider and is responsible for performing the physical exam and facilitating the group discussion. A nurse and social worker are also present for the visit to enhance the group visit and provide support to the APRN and patients throughout the visit.

*Group Well Child Care: Resident Physician Model*

This model is based on a protocol that is currently being conducted at the Yale New Haven Pediatric Primary Care Center. In this model, a second-year resident physician is the principle healthcare provider and is responsible for performing the physical exam and facilitating the group discussion. Three additional personnel are

present in the visit for variable amounts of time: an attending supervises the visit and a nurse and child life specialist assist the resident physician and patients as needed.

#### *Group Well Child Care: Attending Physician Model*

We created a model that could be sustained outside of an academic primary care clinic setting. The attending physician is the principle healthcare provider and is responsible for performing the physical exam and facilitating the group discussion. The physician is supported by a nurse during the visit.

#### **Determination of Cost for Individual and Group Well Child Care Visit**

We obtained annual salaries for APRNs, second-year resident physicians, attending physicians in academic medicine, and social workers from administrative data from Yale New Haven Hospital, which were comparable to Bureau of Labor statistics(57). In the model utilizing attending physicians, we varied physician salaries from \$100,000-150,000 to reflect the range in different practices and geographic regions of the United States(58).

We converted the annual salaries into hourly salaries by assuming that all providers (APRN, resident physician, attending physician, nurse, social worker, and child life specialist) work 48 weeks per year and that APRNs work 40 hours per week, second-year resident physicians work 65 hours per week(59), attending physicians work 53 hours per week(58), and social workers work 40 hours per week.

We obtained hourly salaries for nurses and child-life specialists from hospital administrative data, which were similar to the statistics found in the Bureau of Labor data. Table 5 summarizes the costs of each healthcare provider.

Table 5. Salaries of Healthcare Providers

<b>Provider</b>	<b>Annual Salary</b>	<b>Total Hours/Week</b>	<b>Salary/Hour</b>	<b>Salary/Minute</b>
<b>APRN</b>	\$ 85,000	40	\$44.27	\$0.74
<b>MD (Resident)</b>	\$ 54,800	65	\$17.56	\$0.29
<b>MD (Attending) –</b>				
<b>Low Salary</b>	\$100,000	53	\$39.31	\$0.66
<b>MD (Attending) –</b>				
<b>High Salary</b>	\$150,000	53	\$58.96	\$0.98
<b>Nurse</b>	\$ 66,240	40	\$34.50	\$0.58
<b>Social Worker</b>	\$ 75,000	40	\$39.06	\$0.65
<b>Child Life Specialist</b>	\$ 38,400	40	\$20.00	\$0.33

We calculated the cost of an individual visit by using the information about healthcare provider salaries (Table 5) and the length of time each type of provider was present in an individual WCV (Table 1). This value was then used to establish economically viable combinations of healthcare providers and group size in the group

well child care model. The cost of an individual WCV was used as the breakeven point when creating the group WCV graphs which determined the combinations of nursing, social work, child life and attending time that could be offered during group visits of different sizes.

## **Analysis**

### *APRN Model*

We calculated the cost of an individual WCV performed by an APRN, requiring 20 minutes of APRN time and 10 minutes of nursing time. This value was used as the breakeven point to determine viable combinations of group size, nursing time and social worker time for the group well child care model.

We performed sensitivity analyses on the size of each group (1-8 dyads) and the length of time the nurse (0-120 minutes) and social worker (0-90 minutes) could be present in a session while maintaining costs at or below that of an individual visit. The nursing time was varied up to 120 minutes in all models, 30 minutes more than the length of the actual patient visit, to determine if more nursing time could be made available, because a group visit may create additional set-up, break-down, or patient care responsibilities. The social work time was varied up to 90 minutes, the duration of the actual visit. We assumed that the APRN must be present during the entire 90 minute visit and therefore kept APRN time fixed.

We produced graphs to demonstrate the combination of nursing time and social work time that could be provided with different group sizes, while keeping costs equal to that of an individual visit.

#### *Resident Physician Model*

We calculated the cost of an individual WCV performed by a second-year resident physician, requiring 30 minutes of resident time, 5 minutes of attending time using the low attending salary, and 10 minutes of nursing time. This value was used as the breakeven point to determine possible combinations of group size, attending time, nursing time, and child life specialist time for the group well child care model.

We performed sensitivity analyses on the size of each group (1-8 dyads) and the length of time the attending (30, 45, 60 and 90 minutes), nurse (0-120 minutes), and child life specialist (0-90 minutes) could be present in a session while maintaining costs at or below that of an individual visit. We established that the resident must be present during the entire 90 minute visit and therefore the time that she would be present was fixed.

We produced graphs to illustrate the combination of attending, nursing, and child life time that could be provided with different group sizes while keeping costs equal to that of an individual visit.

#### *Attending Physician Model*

We calculated the cost of an individual WCV performed by an attending physician, requiring 15 minutes of attending time and 10 minutes of nursing time. A low and high physician salary (\$100,000 and \$150,000) was used to obtain two values. These



numbers were used to determine practical combinations of group size and nursing time for the group well child care model.

We performed sensitivity analyses on the size of each group (1-8 dyads) and the length of time the nurse (0-120 minutes) could be present in a session while maintaining costs at or below that of an individual visit. We assumed that the attending must be present during the entire 90 minute visit and therefore the time that she would be present was fixed.

We produced graphs to show the nursing time that could be offered for different group sizes assuming a low or high physician salary.

All analyses were conducted using Microsoft Excel software (Microsoft Corporation, Redmond, WA).

## **Contributions**

The project was designed based on the protocol used in the group well child care study conducted at the Yale New Haven Pediatric Primary Care Center in partnership with Yale University and the Centering Healthcare Institute: “Integrating Well-Woman and Well-Baby Care to Improve Parenting and Family Wellness: Pilot Study.” The principle investigator was Dr. John Leventhal and the study was funded by the National Institute of Child Health & Human Development. The models for this thesis were designed by Dr. Marjorie Rosenthal and Ms. Hiromi Yoshida with valuable insights from Dr. Ada Fenick. Ms. Yoshida performed the sensitivity analysis by creating spreadsheets that varied group size, length of time healthcare providers can be present and physician

salaries, and produced the associated graphs. Ms. Yoshida wrote the initial draft of the thesis and Dr. Rosenthal provided critical revisions.

## Results

### *APRN Model*

The cost of an individual WCV performed by an APRN was \$20.51. We calculated this by using the length of time each provider was present during the visit (Table 1) and the salary per minutes of each provider (Table 5). The calculation is presented in Table 6.

Table 6. Calculation of Individual Well Child Visit

<b>Model</b>	<b>Calculation</b>
<b>APRN</b>	$(\text{APRN Sal/Min}^1) * (\text{Min/Visit}^2) + (\text{Nurse Sal/Min}) * (\text{Min/Visit}) =$ Cost of Individual WCV $(\$0.74) * (20\text{min}) + (\$0.58) * (10\text{min}) = \mathbf{\$20.51}$
<b>Resident Physician</b>	$(\text{Resident Sal/Min}) * (\text{Min/Visit}) + (\text{Attending Sal/Min}^3) * (\text{Min/Visit}) + (\text{Nurse Sal/Min}) * (\text{Min/Visit})$ = Cost of Individual WCV $(\$0.29) * (30\text{min}) + (\$0.66) * (5\text{min}) + (\$0.58) * (10\text{min}) = \mathbf{\$17.81}$
<b>Attending Physician – Low Salary</b>	$(\text{Attending Sal/Min}) * (\text{Min/Visit}) + (\text{Nurse Sal/Min}) * (\text{Min/Visit})$ = Cost of Individual WCV $(\$0.66) * (15\text{min}) + (\$0.58) * (10\text{min}) = \mathbf{\$15.58}$
<b>Attending Physician – High Salary</b>	$(\text{Attending Sal/Min}) * (\text{Min/Visit}) + (\text{Nurse Sal/Min}) * (\text{Min/Visit})$ = Cost of Individual WCV $(\$0.98) * (15\text{min}) + (\$0.58) * (10\text{min}) = \mathbf{\$20.49}$

<sup>1</sup>Salary/Minute

<sup>2</sup> Length of time provider is present during an individual WCV

<sup>3</sup> Use Attending Low Salary estimate for Academic Attending Salary

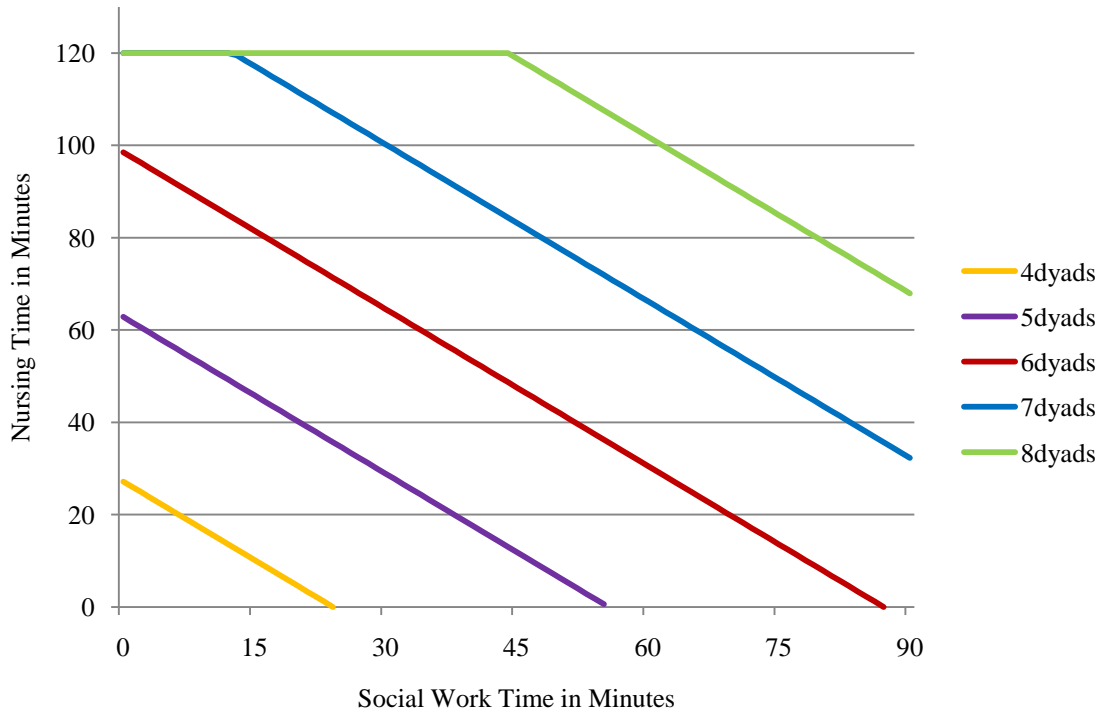
In the APRN model, which assumed that the APRN provided 90 minutes of care, a group visit could be conducted with 4 or more dyads while maintaining costs below \$20.51 for each dyad. In our model, more nursing time could be provided relative to social work time because nurses have a slightly lower salary than social workers. Any

combination of nursing time and social work time on each of the curves seen in Graph 1 could be provided for \$20.51 and any combination under each curve could be provided for less than the cost of individual care.

Our arrangements of cost-neutrality are demonstrated in Graph 1: for 4 dyads, up to 27 minutes of nursing or 24 minutes of social work time could be provided for \$20.51. For 5 dyads, up to 62 minutes of nursing or 55 minutes of social work time could be provided. For 6 dyads, up to 98 minutes of nursing or 87 minutes of social work time could be provided. For 7 dyads, up to 120 minutes of nursing with 12 minutes of social work time or 32 minutes of nursing with 90 minutes of social work time could be provided. For 8 dyads, up to 120 minutes of nursing with 44 minutes of social work time or 68 minutes of nursing with 90 minutes of social work time could be provided.

With a group of 7 or 8 dyads, the nurse could have 30 minutes outside of the visit to attend to any additional set-up, break-down, or patient care responsibilities created by a group visit, while keeping costs below that of an individual visit.

Graph 1. Breakeven Times for Nursing and Social Work Time in the APRN Model



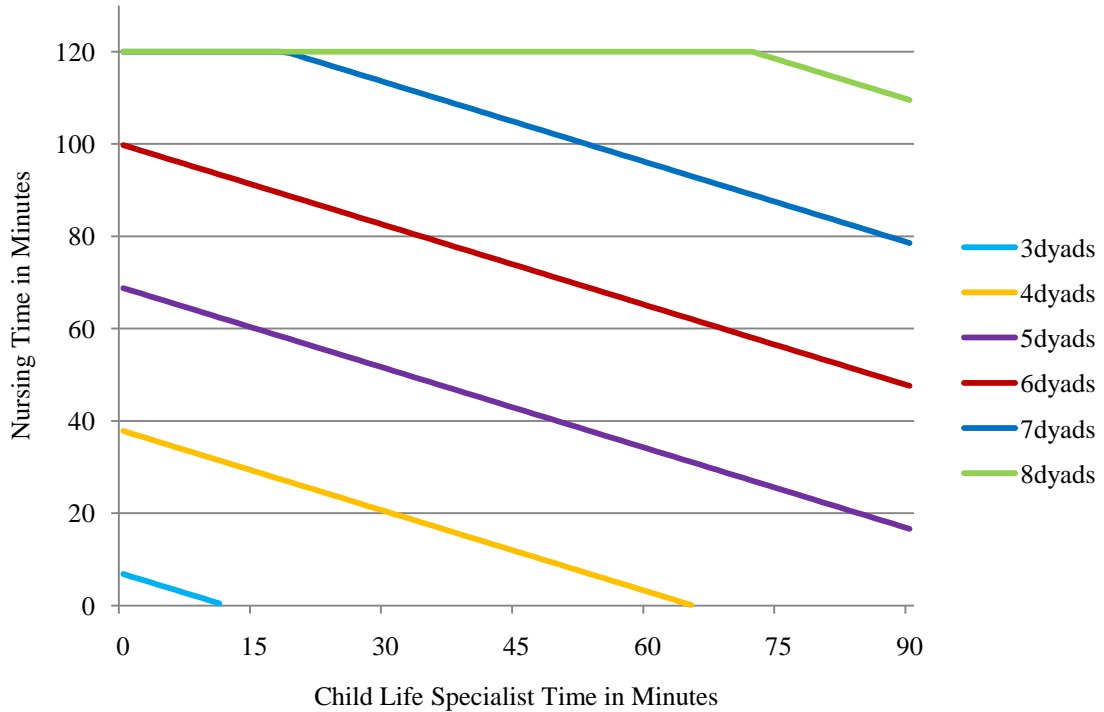
*Resident Physician Model*

The cost of one individual WCV led by a second-year resident under the supervision of an attending was \$17.81 (Table 6). In our model, more child life specialist time could be provided in proportion to nursing time because child life specialists have a slightly lower salary than nurses. Any combination of nursing time and child life specialist time on each of the curves seen in Graph 2-5 could be provided for \$17.81 and any combination under each curve could be provided for less than the cost of individual care.

*Resident Physician Model with 30 Minutes of Attending Time*

In the model that assumed an attending would be present for 30 minutes, a group visit could be conducted with 3 or more dyads (Graph 2). For 3 dyads, up to 6 minutes of nursing or 11 minutes of child life specialist time could be provided for less than \$17.81 per dyad. For 4 dyads, up to 37 minutes of nursing or 65 minutes of child life specialist time could be offered. For 5 dyads, up to 68 minutes of nursing or 16 minutes of nursing with 90 minutes of child life specialist time could be provided. For 6 dyads, up to 99 minutes of nursing or 47 minutes of nursing with 90 minutes of child life specialist time could be provided. For 7 dyads, 120 minutes of nursing with 18 minutes of child life specialist time or 78 minutes of nursing with 90 minutes of child life specialist time could be provided. For 8 dyads, up to 120 minutes of nursing with 71 minutes of child life specialist time or 109 minutes of nursing with 90 minutes of child life specialist time could be provided while remaining cost neutral, allowing the resident physician, nurse, and child life specialist to be present for most of the visit.

Graph 2. Breakeven Times for Nursing and Child Life Specialist Time with 30 Minutes of Attending Time in a Resident Physician Model



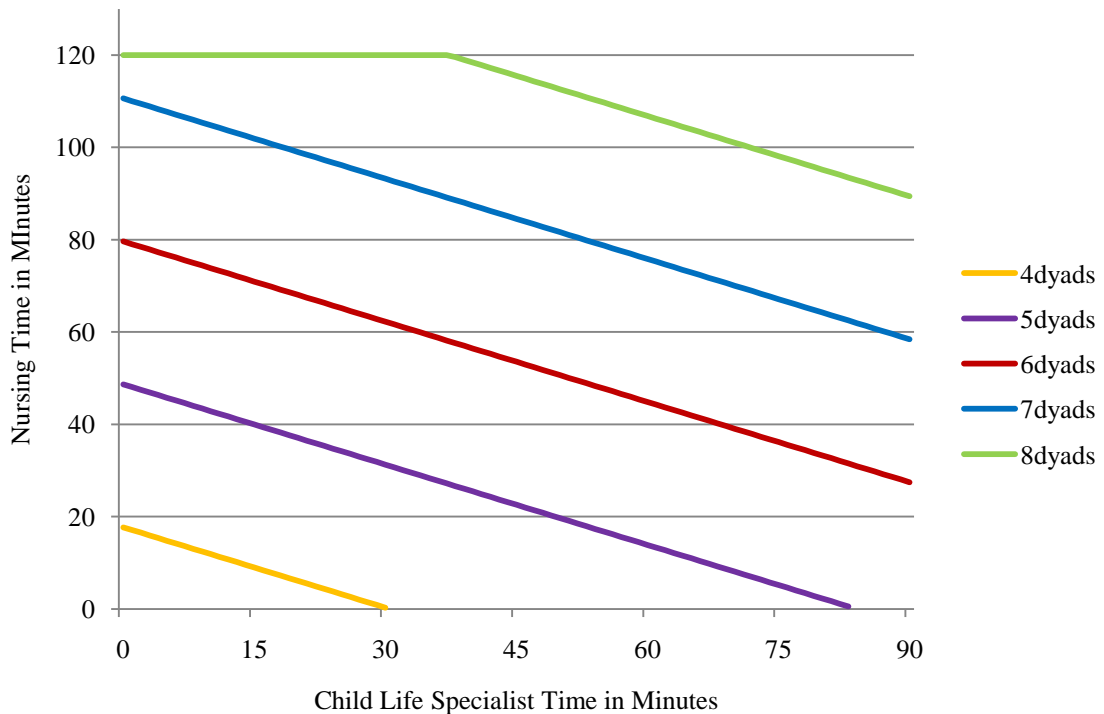
*Resident Physician Model with 45 Minutes of Attending Time*

In the model that assumed an attending would be present for 45 minutes, a group visit could be conducted with 4 or more dyads (Graph 3). For 4 dyads, up to 17 minutes of nursing or 30 minutes of child life specialist time could be provided per visit for less than \$17.81 per dyad. For 5 dyads, up to 48 minutes of nursing or 83 minutes of child life specialist could be provided. For 6 dyads, up to 79 minutes of nursing or 27 minutes of nursing time with 90 minutes of child life specialist time could be provided. For 7 dyads, 110 minutes of nursing or 58 minutes of nursing with 90 minutes of child life specialist time could be provided. For 8 dyads, up to 120 minutes of nursing with 37 minutes of



child life specialist time or 89 minutes of nursing 90 minutes of child life specialist time could be provided while remaining cost neutral.

Graph 3. Breakeven Times for Nursing and Child Life Specialist Time with 45 Minutes of Attending Time in a Resident Physician Model

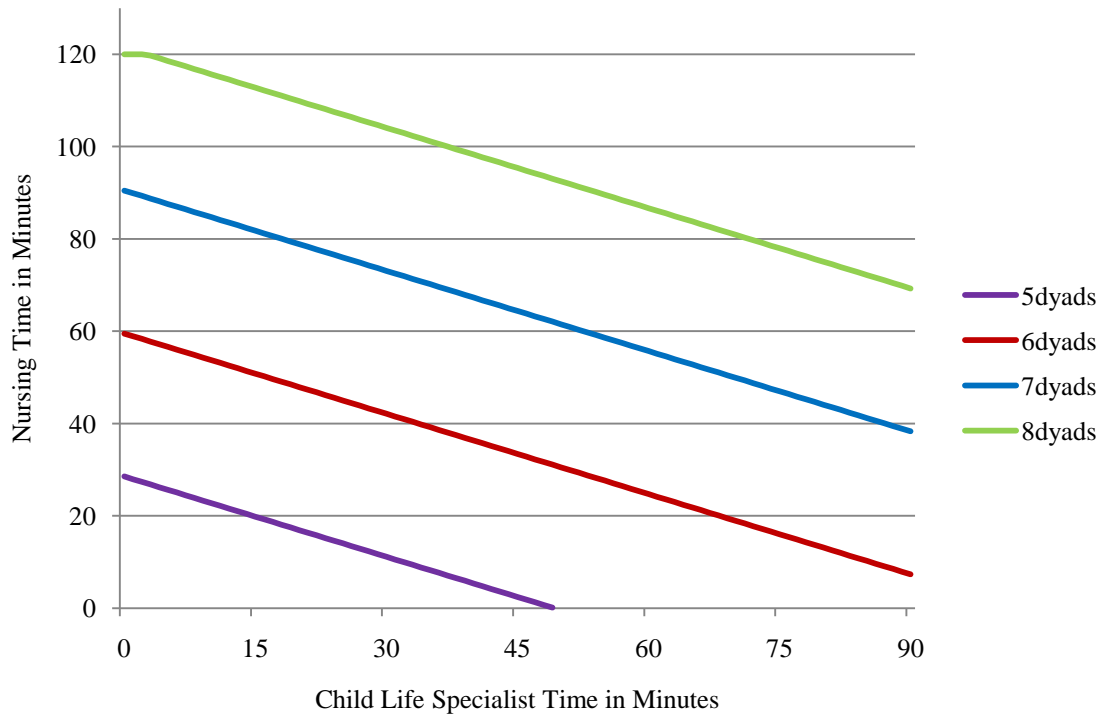


*Resident Physician Model with 60 Minutes of Attending Time*

In the model that assumed an attending would be present for 60 minutes, it was possible to conduct a group visit for groups with 5 or more dyads (Graph 4). For 5 dyads, up to 28 minutes of nursing or 49 minutes of child life specialist time could be provided while maintaining costs below \$17.81. For 6 dyads, up to 59 minutes of nursing or 7 minutes of nursing with 90 minutes of child life specialist time could be provided. For 7

dyads, 90 minutes of nursing or 38 minutes of nursing with 90 minutes of child life specialist time could be provided. For 8 dyads, up to 120 minutes of nursing with 3 minutes of child life specialist time or 69 minutes of nursing with 90 minutes of child life specialist time could be offered.

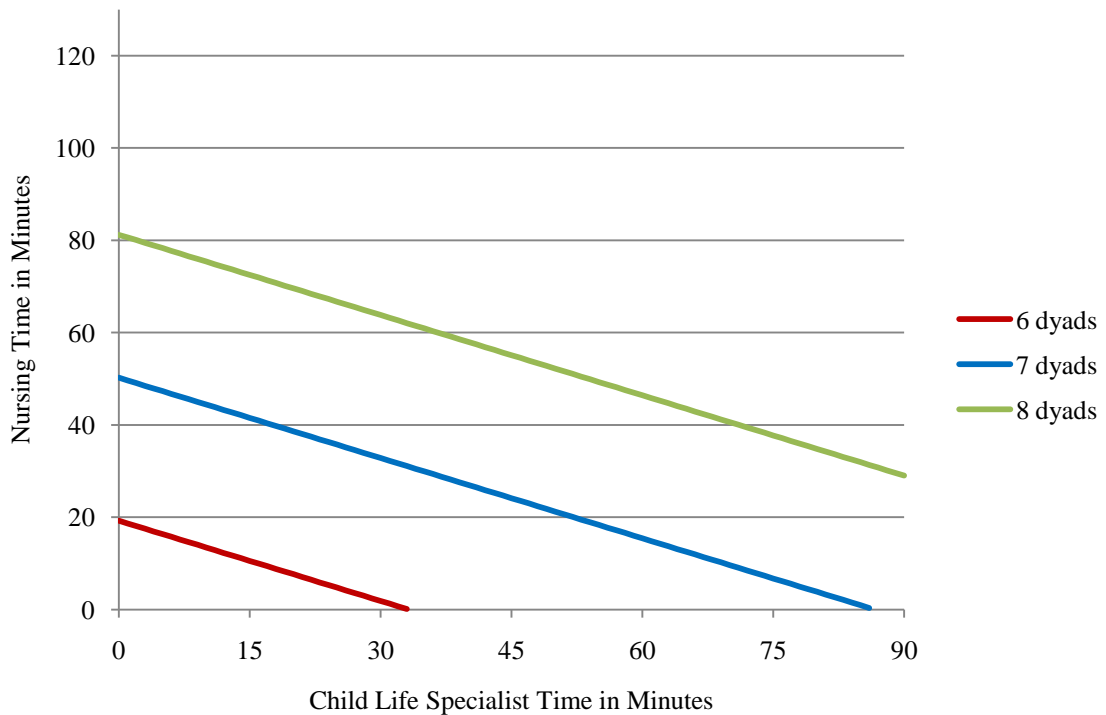
Graph 4. Breakeven Times for Nursing and Child Life Specialist Time with 60 Minutes of Attending Time in a Resident Physician Model



*Resident Physician Model with 90 Minutes of Attending Time*

In the model that assumed an attending would be present during the entire 90 minutes session, it was possible to have a group visit with 6 or more dyads and keep costs below \$17.81 for each dyad. As illustrated in Graph 5, for 6 dyads, up to 19 minutes of nursing or 33 minutes of child life specialist time could be provided. For 7 dyads, up to 50 minutes of nursing or 86 minutes of child life specialist time could be provided. For 8 dyads, up to 81 minutes of nursing or 29 minutes of nursing with 90 minutes of child life specialist time could be offered.

Graph 5. Breakeven Times for Nursing and Child Life Specialist Time with 90 Minutes of Attending Time in a Resident Physician Model



### *Attending Physician Model*

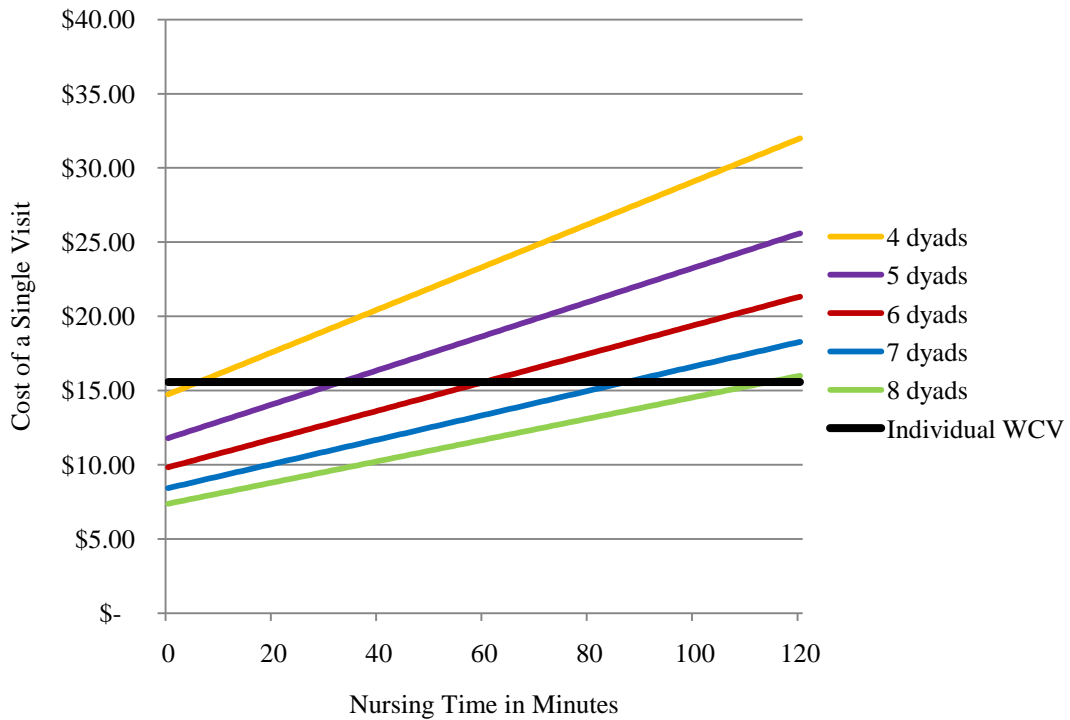
When accounting for a range in annual physician salaries from \$100,000 to \$150,000, the cost of an individual visit performed by an attending physician ranged from \$15.58 to \$20.49 (Table 6). These two values were used as a cut-off point for determining feasible combinations of group size and nursing time for the attending physician group well child care model. Any combination of group size and nursing time under the “Individual WCV” line are cost saving combinations (Graph 6 and 7).

### *Attending Physician Model with Low Salary*

Assuming a low annual physician salary of \$100,000, a group visit could be conducted with 4 or more dyads although nursing time was severely limited with 4 dyads (Graph 6). For 4 dyads, 5 minutes of nursing time could be provided during the visit while maintaining costs under \$15.58 per visit for each dyad. For 5 dyads, up to 32 minutes of nursing time could be provided. For 6 dyads, up to 60 minutes of nursing time could be provided. For 7 dyads, up to 87 minutes of nursing time could be provided and for 8 dyads, up to 114 minutes of nursing time could be provided while remaining cost neutral.

With a group of 8, the nurse could have 24 minutes outside of the visit to attend to any additional set-up, break-down, or patient care responsibilities created by a group visit, while keeping costs below that of an individual visit.

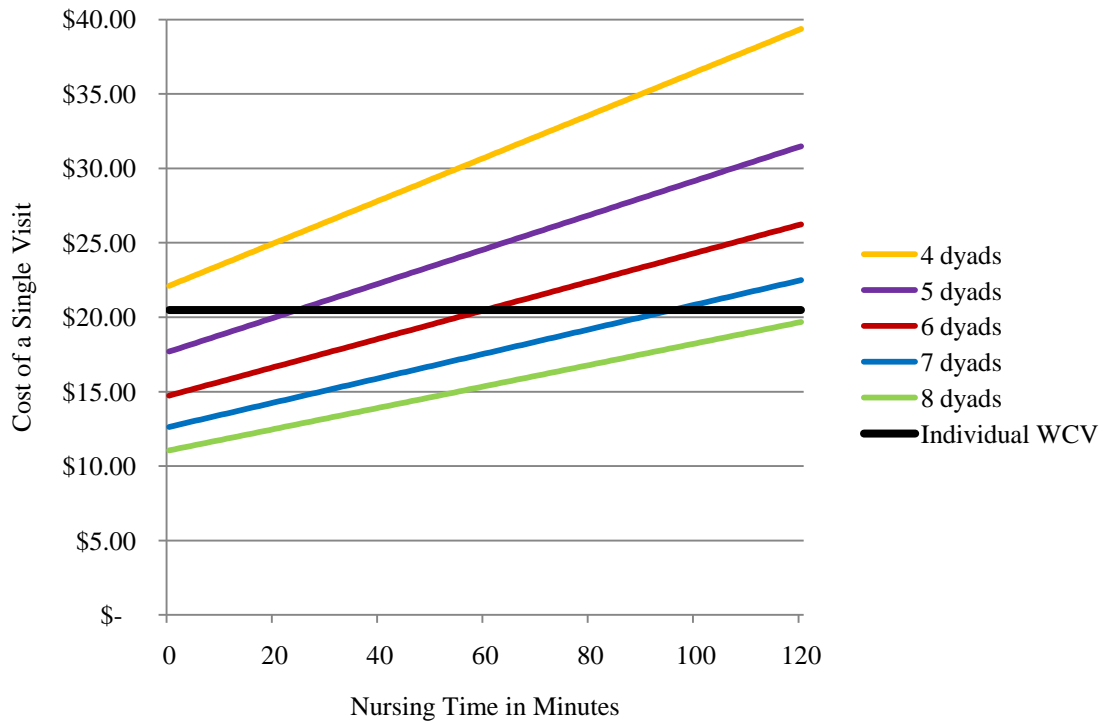
Graph 6. Nursing Time that Could be Provided in Group WCV While Keeping Cost Neutral or Cost Saving with a Low Attending Salary



*Attending Physician Model with High Salary*

Assuming a high annual physician salary of \$150,000, a group visit could be conducted with 5 or more dyads while maintaining costs below that of an individual WCV (Graph 7). For 5 dyads, up to 24 minutes of nursing time could be provided. For 6 dyads, up to 60 minutes of nursing time could be provided. For 7 dyads, up to 95 minutes of nursing time could be provided and for 8 dyads, over 120 minutes of nursing time could be provided while keeping costs under \$20.49.

Graph 7. Nursing Time that Could be Provided in Group WCV While Keeping Cost Neutral or Cost Saving with a High Attending Salary



## Discussion

This study demonstrated that it is feasible to provide group well child care visits in a cost neutral manner in models by optimizing the group size and the length of time specific healthcare providers are present during the visit. We achieved cost-neutrality in the group model at four dyads in the APRN model; we achieved cost-neutrality in three, four, five, and six dyads in the resident physician model with, respectively 30, 45, 60 and 90 minutes of attending supervision; and we achieved cost-neutrality at four dyads in the attending model with a low salary, and at five dyads in the attending model with a high salary. In the APRN and resident physician model, the dyads benefit not only from the unique group visit structure, but also from the additional expertise and resources offered by the nurse and social worker or child life specialist.

It appears that having four to five dyads per group session in any of the models allows for the visit to be cost neutral in comparison to an individual WCV. In the pilot studies performed at Yale with APRNs and pediatric residents, it appeared that group visits consisting of three to six dyads was ideal in order to have good group dynamics and psychosocial interactions. When groups fall below three dyads, it become difficult to elicit participation from group members and when the groups are too large, it becomes challenging for the clinician to manage the discussion and attend to the individual needs of the patients and their families, even with the additional healthcare providers present.

We attempted to create combinations of healthcare providers that would be available in many practices to make our results generalizable. The APRN model was based on the group well child care study conducted at the Yale New Haven Pediatric

Primary Care Center. The resident physician model was also based on a protocol for a study being conducted at the Yale New Haven Pediatric Primary Care Center. This model was created with the understanding that for group well child care to grow in the community, future community pediatricians need to have exposure to and experience running group sessions. Lastly, the attending physician model was created to determine if group WCVs could be conducted by pediatricians in the community.

There are several limitations to our study. We only considered personnel costs when evaluating the cost of each type of WCV. We did not include the cost of finding and renting extra space that a group visit may require, the cost of training people in the group well child care model, nor the cost of handouts and self-assessment sheets that may be distributed in a group visit. Additionally, we only created three different group models to compare the costs of conducting a group WCV to the costs of conducting an individual WCV. However, we understand that healthcare organizations may have to alter combination of clinicians that may be present and the structure of group WCV to best fit their practice. These changes may have different economic consequences. There are many variations that can be created with these models. It is possible to have a model where the attending physician would only be present for the medical examination portion of the visit and the rest of the visit would be facilitated by a nurse, social worker, and/or child life specialist. The cost analysis model may change as the roles and responsibilities of healthcare providers evolve.

Finally, our cost analysis did not assess the non-economic impact that a group WCV may have. Group well child care has been associated with increased overall attendance<sup>(17)</sup> and have similar outcomes of child development, maternal mental health,



and emergency department utilization when compared to individual care(54), but we did not quantify the clinical benefits that the group model may impart in our analyses. It would be interesting to analyze the clinical outcomes data from the “Integrating Well-Woman and Well-Baby Care to Improve Parenting and Family Wellness: Pilot Study,” a study conducted at the Yale New Haven Pediatric Primary Care Center, to quantify the positive effects of group well child care. We could then combine the data collected on healthcare utilization, parenting skills, and maternal and child health and psychosocial behaviors with a cost analysis similar to the one completed in this study to conduct a cost-benefit or cost-effectiveness analysis of group care.

It would be useful to determine the minimal amount of time nurses, social workers, and child life specialists need to make a positive impact on patients and their families. This will allow healthcare organizations to allocate providers in the most cost effective manner, benefiting both the patients and the practice. In addition, it would be beneficial to establish the ideal range of dyads needed to make a group visit most effective.

In order for group well child care to be cost neutral, groups need to exceed a certain threshold. In an academic setting with a resident physician leading the visit, it may be possible to have groups as small as three, but in a community setting, groups need to have five or more dyads to remain cost neutral. An obstacle to reaching a critical group size may be preconceived notions that parents have of group WCVs. Some parents may not be as accepting of the group model because of privacy concerns, comparisons being made between children, and a sense of intrusion on their individual time with their pediatrician(60). Also, scheduling may be a challenge especially once mothers go back to

work, since the visits are longer and more schedules must be coordinated for each visit(55). It will be necessary to establish the benefits of group WCV to alleviate parental concerns and overcome potential barriers in meeting the minimum number of participants required to provide group care in a cost neutral manner.

## **Conclusion**

Group well child care is an innovative way to conduct health supervision visits that may allow pediatricians to better serve the needs of patients and their families. However, even with all of the benefits of group well child care, it will not gain widespread acceptance unless we can describe and understand the potential costs associated with the model. In this study, we assessed whether or not group WCV could be delivered in a cost neutral manner when compared to individual WCV in three different models. We demonstrated that group well child care can be delivered by APRNs, resident physicians, and physicians in a fiscally responsible manner by optimizing group size and contributions made by nurses, social workers, and/or child life specialists.

These models may serve as a basis for assessing the costs of other well child care innovations. In addition, these findings may promote dissemination of the group visit model in different types of practices. Future research should further explore the clinical benefits that group well child care offers so that a cost-benefit or cost-effective analysis can be conducted, broadening acceptance of the group well child care model.

## References

1. Markel, H. 2000. *Formative Years: Children's Health in the United States, 1880-2000*. Ann Arbor: University of Michigan Press. 1-16 pp.
2. 2008. *Bright Futures: Guidelines for Health Supervision for Infants, Children, and Adolescents*. Elk Grove Village, IL: American Academy of Pediatrics.
3. Kemper, K.J. 1992. Self-administered questionnaire for structured psychosocial screening in pediatrics. *Pediatrics* 89:433-436.
4. DuPlessis, H.M., Boulter, S.C., Cora-Bramble, D., Feild, C.R., Handal, G.A., Katcher, M.L., Marino, R.V., Rushton, F.E., Bell, W.C., Wood, D.L., et al. 2005. The pediatrician's role in community pediatrics. *Pediatrics* 115:1092-1094.
5. Osborn, L.M. 1994. Effective well-child care. *Current Problems in Pediatrics* 24:306-326.
6. Hakim, R.B., and Ronsaville, D.S. 2002. Effect of compliance with health supervision guidelines among US infants on emergency department visits. *Archives of Pediatrics & Adolescent Medicine* 156:1015-1020.
7. Hakim, R.B., and Bye, B.V. 2001. Effectiveness of compliance with pediatric preventive care guidelines among medicaid beneficiaries. *Pediatrics* 108:90-97.
8. DeVoe, J.E., Saultz, J.W., Krois, L., and Tillotson, C.J. 2009. A medical home versus temporary housing: The importance of a stable usual source of care. *Pediatrics* 124:1363-1371.
9. Friedberg, M.W., Hussey, P.S., and Schneider, E.C. 2010. Primary care: a critical review of the evidence on quality and costs of health care. *Health Affairs* 29:766-772.
10. O'Malley, A.S., and Forrest, C.B. 1996. Continuity of care and delivery of ambulatory services to children in community health clinics. *Journal of Community Health* 21:159-173.
11. Schuster, M.A., Duan, N., Regalado, M., and Klein, D. 2000. Anticipatory guidance - What information do parents receive? What information do they want? *Archives of Pediatrics & Adolescent Medicine* 154:1191-1198.
12. Schor, E.L. 2004. Rethinking Well-Child Care. *Pediatrics* 114:210-216.

13. Ferris, T.G., Saglam, D., Stafford, R.S., Causino, N., Starfield, B., Culpepper, L., and Blumenthal, D. 1998. Changes in the daily practice of primary care for children. *Archives of Pediatrics & Adolescent Medicine* 152:227-233.
14. Rushton, F.E. 2009. US health-care crisis. *Pediatrics International* 51:603-605.
15. Freed, G.L., Clark, S.J., Pathman, D.E., and Schectman, R. 1999. Influences on the receipt of well-child visits in the first two years of life. *Pediatrics* 103:864-869.
16. Byrd, R.S., Hoekelman, R.A., and Auinger, P. 1999. Adherence to AAP guidelines for well-child care under managed care. *Pediatrics* 104:536-540.
17. Osborn, L.M. 1989. Group well-child care offers unique opportunities for patient education. *Patient Education and Counseling* 14:227-234.
18. Minkovitz, C.S., Hughart, N., Strobino, D., Scharfstein, D., Grason, H., Hou, W., Miller, T., Bishai, D., Augustyn, M., McLearn, K.T., et al. 2003. A practice-based intervention to enhance quality of care in the first 3 years of life the - Healthy steps for young children program. *Journal of the American Medical Association* 290:3081-3091.
19. Bethell, C., Peck, C., and Schor, E. 2001. Assessing health system provision of well-child care: The Promoting Healthy Development Survey. *Pediatrics* 107:1084-1094.
20. Reisinger, K.S., and Bires, J.A. 1980. Anticipatory guidance in pediatric practice. *Pediatrics* 66:889-892.
21. Kaufmann, R.B., Clouse, T.L., Olson, D.R., and Matte, T.D. 2000. Elevated blood lead levels and blood lead screening among US children aged one to five years: 1988-1994. *Pediatrics* 106:7.
22. Bordley, W.C., Margolis, P.A., Stuart, J., Lannon, C., and Keyes, L. 2001. Improving preventive service delivery through office systems. *Pediatrics* 108:8.
23. Holl, J.L., Szilagyi, P.G., Rodewald, L.E., Shone, L.P., Zwanziger, J., Mukamel, D.B., Trafton, S., Dick, A.W., Barth, R., and Raubertas, R.F. 2000. Evaluation of New York State's Child Health Plus: Access, utilization, quality of health care, and health status. *Pediatrics* 105:711-718.
24. Campbell, J.R., Schaffer, S.J., Szilagyi, P.G., Oconnor, K.G., Briss, P., and Weitzman, M. 1996. Blood lead screening practices among US pediatricians. *Pediatrics* 98:372-377.

25. Bethell, C., Reuland, C.H.P., Halfon, N., and Schor, E.L. 2004. Measuring the quality of preventive and developmental services for young children: National estimates and patterns of clinicians' performance. *Pediatrics* 113:1973-1983.
26. Galuska, D.A., Fulton, J.E., Powell, K.E., Burgeson, C.R., Pratt, M., Elster, A., and Griesemer, B.A. 2002. Pediatrician counseling about preventive health topics: Results from the physicians' practices survey, 1998-1999. *Pediatrics* 109.
27. Barkin, S.L., Scheindlin, B.J., Brown, C., Ip, E., Finch, S., and Wasserman, R.C. 2005. Anticipatory guidance topics: Are more better? *Ambulatory Pediatrics* 5:372-376.
28. Center for Disease Control and Prevention. 2009. National Immunization Survey. Atlanta, GA: Centers for Disease Control and Prevention.
29. Cheng, T.L., DeWitt, T.G., Savageau, J.A., and O'Connor, K.G. 1999. Determinants of counseling in primary care pediatric practice - Physician attitudes about time, money, and health issues. *Archives of Pediatrics & Adolescent Medicine* 153:629-635.
30. Belamarich, P.F., Gandica, R., Stein, R.E.K., and Racine, A.D. 2006. Drowning in a sea of advice: Pediatricians and American Academy of Pediatrics policy statements. *Pediatrics* 118:E964-E978.
31. Yarnall, K.S.H., Pollak, K.I., Ostbye, T., Krause, K.M., and Michener, J.L. 2003. Primary care: Is there enough time for prevention? *American Journal of Public Health* 93:635-641.
32. Sand, N. 2005. Pediatricians' reported practices regarding developmental screening: do guideline work? Do they help? *Pediatrics* 116:174-179.
33. Yu, S.M., Bellamy, H.A., Kogan, M.D., Dunbar, J.L., Schwalberg, R.H., and Schuster, M.A. 2002. Factors that influence receipt of recommended preventive pediatric health and dental care. *Pediatrics* 110:8.
34. Olson, L.M., Inkelas, M., Halfon, N., Schuster, M.A., O'Connor, K.G., and Mistry, R. 2004. Overview of the content of health supervision for young children: Reports from parents and pediatricians. *Pediatrics* 113:1907-1916.
35. Inkelas, M., Schuster, M.A., Olson, L.M., Park, C.H., and Halfon, N. 2004. Continuity of primary care clinician in early childhood. *Pediatrics* 113:1917-1925.
36. Chung, P.J., Lee, T.C., Morrison, J.L., and Schuster, M.A. 2006. Preventive care for children in the United States: Quality and barriers. *Annual Review of Public Health* 27:491-515.

37. Young, K.T., Davis, K., Schoen, C., and Parker, S. 1998. Listening to parents - A national survey of parents with young children. *Archives of Pediatrics & Adolescent Medicine* 152:255-262.
38. Coker, T.R., Chung, P.J., Cowgill, B.O., Chen, L., and Rodriguez, M.A. 2009. Low-income parents' views on the redesign of well-child care. *Pediatrics* 124:194-204.
39. Tanner, J.L., Stein, M.T., Olson, L.M., Frintner, M.P., and Radecki, L. 2009. Reflections on well-child care practice: A national study of pediatric clinicians. *Pediatrics* 124:849-857.
40. American Academy of Pediatrics. 2001. *Periodic Survey of Fellows 46*. Elk Grove Village, IL: American Academy of Pediatrics.
41. Zuckerman, B., and Parker, S. 1995. Preventive pediatrics - New models of providing needed health-services. *Pediatrics* 95:758-762.
42. Murray, M., and Berwick, D.M. 2003. Advanced access - Reducing waiting and delays in primary care. *Journal of the American Medical Association* 289:1035-1040.
43. Glascoe, F.P., Foster, E.M., and Wolraich, M.L. 1997. An economic analysis of developmental detection methods. *Pediatrics* 99:830-837.
44. Hanna, B.A., Edgecombe, G., Jackson, C.A., and Newman, S. 2002. The importance of first-time parent groups for new parents. *Nursing & Health Sciences* 4:209-214.
45. Telleen, S., Herzog, A., and Kilbane, T.L. 1989. Impact of a family support program on mothers social support and parenting stress. *American Journal of Orthopsychiatry* 59:410-419.
46. Margolis, P.A., Stevens, R., Bordley, W.C., Stuart, J., Harlan, C., Keyes-Elstein, L., and Wisseh, S. 2001. From concept to application: The impact of a community-wide intervention to improve the delivery of preventive services to children. *Pediatrics* 108.
47. Schuster, M.A., Wood, D.L., Duan, N.H., Mazel, R.M., Sherbourne, C.D., and Halfon, N. 1998. Utilization of well-child care services for African-American infants in a low-income community: Results of a randomized, controlled case management home visitation intervention. *Pediatrics* 101:999-1005.
48. Zuckerman, B., Parker, S., Kaplan-Sanoff, M., Augustyn, M., and Barth, M.C. 2004. Healthy steps: A case study of innovation in pediatric practice. *Pediatrics* 114:820-826.

49. Kuo, A.A., Inkelas, M., Lotstein, D.S., Samson, K.M., Schor, E.L., and Halfon, N. 2006. Rethinking well-child care in the United States: An international comparison. *Pediatrics* 118:1692-1702.
50. Stein, M.T. 1977. Providing of well-baby care within parent-infant groups - Pediatricians are encouraged to explore parent-infant group model in their practices. *Clinical Pediatrics* 16:825-828.
51. Osborn, L.M. 1985. Group well-child care. *Clinics in Perinatology* 12:355-365.
52. Dodds, M., Nicholson, L., Muse, B., and Osborn, L.M. 1993. Group health supervision visits more effective than individual visits in delivering health-care information. *Pediatrics* 91:668-670.
53. Crockenberg, S.B. 1981. Infant irritability, mother responsiveness, and social support influences on the security of infant-mother attachment. *Child Development* 52:857-865.
54. Taylor, J.A., and Kemper, K.J. 1998. Group well-child care for high-risk families - Maternal outcomes. *Archives of Pediatrics & Adolescent Medicine* 152:579-584.
55. Osborn, L.M., and Woolley, F.R. 1981. Use of groups in well childcare. *Pediatrics* 67:701-706.
56. Mooney, S.E., Russell, M.A., Prairie, B., Savage, C., and Weeks, W.B. 2008. Group prenatal care: an analysis of cost. *J Health Care Finance* 34:31-41.
57. Bureau of Labor Statistics. 2010. May 2009 National Occupational Employment and Wage Estimates United States: Healthcare Practitioner and Technical Occupations.
58. Leigh, J.P., Tancredi, D., Jerant, A., and Kravitz, R.L. 2010. Physician Wages Across Specialties Informing the Physician Reimbursement Debate. *Archives of Internal Medicine* 170:1728-1734.
59. November 11, 2010. Personal communication with the Chief Pediatrics Resident at Yale New Haven Hospital.
60. Radecki, L., Olson, L.M., Frintner, M.P., Tanner, J.L., and Stein, M.T. 2009. What do families want from well-child care? Including parents in the rethinking discussion. *Pediatrics* 124:858-865.