The Association of Family Continuity with Infant Health Service Use

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Purpose: **Continuity of care is a fundamental component of family medicine that has been shown to improve health care quality. Family continuity, when different family members are seen by the same clinician or practice, has not been well studied.**

Methods: **We performed a retrospective cohort study of Medicaid enrollees in Oregon using administrative data. Infants were determined to have family continuity if they received well-baby care at the same clinic as that in which their mothers received prenatal care.**

Results: **Of the 1591 infants identified for participation in this study, 749 (47.1%) had family continuity. Infants had a mean of 4.55 well-child visits, 1.23 emergency department visits, and 0.17 hospitalizations in the first 13 months of life. Multivariate analyses found that infants with family continuity had increased numbers of well-child visits (relative risk, 1.05; $P = .041$), increased numbers of emergency department visits (relative risk, 1.36; $P < .0001$), and no difference in the number of hospitalizations (relative risk, 0.85; $P = .282$) when compared with infants without family continuity.**

Conclusions: **Family continuity, when measured at the clinic level, is associated with a variable effect on infant health service use. This finding suggests that clinic-level continuity is not sufficient for achieving all the benefits of continuity. (J Am Board Fam Med 2008;21:385–391.)**

Continuity of care, defined as having a sustained relationship with a health care provider, is a fundamental component of primary care.[1] This definition of continuity, sometimes called interpersonal continuity, resonates best with clinicians.[2,3] Studies suggest that interpersonal continuity leads to improved trust and interpersonal knowledge between a patient and a provider, and thereby can lead to improved care.[4] Other definitions of continuity exist. For example, the phrase "team continuity" has been used to refer to the relationship of an individual patient with a team of health care providers who have access to common records and provide coordinated care.[1]

Although the findings are mixed, current evidence indicates that continuity is associated with improved preventive care,[5] immunizations,[6,7] compliance with medication prescriptions,[8–10] and physician recognition of medical problems.[11–13] Evidence also shows continuity is associated with reduced rates of hospital admissions,[14] reduced rates of emergency department visits,[15–17] and improved control of chronic diseases such as diabetes mellitus.[18] Patients who have continuity with a physician are more satisfied with their care,[19–21] are more likely to keep follow-up appointments,[19,22] and communicate better with their physician.[23] In addition, patients rank continuity as a high priority in their medical care.[24,25]

Continuity is usually conceptualized as something that occurs for an individual patient, ie, the extent to which an individual patient sees the same health care provider or team. However, health care also occurs in the context of the family. In other words, family continuity could be conceptualized as the extent to which different family members see the same health care provider or team over time. In fact, the Institute of Medicine defines primary care

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as being grounded "in the context of the family."[1] It therefore makes sense to measure continuity not only for the individual, but also for the family. Examining continuity of care in the context of the family may be helpful for better understanding how continuity influences care.

Family continuity may be particularly important for infants. In most cases, a pregnant woman will have developed a sustained relationship with a health care provider during prenatal care, which ideally would result in mutual interpersonal knowledge and trust. If the mother's prenatal provider becomes the baby's provider, the growing family can take advantage of the continuity relationship that has already developed. This is particularly important for children, because they do not make their own health care decisions; it is usually the mother who makes health care decisions for them. Therefore, the relationship between the mother and her provider could translate to positive benefits for the baby. This could be particularly important for uninsured and underinsured children who are at increased risk for poor quality health care.[26]

One previous study that examined the potential benefits of family continuity in infancy[27] found that family continuity was associated with improved immunization rates for low-income children. In the current study we examined the association between family continuity and infant health service use. We hypothesized that infants with family continuity would have more well-child visits, fewer emergency department (ED) visits, and fewer hospitalizations compared with those without family continuity.

Methods

Study Design

We performed a retrospective cohort study of Medicaid enrollees using administrative data from Oregon's largest Medicaid-only managed care plan CareOregon. Infants with family continuity were compared with infants without family continuity for 3 measures of health service use: (1) well-child visits, (2) ED visits, and (3) hospitalizations. Oregon Health & Science University's Internal Review Board reviewed this project and granted an exemption from review.

Study Population

Infants enrolled in CareOregon born between 1 January 1998 and 31 August 2001 were enrolled in the study. CareOregon's total enrollment during this period was approximately 75,000 patients; approximately 2,000 births per year were covered.

To be eligible for inclusion in the study, infants had to be live singleton births, continuously enrolled with CareOregon from birth until 13 months of age, whose mothers were also continuously enrolled with CareOregon during the infant's prenatal period, defined as 20 weeks before birth until birth. Continuous enrollment was defined as having no more than one break in enrollment lasting no more than 30 days; this was required so that all health care claims could be captured during the period of interest.

Infants were excluded from the study if they had evidence of birth complications or if they had no claims activity during the study period. Birth complications were defined as infants with birth hospitalizations longer than 4 days; we excluded these children to reduce the impact of serious medical illnesses on outcome variables.

Data

Personnel from CareOregon identified infants who met the enrollment/eligibility criteria and extracted all claims data for the 5-year period of the study (15 August 1997 to 30 September 2002). The claims data were extracted for all infants and their mothers in May 2003, allowing for an 8-month lag period to capture all claims. In addition to claims data, demographic data and Medicaid eligibility category were also extracted. All data were blinded and CareOregon provided a linking identifier that connected each infant and mother.

Variables

Independent variable: family continuity

Family continuity was defined by the mother and baby having the same provider of outpatient care according to claims data. Provider was defined by clinic rather than by individual clinician because providers frequently bill under a group billing number, especially nurse practitioners, physician assistants, and residency teaching programs, which represent a high percentage of prenatal care for Medicaid clients in Oregon. The baby's provider was defined as the clinic at which the majority of well-child visits occurred during the first 13 months of life. Family continuity was achieved if the baby's mother ever saw the baby's predominant provider group during the prenatal period.

Outcome Variables

Our outcome variables included well-child visits, ED visits, and hospital admissions. Well-child visits were defined by Current Procedural Terminology (CPT) codes for well-child visits (99381, 99382, 99391, and 99392). Emergency department visits were defined by CPT codes (90281 to 90285) and revenue codes (450, 451, 452, 459). Hospitalizations were defined by CPT codes (99217 to 99223, 99231 to 99239); claims separated by fewer than 2 days were considered as part of the same hospitalization. Birth hospitalizations, defined as a hospital claim with a start date no more than 2 days after birth, were excluded from the measure of hospital admissions.

Analysis

Our primary analysis examined the association between family continuity and each outcome variable. We compared the mean number of well-child visits, ED visits, and hospital admissions during the 13-month study period in the continuity group and the noncontinuity group. For well-child visits, which were normally distributed, we used the independent samples *t* test, with $P < .05$ as the cutoff for statistical significance. Emergency department visits and hospital admissions were not normally distributed and, therefore, for this comparison we used the Mann-Whitney *U* test, with $P < .05$ as the cutoff for statistical significance.

Next, we converted each outcome variable into a dichotomous variable. For well-child visits, we examined whether or not there were an adequate number of well-child visits during the 13-month period, with "adequate" defined as 6 or more visits, according to the recommendations of Medicaid's Early Periodic Screening, Diagnosis, and Treatment (EPSDT) Program (eg, ≥6 vs ≤5).[28] For ED visits and hospitalizations, we examined whether infants had any versus no visits during the 13-month period (eg, none versus any). For the comparisons of dichotomous variables, we conducted χ^2 tests, with $P < .05$ as the cutoff for statistical significance.

Finally, multivariate analyses were performed to control for the effect of demographic variables on the relationship between continuity and each outcome measure. Variables included in the models were mother's age at time of birth, baby's gender, race, and county of residence. The mother's age was entered as a continuous variable; baby's gender as a binary variable (male and female); baby's race was grouped into one of 3 categories (white, Hispanic, and other); and county of residence was entered as a binary variable (urban and rural). Urban residence was defined as living in a county in the I-5 corridor, where the majority of Oregon's population is located. For count measures, negative binomial regression models were developed. For binary outcomes, logistic regression models were used.

Table 1. Demographic Characteristics of Study Sample

Characteristic	N (%)
Gender	
Female	768 (48.3)
Male	823 (51.7)
Race	
White	1087 (68.3)
Hispanic	312 (19.6)
African-American	103 (6.5)
Other	89 (5.6)
Mother's age at time of birth (yr)	
<20	307 (19.3)
20–24	606 (38.1)
25–34	545 (34.3)
35+	133 (8.4)
Residence	
Urban	1075 (67.6)
Rural	516 (32.4)

Results

Of the initial 1797 infants who met the inclusion criteria, 29 infants were excluded because of no claims activity during the study period and 177 were excluded for prolonged birth hospitalizations, resulting in a final study population of 1591 infants. Of these infants, 749 (47.1%) had family continuity and 842 (52.9%) did not. Table 1 provides demographic information about the infants included in this study. Infants were predominantly white (68%); 20% were Hispanic and 7% were African-American. Most (68%) lived in an urban setting. Mothers' mean age was 25 years, with a range of 14 to 48 years (SD, 5.9 years). Table 2 shows the distribution of infant health service use indicators for the entire population and compares measures of health service use in infants with family continuity with infants without family continuity.

Children with family continuity had a greater mean number of well-child visits than children

Table 2. Comparison of Outcome Measures by Family Continuity Status*

Outcome Measure	Total Population (N = 1591)	Continuity (n = 749)	No Continuity (n = 842)	*P*
Continuous (mean [SD])				
Well-child visits	4.55 (1.718)	4.64 (1.744)	4.47 (1.693)	.045†
ED visits	1.23 (1.783)	1.45 (1.934)	1.04 (1.614)	<.001†
Hospitalizations	0.17 (0.486)	0.16 (0.458)	0.18 (0.509)	.528†
Categorical ([%] n)				
Well-child visits (≥6)	31.8 (506)	33.5 (251)	30.3 (255)	.168‡
ED visits (≥1)	54.0 (859)	60.3 (452)	48.3 (407)	<.0001‡
Hospitalizations (≥1)	13.4 (213)	12.8 (96)	13.9 (117)	.606‡

*Hospitalizations does not include birth hospitalization.
†*P* values for continuous variable analyses are from the independent sample *t* test for well-child visits, which are normally distributed, and from the Mann-Whitney *U* test for ED visits and hospitalizations, which are not normally distributed.
‡*P* values for categorical variable analyses are from the Pearson χ^2 test.
ED, emergency department.

without family continuity (4.64 and 4.47 mean visits, respectively; $P = .045$). Infants with family continuity had a greater mean number of ED visits than infants without family continuity (1.45 and 1.04 mean visits, respectively; $P < .001$). Hospitalizations were not statistically different in the 2 groups (0.16 vs 0.18 mean hospitalizations, respectively; $P = .528$). When each of these results was evaluated categorically (well-child visits, ≥6 vs ≤5; ED visits, none versus any; and hospitalizations, none versus any) similar results were observed; however, the difference in well-child visits was no longer statistically significant ($P = .168$).

After controlling for demographic variables, including the mother's age at time of birth, baby's gender, baby's race, and urban or rural residence, continuity remained associated with a higher number of ED visits (relative risk, 1.36; $P < .0001$) as well as a greater likelihood of having an ED visit (relative risk, 1.53; $P < .0001$). Well-child visits and hospitalization results were unaffected by controlling for these variables. These results are presented in Table 3.

Discussion

In this study we found that family continuity measured at the clinic level is associated with a greater number of ED visits. The number of well-child visits may be increased, and no significant effect was noted on hospitalizations.

Well-child Visits

The finding of a positive association between family continuity and well-child visits is consistent with previous findings and our hypothesis. Establishing a source of well-child care may be particularly important for low-income children with Medicaid insurance because they have more difficulty finding a provider.[26] When both prenatal and well-child care are provided at the same location, the child has a regular source of care even before birth. Having a preestablished source of well-child care can eliminate the barrier of trying to find a provider that accepts Medicaid patients, as well as the barrier of becoming familiar and comfortable with a new provider or new office. This benefit is particularly important when there are barriers of ethnicity or

Table 3. Multivariate Results*

	Continuity (Relative Risk [95% CI])	*P*
Count Outcomes†		
Well-child visits	1.05 (1.00–1.10)	.041
ED visits	1.36 (1.18–1.56)	<.0001
Hospitalizations	0.85 (0.64–1.14)	.282
Categorical Outcomes‡		
Well-child visits (≥6)	1.22 (0.98–1.52)	.070
ED visits (≥1)	1.53 (1.25–1.88)	<.0001
Hospitalizations (≥1)	0.87 (0.65–1.17)	.361

*Six different multivariate models were developed, one for each outcome. In this table, only the relative risk for continuity is presented. Each model controlled for the baby's gender, race, county of residence, and the mother's age.
†Count outcome multivariate analyses were performed using negative binomial regression.
‡Categorical outcome multivariate analyses were performed using logistic regression.
ED, emergency department; CI, confidence interval.

language. This result, however, should be taken with some caution because the categorical measure of well-child visits (≥6 vs ≤5 visits in the first year) was not significantly different in the 2 groups. In addition, although the finding is statistically significant when analyzed as a continuous variable, it is debatable whether the difference is of clinical significance.

Only 33% of children in the continuity group and 30% of the children in the noncontinuity group (32% overall) had an adequate number of well-child visits as defined by Medicaid's EPSDT program. This finding suggests a potential problem with the use of routine well-child care in the Medicaid population in Oregon, however, optimal numbers of well-child visits is debated.[29]

Hospitalizations

No significant difference was seen for hospitalizations. This finding may be because of the small number of hospitalizations in the sample. The decision of whether or not to admit a patient to the hospital is often subjective, and could be affected by the level of interpersonal knowledge and trust between the patient and the physician.

Emergency Department Visits

The association between family continuity and a greater number of ED visits was surprising and is in the opposite direction of what has been seen in studies of individual patient continuity with one provider.[15,17] No previously published studies have looked at the association between family continuity and ED visits. The reason for this finding is unclear. In the case of individual patient continuity with one provider, the negative association is hypothesized to be caused by increased knowledge and trust, whereby the patient is more likely to seek care from their regular physician rather than the ED and the physician is more likely to feel comfortable managing problems in the office or over the telephone rather than referring the patient to the ED.[15] Clinic continuity may have the opposite effect because although a patient may be more likely to call a clinic seeking advice because of the established relationship with the clinic, the clinical staff may be more likely to encourage the patient to seek immediate medical care because the patient is not well known.

Other explanations of this association should also be considered. It is possible, for example, that differences in health status could be the cause. Sicker children are both more likely to have clinic continuity and to go to the ED. Although we eliminated any child with a long birth hospitalization, this approach may not capture all the health differences in the 2 groups. It is also possible that claims data may be collected in such a way that our definition of continuity may also be associated with greater capture of ED visits. Regardless of the cause, our findings show that family continuity, when measured at the clinic level, is not associated with a reduction in ED visits.

Prevalence of Family Continuity

This study found that almost 50% of all infants had family continuity. Our continuity definition permits at least 3 practice arrangements that could result in family continuity. These include (1) solo family physicians who provide both prenatal and well child care, (2) groups of family physicians who provide these services, and (3) multispecialty groups including obstetricians, pediatricians, and family physicians who provide these services in the same location. Because of limitations of the data, we do not know which model of care accounts for the majority of continuity in this study.

Although continuity has been defined in a variety of ways, the definition that has the greatest resonance with family physicians is that of interpersonal continuity, or continuity in which an ongoing personal relationship between the patient and clinician is characterized by personal trust and responsibility.[2] Our study looked at clinic-level continuity and therefore additional research is needed to address provider-level continuity. This will be of particular importance because of the discrepancies about ED visits found in our study as opposed to studies looking at continuity between an individual patient and a clinician. If this discrepancy is real it emphasizes the importance of provider-level continuity as opposed to clinic-level continuity for the reduction of ED visits. Some previous work has been done to tease apart the effects of clinic-level versus provider-level continuity; however, this area is not well understood.[14,30]

Limitations

There are several limitations that must be considered when interpreting the results of this study. First, our study evaluates a very specific population and these results may not generalize to other set-

tings. We limited our study to Oregon Medicaid recipients enrolled in a single Medicaid managed care organization and we required continuous enrollment of both the infant and its mother. This requirement is necessary to capture most health care use during the period of interest; however, many Medicaid clients are not continuously enrolled because of changes in income or other eligibility criteria.

A second limitation is the use of claims data. Claims data are a reasonable measure of health care services delivered and have been used in a number of other studies. However, some care is probably not captured in claims data, specifically care received outside of the specific insurance company. We controlled for this factor as much as is possible by limiting our population to those mother baby pairs who were continuously enrolled with the Oregon Medicaid insurance company, but it is still possible that health care use outside of the health system occurred and is not accurately reflected in the claims data. In addition, claims data do not capture some potentially important variables, such as whether the mother was the primary caretaker of the child or the mother's education level. Despite these limitations, this study is an important addition to the literature because it is the first study to measure family continuity on a population level.

Conclusions

Our results indicate that family continuity may increase well-child visits. This result suggests that when prenatal care is provided by clinician groups that also provide well-child care, encouraging mothers to stay with these clinicians for their babies' care may increase well-child visits. Our results also suggest that family continuity, when measured at the clinic level, may increase ED use, although the reasons for this association are not clear. Given the association seen in other settings showing that individual provider continuity reduces ED use, this finding suggests that clinic continuity may be less important than provider continuity. Additional research exploring the impact of provider continuity on ED use is warranted, especially research exploring the effect of strong interpersonal relationships. Our study also found that the majority of the children in the study may have had inadequate well-child care. This problem has important implications for health care delivery for low-income children and should be further explored.

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References

1. Donaldson M, Yordy KD, Lohr KN, Vanselow NA. Primary care: America's health in a new era. Washington, DC: National Academy Press; 1996.
2. Saultz JW. Defining and measuring interpersonal continuity of care. Ann Fam Med 2003;1:134–43.
3. Freeman G, Hjortdahl P. What future for continuity of care in general practice? BMJ 1997;314:1870–3.
4. Mainous AG, Baker R, Love M, Gray D, Gill J. Continuity of care and trust in one's physician: evidence from primary care in the United States and the United Kingdom. Fam Med 2001;33:22–7.
5. Kasper J. The importance of type of usual source of care for children's physician access and expenditures. Med Care 1987;25:386–98.
6. McDaniel D, Patton E, Mather J. Immunization activities of private-practice physicians: a record audit. Pediatrics 1975;56:504–7.
7. Christakis D, Mell L, Wright J, Davis R, Connell F. The association between greater continuity of care and timely measles-mumps-rubella vaccination. Am J Public Health. 2000;90:962–5.
8. Becker M, Drachman R, Kirscht J. Predicting mothers' compliance with pediatric medical regimens. J Pediatr 1972;81:843–54.
9. Charney E, Bynum R, Eldredge D, et al. How well do patients take oral penicillin? A collaborative study in private practice. Pediatrics 1967;40:188–95.
10. Kerse N, Buetow S, Mainous AG, Young G, Coster G, Arroll B. Physician-patient relationship and medication compliance: a primary care investigation. Ann Fam Med 2004;2:455–61.
11. Steinwachs D, Yaffe R. Assessing the timeliness of ambulatory medical care. Am J Public Health 1978; 68:547–56.
12. Blankfield R, Kelly R, Alemagno S, King C. Continuity of care in a family practice residency program. Impact on physician satisfaction. J Fam Pract 1990; 31:69–73.
13. Becker M, Drachman R, Kirscht J. Continuity of pediatrician: new support for an old shibboleth. J Pediatr 1974;84:599–605.
14. Gill J, Mainous A. The role of provider continuity in preventing hospitalizations. Arch Fam Med 1998;7: 352–7.
15. Gill J, Mainous A, Nsereko M. The effect of conti-

nuity of care on emergency department use. Arch Fam Med 2000;9:333–8.
16. Sweeney K, Gray D. Patients who do not receive continuity of care from their general practitioner-are they a vulnerable group? Br J Gen Pract 1995;45: 133–5.
17. Christakis DA, Wright JA, Koepsell TD, Emerson S, Connell FA. Is greater continuity of care associated with less emergency department utilization? Pediatrics 1999;103(4 Pt 1):738–42.
18. Parchman M, Pugh J, Noel P, Larme A. Continuity of care, self-management behaviors, and glucose control in patients with type 2 diabetes. Med Care 2002;40:137–44.
19. Becker M, Drachman R, Kirscht J. A field experiment to evaluate various outcomes of continuity of physician care. Am J Public Health 1974;64:1062–70.
20. Wasson J, Sauvigne A, Mogielnicki R, et al. Continuity of outpatient medical care in elderly men. A randomized trial. JAMA 1984;252:2413–7.
21. Saultz JW, Albedaiwi W. Interpersonal continuity of care and patient satisfaction: a critical review. Ann Fam Med 2004;2:445–51.
22. Spivak H, Levy J, Bonanno R, Cracknell M. Patient and provider factors associated with selected measures of quality of care. Pediatrics 1980;65:307–13.
23. Love M, Mainous A, Talbert J, Hager G. Continuity of care and the physician-patient relationship: the importance of continuity for adult patients with asthma. J Fam Pract 2000;49:998–1004.
24. Fletcher R, O'Malley M, Earp J, et al. Patients' priorities for medical care. Med Care 1983;21:234–42.
25. Casparie A, van der Waal M. Differences in preferences between diabetic patients and diabetologists regarding quality of care: a matter of continuity and efficiency of care? Diabet Med 1995;12:828–32.
26. US Department of Health and Human Services. Healthy people 2010: Understanding and improving health, 2nd ed. Washington, DC: U.S. Government Printing Office; 2000.
27. Gill J, Saldarriaga A, Mainous A, Unger D. Does continuity between prenatal and well-child care improve childhood immunizations? Fam Med 2002;34: 274–80.
28. EPSDT and Title V Collaboration to Improve Child Health. Available at http://www.hrsa.gov/epsdt. Accessed April 3, 2008.
29. Selden TM. Compliance with well-child visit recommendations: evidence from the Medical Expenditure Panel Survey, 2000–2002. Pediatrics 2006;118: 1766–78.
30. Mainous AG, Kern D, Hainer B, Kneuper-Hall R, Stephens J, Geesey ME. The relationship between continuity of care and trust with stage of cancer at diagnosis. Fam Med 2004;36:35–9.