

Implementation of a Hospitalist System in a Large Health Maintenance Organization: The Kaiser Permanente Experience

Diane E. Craig, MD*; Liz Hartka, PhD*; William H. Likosky, MD*; William M. Caplan, MD; Paul Litsky, MA; and Jannalee Smithey, BS

This paper presents preliminary quality and utilization data from a hospitalist system that is being implemented at Kaiser Permanente, a large health maintenance organization with 16 hospitals in northern California. Hospitalist programs, which are staffed by clinicians highly skilled in caring for inpatients, are being launched with the aim of delivering high-quality, efficient medical care in an increasingly competitive health care delivery environment. This paper also describes, in some detail, the process of implementation at one hospital. Challenges to implementation included 1) overcoming the reluctance of clinic physicians to relinquish inpatient care responsibilities, 2) developing sustainable work schedules, 3) creating effective channels of communication between staff in inpatient and outpatient settings, and 4) designing appropriate compensation scales for hospitalists. Mean length of stay, patient-day rates, admission rates, consultation request rates, costs, and readmission rates were examined for patients discharged from adult medicine services at all 16 hospitals between 1 January 1994 and 30 June 1997. These preliminary resource utilization data seem promising, but further analysis is needed to assess how hospitalist programs may affect clinical quality of care, costs, and patient and provider satisfaction.

Ann Intern Med. 1999;130:355-359.

From the Kaiser Permanente Medical Center, Santa Clara, California; and The Permanente Medical Group, Oakland, California. For current author addresses, see end of text.

*Equally responsible co-principal authors.

Kaiser Permanente provides health care services to 25% of the total population of northern California, an area of high managed care penetration—60% of all health care consumers are enrolled in a health maintenance organization (1). We describe hospitalist programs in place at Kaiser Permanente Northern California. In this part of the California Division, Kaiser Permanente is a partnership of the Kaiser Foundation Health Plan, the Kaiser Foundation Hospitals, and The Permanente Medical Group.

In 1994, The Permanente Medical Group—the entity responsible for members' medical care—evaluated the potential of hospitalist programs for enhancing the quality and efficiency of medical care. In 1995, The Permanente Medical Group produced a template (2) that described the essential components and anticipated the benefits of a hospitalist program (3). In the "best practice" hospitalist model,

which was recommended for implementation at Kaiser Permanente Northern California, hospitalist teams would provide routine inpatient care to all patients seen in the adult medicine service (except for those requiring obstetric and higher-level intensive care) and could participate in managing clinical decision units or short-stay units. Physicians would initially allocate more than half of their time to hospitalist responsibilities and would eventually dedicate all of their time to the hospitalist program. Two or more physicians from the specialties of internal medicine, family practice, or intensive care medicine would staff the hospitalist team. Initially, the physician-to-patient ratio would be set at 1:10 or 1:12. Hospitalist coverage would be continuous, 24 hours per day and 7 days per week. Hospitalist program staff would maintain well-established communication links with primary care physicians.

The hospitalist program at Kaiser Permanente Northern California is expected to improve the quality of inpatient care, achieve utilization targets by integrating clinical guidelines with treatment plans and by placing patients in the most appropriate health care settings, improve patients' access to their personal physicians in the outpatient setting, reduce hospital costs, and improve patient and professional satisfaction. In this article, we describe an ongoing evaluation designed to determine whether the hospitalist program delivers these expected outcomes. We also present observations from a case study of the implementation process at one hospital in Santa Clara, California, where a hospitalist program was launched in September 1996.

Methods

The main comparisons in this paper were done with outcome and utilization measures collected before and after the implementation of hospitalist programs. A 180-day "grace period" was added to the start date of each hospitalist program for all analyses. Facilities were designated "nonhospitalist" before and "hospitalist" after this 180-day grace period. Between January 1996 (when the first hospitalist program officially started) and June 1997, data were examined by 6-month periods. This approach revealed long-term trends in the measures as well as

Table 1. Operational Features of Hospitalist Programs at Kaiser Permanente Facilities in Northern California*

Facility	Implementation Date	Inpatients in Adult Medicine Service, January–September 1997				Full-Time Hospitalists†	Part-Time Hospitalists‡	Physicians Participating on Another Basis§	Daily Coverage	Mean Daily Census, Medical and Surgical Departments
		Mean Admissions per Month	Female Patients	Mean Age	Mean Disease Severity					
		<i>n</i>	%	<i>y</i>						
South Sacramento	October 1995	313	50.8	63.2	1.01	3	2	28	12	45
Santa Rosa	January 1996	183	48.0	65.9	1.05	2	8	0	9	28
Sacramento	March 1996	902	49.0	64.3	0.96	7	6	0	16	95
Walnut Creek/ Martinez	July 1996	651	50.0	62.0	0.96	14	0	2	15	100
Santa Clara	September 1996	447	49.3	62.3	1.00	10	1	0	24	50
Vallejo	October 1996	559	51.2	63.8	0.98	7	0	40	12	85
Hayward/Fremont	January 1997	356	47.6	63.3	1.12	0	3–4	0	24	55
San Francisco	April 1997	341	48.0	65.4	0.99	9	3	0	12	50–90
Fresno	May 1997	185	43.9	62.8	0.96	0	1	13	12	–
Stockton	June 1997	138	46.7	61.9	1.00	0	11	0	5	8–15
Oakland	July 1997	464	51.3	62.7	0.95	5	0	4	12	75
Richmond	August 1997	128	50.0	63.5	0.86	1	0	0	8	–
Redwood City	September 1997	220	51.2	60.7	0.97	3	1	0	12	39
Santa Teresa	September 1997	263	45.2	60.3	1.02	0	18	14	24	60
South San Francisco	October 1997	264	48.5	64.3	1.05	2	0	21	9	43
San Rafael	NA	222	51.8	65.7	0.98	–	–	–	–	–
Kaiser Permanente Northern California	–	–	49.3 (43.9–51.8)	63.3 (60.3–65.9)	0.99	–	–	–	–	–

* Information current to April 1998. NA = not available.

† 100% of time.

‡ 25% to 99% of time.

§ For example, on a rotational basis.

|| Hours of coverage, Monday through Friday with on-call service for weekends.

differences before and after the implementation of hospitalist programs.

We included insured patients 20 years of age and older who were admitted to the adult medicine service at any of the 16 Kaiser Permanente hospitals in northern California between 1 January 1994 and 30 June 1997. We used an indirect method to adjust for differences in age and sex between facility populations and regional populations (4). The inpatient database at Kaiser Permanente Northern California was the main source for data on utilization and hospital readmissions. Databases at Kaiser Permanente Northern California contain relatively good measures of diagnosis and information on numbers and types of laboratory and radiology orders, consultations, and length and cost of inpatient stays. These data can all be linked at the patient level. The mean level of disease severity was determined by relative weight, a measure intended to reflect normal resource consumption (and cost) associated with a given diagnosis-related group (5, 6). Complete utilization and demographic data were available for the study sample. Consultation data captured at discharge (when patient charts were reviewed) were about 95% complete.

Analysis of readmission rates focused on unplanned readmissions to the adult medicine service. Transfers and elective admissions were counted as admissions but not as readmissions. Rates were calculated by dividing the number of patients readmit-

ted within 7 days after discharge by the number of admissions for a given 6-month period.

Utilization indicators included mean length of hospital stay, patient-day rate, admission rate, and consultation request rates. Mean length of stay was measured by using the number of days from hospital admission to discharge. Admission rates were calculated as the ratio of hospital admissions per 1000 facility-based health plan members. Because our members can appear for medical care at the facility of their choice, each medical center's member population has a probabilistic component. Therefore, medical center memberships are recalculated quarterly (7). Patient-day rates are the product of admission rate and length of hospital stay and thus reflect patient-days spent in the adult medicine service per 1000 health plan members. Consultation request rates from 1 January 1994 through 30 June 1997 were calculated as the number of consultations per 1000 adult medical patients discharged. Consultations from every service were included if they were done for a patient on the adult medicine service. Three facilities were excluded from the analysis because of incomplete or questionable data.

Mean direct costs per patient were calculated (by using a locally modified version of a hospital cost accounting system marketed by Transition Systems, Inc., Boston, Massachusetts) for hospital stays from 1 January 1996 through 30 September 1997. Direct costs specifically reflect services and products pro-

vided to inpatients during hospitalization. For example, physician time spent with a patient was considered a direct cost, but medical center administration was not.

Results

Table 1 summarizes descriptive information about 16 facilities in Kaiser Permanente Northern California, 15 of which have implemented hospitalist programs. Descriptive information about the adult medicine services is shown for the period from 1 January 1997 through 30 September 1997. Relatively minor differences among facilities were seen in patient age, sex, and disease severity. The mean number of admissions per month varied the most, ranging from 129 to 902 during this period.

Readmission rates increased slightly (by about half a percentage point) at the aggregate level between January 1994 and June 1997. As **Table 2** shows, readmission rates at hospitalist and nonhospitalist facilities were about the same.

Inpatient utilization has been declining in Kaiser Permanente Northern California since 1990. Patient-day rates for all services, including adult medicine, are low at 848 days per 1000 members for the Medicare population and 154 days per 1000 members for members younger than 65 years of age. At the regional level, between 1995 and 1996, patient-day rates across adult medicine and pediatric services decreased from 116 days per 1000 members to 104 days per 1000 members. Patient-day rates increased slightly in 1997 to 108 days per 1000 members. Admission rates have remained fairly stable, decreasing from about 30 admissions per 1000 members in 1995 to 29 admissions per 1000 members in 1996 and then increasing to 32 admissions per 1000 members in 1997. Mean length of stay has

decreased steadily (from 3.8 days to 3.4 days) since 1995.

Facilities that implemented hospitalist programs have seen a trend toward lower mean lengths of stay for adult medicine inpatients (**Table 2**). We have not seen the same type of decrease in admission rates, which have remained fairly stable since the implementation of hospitalist programs. In 1996, consultation request rates began to decline in all facilities. When we directly compared pre-hospitalist program consultation rates with post-hospitalist program consultation rates for each facility separately, we found decreases in six of the eight programs examined. One hospitalist facility's rates remained the same; in another facility, where hospitalists were actively encouraged to consult other services during the early stages of a patient's stay, consultation rates increased. Mean direct costs were about 13% higher in 1996 and about 5% higher in 1997 for patients in hospitalist programs than for patients in nonhospitalist programs. However, costs varied considerably across hospitals and by diagnosis.

Discussion

At the aggregate level, we found no striking changes in utilization or quality outcomes in facilities that adopted a hospitalist model for inpatient care. Some utilization measures, such as mean length of stay, decreased; however, a historical trend toward decreasing utilization is operating throughout Kaiser Permanente Northern California, and our rates were relatively low even before implementation of the hospitalist programs. Consultation request rates also declined; recent declines in consultation request rates at Kaiser Permanente match those seen in other studies (8, 9). In contrast, admission and readmission rates remained the same.

Table 2. Major Findings from Hospitalist Programs Implemented at Kaiser Permanente Facilities in Northern California, by 6-Month Periods, January 1994–June 1997*

Measures	January–June 1994	July–December 1994	January–June 1995	July–December 1995	January–June 1996	July–December 1996	January–June 1997
Readmission rates							
Nonhospitalist facilities	4.2 ± 0.10	4.3 ± 0.12	4.3 ± 0.11	4.5 ± 0.11	4.7 ± 0.12	4.8 ± 0.14	5.1 ± 0.15
Hospitalist facilities	NA	NA	NA	NA	5.4 ± 0.57	4.8 ± 0.25	4.8 ± 0.19
Mean length of stay							
Nonhospitalist facilities	NA	4.1 ± 0.02	3.8 ± 0.02	3.7 ± 0.02	3.8 ± 0.02	3.6 ± 0.03	3.7 ± 0.03
Hospitalist facilities	NA	NA	NA	NA	3.2 ± 0.08	3.0 ± 0.04	3.3 ± 0.03
Admission rates†							
Nonhospitalist facilities	NA	40.1 ± 0.10	38.9 ± 0.14	36.5 ± 0.14	38.1 ± 0.15	34.4 ± 0.16	36.6 ± 0.17
Hospitalist facilities	NA	NA	NA	NA	43.4 ± 0.77	40.6 ± 0.31	39.2 ± 0.25
Consultation rates‡							
Nonhospitalist facilities	540.6 ± 4.2	550.8 ± 4.4	574.1 ± 4.6	571.1 ± 4.7	560.6 ± 4.6	550.9 ± 5.5	498.1 ± 5.6
Hospitalist facilities	NA	NA	NA	NA	520.8 ± 18.3	510.8 ± 8.6	514.5 ± 6.7

* Findings are adjusted for age and sex. Values given are the mean ± SE. NA = not applicable.

† Admissions per 1000 Kaiser Permanente members.

‡ Consultations per 1000 discharges.

Factors such as differences in inpatient populations or infrastructures may explain low utilization rates at certain facilities. In hospitals where length of stay is already well managed, the hospitalist intervention may favorably affect quality, access to clinicians, and patient and provider satisfaction but not utilization per se.

Although mean length of stay decreased in hospitalist programs in Kaiser Permanente Northern California, we did not see the decreases in costs that were demonstrated in the studies at Park Nicollet (8) and the University of California, San Francisco (9). Our hospitalization costs increased, and we are currently examining various factors, such as differences in disease severity or changes in medical care cost components, that might explain this increase.

Several limitations should be considered when the preliminary results of our evaluation are reviewed. The Kaiser Permanente Northern California facilities did not begin implementing their hospitalist programs at the same time, nor did they implement the programs in exactly the same way. For example, stage 4 programs (10), such as the one at our Santa Clara medical center, have fully dedicated hospitalist staff on call continuously. The hospitalist program at our South Sacramento medical center, in contrast, has few fully dedicated hospitalist staff; instead, most physicians still attend their ambulatory patients when these patients are hospitalized. Future statistical analyses will determine whether different styles of implementation result in different outcomes. We plan to examine risk-adjusted costs for the hospitalist program at the patient level and to evaluate changes in the use of hospital outpatient services, skilled nursing facilities, and home health care as the hospitalist programs are implemented. The as-yet unevaluated differences in outcome may reflect the diversity of inpatient populations or differences in the ability to provide alternatives to hospitalization across the 16 hospitals in this study.

The issues that we confronted in implementing our hospitalist program within an integrated health care delivery system are unique in some ways but share many features with other programs. As an example, we describe specific implementation measures taken at our medical center in Santa Clara, California, where a hospitalist program was started in September 1996.

The main barrier to implementing the hospitalist program at Santa Clara was the reluctance of internists to relinquish their traditional inpatient care responsibilities. This unwillingness was partially overcome by giving all members of the internal medicine department the opportunity to join the hospitalist program if they were willing to commit 25% of their time to inpatient care. Although our original goal was to make the transition to a fully

dedicated hospitalist program over the course of 1 year, a full quota of qualified internal candidates was willing to commit 100% of their time to inpatient care at the start of the program. We were thus able to ensure access and continuity of care in the outpatient clinic while providing high-quality inpatient coverage for our tertiary care medical center 24 hours per day, 7 days per week.

Maintaining relationships among internists now divided between inpatient and outpatient care settings remains an ongoing priority for our hospitalist program. A high degree of trust and willingness to give feedback to colleagues, as well as reliable and effective communication systems for relaying patient information across the continuum of care, are key to bridging the gap. Fortunately, much member information is available from our electronic patient information database, and complete medical records for most inpatients and outpatients are accessible from both the hospital and the outpatient setting. At Santa Clara, patients' personal physicians are notified of all inpatient admissions and provide valuable input into inpatient management. Physicians are encouraged to make "social visits" to their hospitalized patients, but this practice has not been widespread.

One of our most formidable tasks has been to develop a sustainable work schedule. Preventing physician burnout and staffing the hospitalist program around the clock are ongoing challenges. A second goal has been to develop appropriate compensation scales for hospitalists. As the severity of illness among hospitalized patients continues to increase, the demands of the hospitalist's job begin to resemble those of emergency department or intensive care specialists more than those of outpatient primary care internists. Currently, compensation for inpatient and outpatient physicians in our group is about the same. However, we believe that as the hospitalist specialty evolves and becomes the standard of care for inpatients, the value of (and, thus, the compensation for) physicians skilled in providing this care will increase.

Having a relatively small team of dedicated hospitalists whose sole clinical responsibility is inpatient care has many advantages. At Santa Clara, we have evolved into a close-knit group of highly motivated physicians committed to providing quality care, promoting efficient use of hospital resources, and fostering excellent training and professional development opportunities for housestaff.

It is still too early to predict the success of the hospitalist program in Kaiser Permanente Northern California. As we have described, the implementation of this program presented many challenges to The Permanente Medical Group leadership. We found that most of these challenges can be over-

come through careful planning and collaboration. Declines in mean length of stay and in consultation request rates are encouraging, but these declines have occurred in the context of consistently decreasing overall utilization at Kaiser Permanente Northern California over the past several years. In the months ahead, we will attempt to separate the effects of the hospitalist program from global trends in outcomes and utilization.

Acknowledgments: The authors thank all of the hospital-based specialists at Kaiser Permanente Northern California, whose dedication has made the program a reality. They also thank Patricia Kipnis, PhD, for statistical advice, and the Medical Editing Department at the Kaiser Foundation Research Institute for editorial assistance.

Grant Support: This project was internally funded.

Requests for Reprints: William H. Likosky, MD, The Permanente Medical Group, Department of Quality and Utilization, 1800 Harrison Street, Suite 410, Oakland, CA 94612; e-mail, bill.likosky@ncal.kaiperm.org.

Current Author Addresses: Dr. Craig: Department of Medicine, Kaiser Permanente Medical Center, 900 Kiely Boulevard, Santa Clara, CA 95051.

Dr. Hartka: Market Analysis and Planning, Kaiser Foundation Health Plan, Inc., One Kaiser Plaza, 25L, Oakland, CA 94612.

Dr. Likosky and Mr. Litsky: The Permanente Medical Group, Department of Quality and Utilization, 1800 Harrison Street, Suite 410, Oakland, CA 94612.

Dr. Caplan: Operations Development, The Permanente Medical Group, 1950 Franklin Street, 19th Floor, Oakland, CA 94612.
Ms. Smithy: Operations Support Services, The Permanente Medical Group, 1800 Harrison Street, Suite 430, Oakland, CA 94612.

References

1. Interstudy Publications. The Interstudy Competitive Edge: 7.1 Edition. Part III: The Regional Market Analysis. Bloomington, MN: Interstudy Publications; 1997.
2. **The Permanente Medical Group.** Hospital-Based Specialist: Suggested Design Template for Implementation. Oakland, CA: Kaiser Permanente Medical Care Program; 1997.
3. **Caplan WM.** The hospital-based specialist system. *The Permanente Journal.* 1997;1:37-40.
4. **Kahn HA, Sempos CT.** *Statistical Methods in Epidemiology.* New York: Oxford Univ Pr; 1989.
5. Changes to DRG classifications and relative weights. *Fed Regist.* 1997;62:45970.
6. **Kaiser Permanente Information Technology Services.** ADT/CABS Enhancements Phase I: Glossary and Training Guide. Walnut Creek, CA: Kaiser Permanente Regional Data Center; November 1996.
7. **The Permanente Medical Group Department of Quality & Utilization.** Population at Risk for Utilization. Oakland, CA: Kaiser Permanente Medical Care Program; December 1997.
8. **Freese RB.** The Park Nicollet experience in establishing a hospitalist system. *Ann Intern Med.* 1999;130:350-4.
9. **Wachter RM.** Outcomes, cost, and satisfaction data from hospitalist systems: the UCSF experience. In: *Proceedings of the Emerging Role of Hospitalists in American Health Care: A National Conference,* 5-6 December 1997. 227-235.
10. **Wachter RM, Goldman L.** The emerging role of "hospitalists" in the American health care system. *N Engl J Med.* 1996;335:514-7.