



**Figure 1. Estimated Survival of 189,004 Adults Who Underwent Kidney Transplantation from 1987 to 2006, According to the Scientific Registry of Transplant Recipients Database.**

The graph shows the estimated proportion of kidney-transplant recipients who would have been alive 15 years after transplantation (without retransplantation) on the basis of their patterns of survival: 59.1% of recipients from a living donor and 41.1% of recipients from a deceased donor. Estimates are based on a Cox model adjusted only for the year of transplantation. Data regarding follow-up for all patients were censored on repeat transplantation.

mofetil, and corticosteroids are compelling and reproducible. Even though the investigators used relatively low initial targets for tacrolimus trough levels and conventional midrange dosing strategies, their study does not address the question of whether limiting the initial dose of tacrolimus would result in long-term conserved efficacy and reduced toxic effects. The question of whether such an approach would improve long-term function of renal allografts and the overall health and

quality of life of kidney-transplant recipients remains unanswered.

No potential conflict of interest relevant to this article was reported.

I thank Keith McCullough for his preparation of early drafts of the figure.

From the Department of Medicine, Division of Nephrology, University of Michigan Medical School, Ann Arbor.

- Halloran PF. Immunosuppressive drugs for kidney transplantation. *N Engl J Med* 2004;351:2715-29. [Erratum, *N Engl J Med* 2005;352:1056.]
- Ekberg H, Tedesco-Silva H, Demirbas A, et al. Reduced exposure to calcineurin inhibitors in renal transplantation. *N Engl J Med* 2007;357:2562-75.
- Vincenti F, Laskow DA, Neylan JF, Mendez R, Matas AJ. One-year follow-up of an open-label trial of FK506 for primary kidney transplantation: a report of the U.S. Multicenter FK506 Kidney Transplant Group. *Transplantation* 1996;61:1576-81.
- Kaplan B, Schold JD, Meier-Kriesche HU. Long-term graft survival with Neoral and tacrolimus: a paired kidney analysis. *J Am Soc Nephrol* 2003;14:2980-4.
- Scientific Registry of Transplant Recipients. National reports. (Accessed November 29, 2007, at <http://www.ustransplant.org/csr/current/nats.aspx>.)
- Neylan JF. Immunosuppressive therapy in high-risk transplant patients: dose-dependent efficacy of mycophenolate mofetil in African-American renal allograft recipients. *Transplantation* 1997;64:1277-82.
- Idem*. Racial differences in renal transplantation after immunosuppression with tacrolimus versus cyclosporine. *Transplantation* 1998;65:515-23.
- Naito T, Shinno K, Maeda T, et al. Effects of calcineurin inhibitors on pharmacokinetics of mycophenolic acid and its glucuronide metabolite during the maintenance period following renal transplantation. *Biol Pharm Bull* 2006;29:275-80.
- Filler G. Value of therapeutic drug monitoring of MMF therapy in pediatric transplantation. *Pediatr Transplant* 2006;10:707-11.

Copyright © 2007 Massachusetts Medical Society.

## The Hospitalist Movement — Time to Move On

Laurence F. McMahon, Jr., M.D., M.P.H.

The rapid emergence of hospitalist care in the United States has been extraordinary, with more than 20,000 hospitalists practicing today.<sup>1</sup> Several factors underlie this growth, including the increased demands placed on primary care physicians that make caring for both inpatients and outpatients difficult, restrictions on the work hours of residents, and the belief that “practice makes perfect.”<sup>1,2</sup> Although hospitalists may improve outcomes and enhance clinical efficiency, there has been concern that fragmenting the continuity of care could lead to more medical errors and dissatisfied patients.<sup>3</sup>

Early research focusing on cost and clinical outcomes sought to inform the debate about the relative value of hospitalists. These early investigations, which tended to be small studies from single institutions, found that although hospitalist care was associated with modest cost savings, differences in clinical outcomes were unclear.<sup>4-6</sup> These early studies helped to convince hospital executives to subsidize their fledgling hospitalist programs, which had been unable to support themselves through professional billing alone. In this issue of the *Journal*, Lindenauer and colleagues report on the use of a larger and more represen-

tative sample to address the concerns raised by the early hospitalist studies.<sup>7</sup> Their study focused on the same basic questions and it compared the care of hospitalists to that of generalists to identify differences in clinical and economic outcomes.

Although their analyses were robust and their conclusions were appropriately cautious, several questions remain. First, the hospitalists and generalists were apparently self-defined. In what ways is a hospitalist with 50 inpatient admissions per year expected to practice differently from an internist with the same number of admissions? If practice makes perfect, these physicians should be equally skilled. Second, were any important confounding variables omitted from the analysis? The authors raise concerns about such issues, noting that they have no knowledge of any incentives that hospitalist groups may have had to reduce the length of hospital stay. In fact, the management structures of the different practices, including their referral bases, their ability to care for patients after discharge, and their arrangements with visiting nurses, are all unknown. Any of these confounders could alter the length of stay attributed to the physician groups. Case-mix issues are also difficult to address. Much more rigorous case-mix adjustment than that used by the authors has been shown to be inadequate to explain clinically important differences.<sup>8</sup> Finally, the outcome measures of readmission and inpatient mortality are poor measures of health care quality, even if (as is not the case here) one were to attain perfect case-mix adjustment.<sup>9-12</sup>

Despite a state-of-the-art analysis of a large data set, the study by Lindenauer et al. still focused on the question that was of interest in the early stage of the hospitalist movement: how are hospitalists different from other providers? Although such studies may produce interesting insights, their role in shaping the development and growth of hospital medicine has little relevance in 2007. The emergence of hospitalist care as an integral part of the clinical delivery system is a fact. The question is not how much better or worse hospitalists are in caring for inpatients, nor is it how much they “save” the health care system. The real issue is, how do we construct a health care delivery system with hospitalists among its core providers? What are the challenges and opportunities?

The hospitalist workforce is the first challenge. Approximately 75% of hospitalists are general in-

ternists.<sup>13</sup> There is an overall problem with physician shortages, and the American College of Physicians has warned that primary care (the traditional role of general internists) “is at grave risk of collapse.”<sup>14</sup> In a 2007 survey of students graduating from allopathic medical schools in the United States, only 5.1% planned to enter general internal medicine.<sup>15</sup> Although hospital medicine has benefited, in the short-term, by having established physicians redefine themselves and by a one-time infusion of short-term personnel from residents delaying subspecialty training, the long-term hospitalist workforce is linked to the overall physician supply problem in general internal medicine. The solution must come from outside medicine.

The early hospitalist studies focused on savings, and the findings of these studies were used to justify financial support from the hospital for hospitalist programs because payment for hospital-based evaluation and management services was inadequate — the same overarching problem that occurs in primary care. The issue of the physician payment system dictating the type of physician workforce produced in this country is critical, and it may be driven to the fore more quickly by a shortage of hospitalists than by the predicted collapse of primary care.

The most challenging area for the hospitalist movement — and the one with the most long-term opportunity — is the role of hospitalists in academic medical centers. Research and extramural funding heavily weight promotion to leadership roles and advancement in leading academic medical centers. Since most hospitalist faculty lack substantial research experience and available mentors, medical schools are confronted with a large number of hospitalist faculty members who have not had the same training or opportunities as most faculty members.

If hospitalists are to become full members of the faculty and role models for students and trainees, they will need to enhance their academic and research skills. Medical schools and their hospital partners must establish strong fellowship programs in hospital medicine. The research domains of these programs would focus on clinical and health services, education, and information and management sciences. Since most academic hospitalist groups reside in divisions of general internal medicine, they could serve as the academic home for fellowship programs. Funding for hos-

pitalist fellowships would come from both federal and private payers of health care; these payers are most likely to benefit from hospitalist-led research. Hospitalists would be the logical collaborators in or originators of research focused on the comparative effectiveness, bench-to-bedside, and bedside-to-community research agendas of the National Institutes of Health.

The hospitalist movement has arrived, and it has transformed the care of hospitalized patients. Investigations similar to the early studies of hospitalist practice, which were focused on cost and comparing outcomes with those of other providers, should begin to wane. New investigations should focus on quality improvement, comparative effectiveness, clinical informatics, the safety of patients, and the translation of new medical advances to clinical practice. Academic medical centers must make strategic investments to provide opportunities in research training for hospitalist physicians and to support the research infrastructure. The academic focus and role models in the training environment will enhance the pipeline for hospitalists, but the underlying payment structure for evaluation and management needs to be dramatically enhanced if this field is to be sustained. Hospitalists are now an integral component of our delivery system; we must take advantage of these skilled physicians and take the next steps to enhance the care of hospitalized patients. It is time to move on.

No potential conflict of interest relevant to this article was reported.

From the Department of Internal Medicine and Health Management and Policy, University of Michigan, Ann Arbor.

1. Vasilevskis EE, Knebel J, Wachter RM, Auerbach AD. The rise of the hospitalist in California. Oakland: California Health Care Foundation, July 2007.

2. Wachter RM, Goldman L. The hospitalist movement 5 years later. *JAMA* 2002;287:487-94.

3. Sox HC. The hospitalist model: perspectives of the patient, the internist, and internal medicine. *Ann Intern Med* 1999; 130:368-72.

4. Parekh V, Saint S, Furney S, Kaufman S, McMahon L. What effect does inpatient physician specialty and experience have on clinical outcomes and resource utilization on a general medicine service? *J Gen Intern Med* 2004;19:395-401.

5. Auerbach AD, Wachter RM, Katz P, Showstack J, Baron RB, Goldman L. Implementation of a voluntary hospitalist service at a community teaching hospital: improved clinical efficiency and patient outcomes. *Ann Intern Med* 2002;137:859-65.

6. Meltzer D, Manning WG, Morrison J, et al. Effects of physician experience on cost and outcomes on an academic general medicine service: results of a trial of hospitalists. *Ann Intern Med* 2002;137:866-75.

7. Lindenauer PK, Rothberg MB, Pekow PS, Kenwood C, Benjamin EM, Auerbach AD. Outcomes of care by hospitalists, general internists, and family physicians. *N Engl J Med* 2007;357: 2589-600.

8. Rosenberg AL, Hofer TP, Strachan C, Watts CM, Hayward RA. Accepting critically ill transfer patients: adverse effects on a referral center's outcome and benchmark measures. *Ann Intern Med* 2003;138:882-90.

9. Hofer TP, Hayward RA. Identifying poor-quality hospitals: can hospital mortality rates detect quality problems for medial diagnoses? *Med Care* 1996;34:737-53.

10. *Idem*. Can early re-admission rates accurately detect poor-quality hospitals? *Med Care* 1995;33:234-45.

11. Benbassat J, Taragin M. Hospital readmissions as a measure of quality of health care: advantages and limitations. *Arch Intern Med* 2000;160:1074-81.

12. Shojania KG, Showstack J, Wachter RM. Assessing hospital quality: a review for clinicians. *Eff Clin Pract* 2001;4:82-90.

13. 2005-2006 SHM Survey: the authoritative source on the state of hospital medicine: highlights/executive summary. (Accessed November 29, 2007, at <http://www.hospitalmedicine.org/AM/Template.cfm?Section=Surveys2&Template=/CM/ContentDisplay.cfm&ContentID=14352>.)

14. The impending collapse of primary care medicine and its implications for the state of the nation's health care: a report from the American College of Physicians. January 30, 2006. (Accessed November 29, 2007, at [http://www.acponline.org/hpp/statehc06\\_1.pdf](http://www.acponline.org/hpp/statehc06_1.pdf).)

15. Division of Medical Education. 2007 Medical school graduation questionnaire: all schools summary report. Final. Washington, DC: Association of American Medical Colleges, 2007. (Accessed November 29, 2007, at <http://www.aamc.org/data/gq/allschoolsreports/2007.pdf>.)

Copyright © 2007 Massachusetts Medical Society.

#### CLINICAL TRIAL REGISTRATION

The *Journal* requires investigators to register their clinical trials in a public trials registry. The members of the International Committee of Medical Journal Editors (ICMJE) will consider most clinical trials for publication only if they have been registered (see *N Engl J Med* 2004;351:1250-1). Current information on requirements and appropriate registries is available at [www.icmje.org/faq.pdf](http://www.icmje.org/faq.pdf).