EDITORIAL

The Paradox of Primary Care

Kurt C. Stange, MD, PhD, Editor; Robert L. Ferrer, MD, MPH, Associate Editor

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THE PROBLEM

Despite rising costs, health care often is of poor quality.1-4 Current solutions to improving quality may do more harm than good if they focus more on diseases than on people.2,3,9 Efforts to improve the parts (evidence-based care of specific diseases)10,11 may not necessarily improve the whole (the health of people and populations).14-18

Expanding access to specialty care has been proposed as both a source19-21 of and a solution22,23 for deficiencies in quality of care. Primary care is touted as an essential building block of a high-value health care system24-28 even as it is undermined by systems attempting to improve the quality, effectiveness, and value of their health care.5,29-32 These contradictions plague improvement efforts in health care systems around the world, particularly the United States. This article, the third in a series to understand and improve health care, attempts to define and unravel the paradox of primary care. To make sense of this and other paradoxes affecting health care and health, it is useful to begin by considering different levels of analysis and thinking inclusively about seemingly contradictory evidence.

DIFFERENT LEVELS OF ANALYSIS YIELD DIFFERENT VIEWS

Quality of health care most commonly is measured by the application of disease-specific, evidence-based process-of-care guidelines.33-36 This evidence fairly consistently shows that primary care clinicians deliver poorer quality care than specialists.37-67

Evidence from the Medical Outcomes Study assesses care of patients with several chronic diseases. The study finds that patients’ functional health status outcomes are similar for care rendered by specialists and generalists but that generalists use fewer resources.68,69 Similar outcome at lower cost represents higher value.70

A growing number of studies show that for patients with chronic somatic and/or mental illness, shared care between specialists and generalists is optimal.23,71-83 In further contrast, ecological studies comparing states in the United States find that a greater supply of generalists and a lower supply of specialists is associated with greater quality of care on multiple disease-specific quality measures.21,84 Ecological studies comparing westernized countries show that more primary care (and perhaps its associated societal values and public health systems) is associated with better population health with lower cost and greater equity.85-92

NAMING THE PARADOX

Thus, the paradox is that compared with specialty care or with systems dominated by specialty care, primary care is associated with the following: (1) apparently poorer quality care for individual diseases, yet (2) similar functional health status at lower cost for people with chronic disease, and (3) better quality, better health, greater equity, and lower cost for whole people and populations.

INTERPRETATION

Two possible explanations might explain this paradox.

Studies Are Flawed; There Is No Paradox

First, is it possible that one or all groups of these studies are fatally flawed, and there is no paradox. Each of the bodies of work cited has inherent limitations. Studies of disease-specific quality of care typically use as outcomes evidence-based guidelines based on clinical trials that largely exclude patients with comorbid conditions.93,94 Thus, measures of quality may inadequately reflect population morbidity and may not be applicable to most people.94 Unmeasured confounding and selection biases appear to explain part, but not all, of the observed differences between specialty and primary care.42,95 Nonetheless, the face validity of disease-specific studies is high, as it is implausible that, compared with generalists, specialists would know less about their disease of interest or would be less likely to follow guidelines based on
The selection factors involved in the Medical Outcomes Study have been well-articulated, as has the judgment that "no one is likely to ever do a better job." This study is unique in comparing care at the level of functional health status of the whole person.

Studies of shared care are limited by focusing on care of patients with chronic and recurrent illness, where conjoint generalist-specialist care is most likely to be helpful. Although largely internally valid, their generalizability to other populations is not known.

Just as the studies of care of individual diseases may be prone to the reductionist fallacy, population-level studies are prone to the ecological fallacy. In health care the reductionist fallacy is making attributions about whole people, systems, and populations from studies of individual diseases. The ecological fallacy is making attributions about individual diseases or people based on whole-person or group data. As discussed below, it is likely that reductionist and ecological analyses represent separate but interacting truths.

Different Levels of Analysis May Reveal a Complex and Interrelated Whole

A second possible explanation is that the paradox of primary care is a function of different levels of observation, with different levels revealing varied aspects of complex and interrelated factors.

A key barrier to understanding has been the failure to recognize that the driving forces for health outcomes differ by level of analysis. At the level of specific diseases, technical quality of care may be a major determinant of narrowly focused disease markers of clinical success or failure.

At the population level, however, access to care and appropriateness of care (including avoiding overtreatment) functions to which a strong primary care function contributes, may be major outcome drivers. For example, improved access to primary care for veterans led to significant improvements in health outcomes. Appropriateness of care can suffer in areas with a high concentration of specialists, as clinicians working at the level of specific diseases do what they were trained to do without the benefits of the generalist approach described in the prior article in this series.

At the person level, primary care may be particularly important for those with multimorbidity, social deprivation, poorly defined or as-yet undiagnosed illness, or situations in which personal context is important. Specialty care is especially important for those needing particular medical knowledge or procedural expertise for which higher volume sometimes is associated with better outcomes. Specialty care may be most important for individuals whose needs are dominated by a particular disease, especially if that disease is uncommon. For most people, and probably for almost everyone over time, a combination of continuing primary care and selective specialty care is needed. Provision of the majority of care through ongoing person-focused, contextualized primary care relationships can allow care to be integrated and prioritized across acute and chronic illness, preventive, psychosocial, and family care. That health care is not organized this way in the United States may be an important factor in the high cost and low performance of the US health care system compared with other systems based on primary care.

Not only the forces driving the outcomes, but also the important outcomes themselves may differ by level of analysis. People generally are more interested in how health care helps them accomplish what is important in their lives than they are in how it affects their disease numbers. In addition, important outcomes for systems and populations, such as optimizing specialists' case mix or improving equity, are measurable only at the system or population level. Thus, the value of primary care accrues not only from the services provided to individual patients but also from the improved functioning of health care systems, and possibly from freeing resources to be spent on public health and the social determinants of health. Unfortunately, this value is not captured in current performance measures, and efforts to improve quality often place the resource burden on the primary care front line, whereas the benefits accrue to the individual patient, the health care system, and society.

IMPLICATIONS

The implications of the primary care paradox are multiple:

• It is important to simultaneously understand and value quality of care at the level of specific illnesses, whole people, communities, and populations. These different levels may have different drivers of process and outcome. Currently, whole-person and community foci are undervalued, resulting in adverse consequences for the cost, effectiveness, and equity of health care.

• Systems of care are needed that value both generalist and specialist care and that foster their integration.

• Systems that integrate care both horizontally for individuals, communities, and populations and vertically for specific diseases are most likely to provide the greatest value. Currently, vertical integration of care for disease is rewarded and supported to a greater degree than horizontal integration of...
care for people and populations. This imbalance is a source of the dysfunction of the health care system.

Some of these implications may seem obvious, however, we often do not act as though they are obvious or even apparent. The natural human tendency to simplify problems, focusing on easily conceptualized and measured components, can lead us to act in unintentionally damaging ways that overlook what is clear when a broader perspective is taken.

Thus, it is possible that pay-for-performance schemes may not improve the health of the population if they lead to a narrow focus on improving process measures for specific diseases without also creating incentives for the much more difficult-to-measure integration of care of the whole person and the development of systems that foster relationships which integrate narrow and broad knowledge to personalize care.

Evidence-based assessments of quality tend to be based on measures of central tendency from clinical trials that systematically exclude the majority of people with comorbid conditions. The resulting reductionistically biased interventions may achieve their goal. achieve their goal of improving the narrow quality measure but fail in the larger goals of improving the functional health of the individual and providing health care value to the population.

It is easier to conceptualize and measure the value of specialization than of generalism. Specialism fits with the reductionistic understanding of disease and medical care that is dominant in Western countries. Generalism is better understood with broader conceptualizations of health based on systems and complexity theories. The added value of a generalist approach most likely involves integrative functions based on an inclusive focus and an ability to prioritize care within a relationship-centered, whole-person, community-based context, fostering connections to more narrowly focused care when it is needed. These properties affect the performance of other health system components, including efficiency and equity.

An important insight from the paradox of primary care is to distinguish among complex diseases, complex patients, and complex populations. People with a single complex disease, for which successful management requires narrowly focused expertise with uncommon presentations or complicated treatment regimens, are the domain of the specialist. Complex patients, characterized by multiple chronic illnesses and competing priorities, often derive the greatest value from shared care, with selective specialist care integrated by primary care. Complex populations, such as those with large variations in wealth, education, culture, access to health care, or remoteness from health services, will rely heavily on a robust system of primary health care and public health to achieve equity in health outcomes. Care at all levels (diseases, patients, and populations) is best integrated by a generalist approach that prioritizes and personalizes care. Personalization means actually knowing the person over time in their family and community contexts. This contrasts with the current corruption and debasement of the term personalized to mean knowing the person’s genome sufficiently to tailor pharmacotherapy.

One task of health systems is to learn how to support the most effective and efficient care, and where possible, to measure outcomes for complex diseases, patients, and populations. Narrowly defined performance measures are likely to miss performance gaps for complex populations when poor access is the culprit rather than poor technical quality. Conversely, detecting overservice will be important for groups with high access and resources, as overservice is a substantial contributor to poor outcomes. For complex patients, in whom the treatment burden for multiple illnesses may create a new set of functional limitations, more global outcomes measures may be necessary. Creating the lenses to rectify current distortions in health services' evaluative vision is an urgent priority.

Understanding the paradox of primary care and acting on that wisdom can help us to develop systems that maximize the value of health care for individuals and for the population. The next article in this series will address how the components of health care fit together to create value.

**CONCLUSION**

The primary care paradox is the observation that primary care physicians provide poorer quality care of specific diseases than do specialists, yet primary care is associated with higher value health care at the level of the whole person, and better health, greater equity, lower costs, and better quality of care at the level of populations.

This paradox shows that current disease-specific scientific evidence is inadequate for conceptualizing, measuring, and paying for health care performance. Unraveling the paradox of primary care depends on understanding the added value of integrating, prioritizing, contextualizing, and personalizing health care across acute and chronic illness, psychosocial issues and mental health, disease prevention, and optimization of health and meaning. This added value is hard to see in assessments at the level of diseases. The added value is readily apparent, however, at the level of whole people and populations.

Systems development is needed to integrate the complementary strengths of primary and specialty
care to avoid unintended negative health and societal consequences from fragmenting efforts to improve the quality of health care. Research is needed to understand and support the complex and high-value but poorly comprehended generalist function.

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References

1. McGlynn EA, Asch SM, Adams J, et al. The quality of health care delivered to adults in the United States. N Engl J Med. 2003;348(26):2635-2645.

2. Marshall MN, Romano PS, Davies HT. How do we maximize the impact of the public reporting of quality of care? Int J Qual Health Care. 2004;16(Suppl 1):i57-i63.

3. Institute of Medicine. Committee on Quality of Health Care in America. Crossing the Quality Chasm: A New Health System for the 21st Century. Washington, DC: National Academy Press; 2001.

4. Geymonat JP. Health Care in America: Can Our Ailing System be Healed? Boston, MA: Butterworth-Heinemann; 2002.

5. Casalino LP. The unintended consequences of measuring quality on the quality of medical care. N Engl J Med. 1999;341(15):1147-1150.

6. McGlynn EA. Intended and unintended consequences: what should we really worry about? Med Care. 2007;45(1):3-5.

7. Ash JS, Sittig DF, Poon EG, Guappone K, Campbell E, Dykstra RH. The extent and importance of unintended consequences related to computerized provider order entry. J Am Med Inform Assoc. 2007;14(4):415-423.

8. Roland M. Pay-for-performance: too much of a good thing? A conversation with Martin Roland. Interview by Robert Galvin. Health Aff (Millwood). 2006;25(5):w412-w419.

9. Watts IT, Wencel B. Financing and the quality framework. Aust Fam Physician. 2007;36(1-2):32-36.

10. Downing A, Rudge G, Cheng Y, Tu YK, Keen J, Gilthorpe MS. Do the UK government’s new Quality and Outcomes Framework (QOF) scores adequately measure primary care performance? A cross-sectional survey of routine healthcare data. BMC Health Serv Res. 2007;7:166.

11. Doran T, Fullwood C, Gravelle H, et al. Pay-for-performance programs in family practices in the United Kingdom. N Engl J Med. 2006;355(4):375-384.

12. Wald DS. Problems with performance related pay in primary care. BMJ. 2007;335(7619):523.

13. McDonald R, Harrison S, Checkland K, Campbell SM, Roland M. Impact of financial incentives on clinical autonomy and internal motivation in primary care: ethnographic study. BMJ. 2007;334 (7608):1357.

14. Ham C. Integrating Care: Lessons from the front line. The Nuffield Trust. 2008. http://nuffieldtrust.nvisage.uk.com/publications/detail.asp?id=06P&id=383. Accessed May 19, 2009.

15. Stange KC. The paradox of the parts and the whole in understanding and improving general practice. Int J Qual Health Care. 2002;14(4):267-268.

16. De Maeseneer J, van Weel C, Egelman D, Mfenyana K, Kaufman A, Sewankambo N. Strengthening primary care: addressing the disparity between vertical and horizontal investment. Br J Gen Pract. 2008;58(546):3-4.

17. Stange KC. The problem of fragmentation and the need for integrative solutions. Ann Fam Med. 2009;7(2):100-103.

18. Thomas P, Meads G, Moustafa A, Nazareth I, Stange KC, Donnelly Hess G. Combined vertical and horizontal integration of health care—a goal of practice based commissioning. Qual. Primary Care. 2008;16(6):425-432.

19. Starfield B, Shi LY, Macinko J. Contribution of primary care to health systems and health. Milbank Q. 2005;83(3):457-502.

20. Starfield B, Shi L, Grover A, Macinko J. The effects of specialist supply on populations’ health: assessing the evidence. Health Aff (Millwood). 2005;(Suppl Web Exclusives):W5-97-W95-107.

21. Baicker K, Chandra A. Medicare spending, the physician workforce, and beneficiaries’ quality of care. Health Aff (Millwood). 2004;(Suppl Web Exclusives):W184-197.

22. Goldman L. The value of cardiology. N Engl J Med. 1996;335(25):1918-1919.

23. Suris X, Cerda D, Ortiz-Santamaria V, et al. A rheumatology consultancy program with general practitioners in Catalina, Spain. J Rheumatol. 2007;34(6):1328-1331.

24. Donaldson MS, Yordy KD, Lohr KN, Vanselow NA, eds. Primary Care America’s Health in a New Era. Washington DC: National Academy Press; 1996.

25. Chan M. Return to Alma-Ata. Lancet. 2008;372(9642):865-866.

26. Lawn JE, Rohde J, Rifkin S, Were M, Paul VK, Chopra M. Alma-Ata 30 years on: revolutionary, relevant, and time to revitalise. Lancet. 2008;372(9642):917-927.

27. Gunn JM, Palmer VJ, Naccarella L, et al. The promise and pitfalls of generalism in achieving the Alma-Ata vision of health for all. Med J Aust. 2008;189(2):110-112.

28. Gunn J, Naccarella L, Palmer V, Kakanovic R, Pope C, Lathlean J. What is the place of generalism in the 2020 primary health care team? Australian Primary Health Care Research Institute. 2008. http://www.anu.edu.au/aphcri/Domain/Workforce/Perkins_25_final.pdf. Accessed May 12, 2009.

29. Bodenheimer T. Primary care—will it survive? N Engl J Med. 2006;355(9):861-864.

30. Starfield B. Is US health really the best in the world? JAMA. 2000;284(4):483-485.

31. Lewin S, Lavis JN, Oxman AD, et al. Supporting the delivery of cost-effective interventions in primary health-care systems in low-income and middle-income countries: an overview of systematic reviews. Lancet. 2008;372(9642):928-939.

32. Rohde J, Couzens S, Chopra M, et al. 30 years after Alma-Ata: has primary health care worked in countries? Lancet. 2008;372(9642):950-961.

33. Marshall M, Campbell S, Hacker J, Roland M, eds. Quality Indicators For General Practice: A Practical Guide to Clinical Quality Indicators For Primary Care Health Professional and Managers. Lake Forest, IL: Royal Society of Medicine Press, Ltd; 2002.

34. Marshall MN, Shekelle PG, McGlynn EA, Campbell S, Brook RH, Roland MO. Can health care quality indicators be transferred between countries? Qual Saf Health Care. 2003;12(1):8-12.

35. McGlynn EA. Selecting common measures of quality and system performance. Med Care. 2003;41(1)(Suppl):i39-i47.
36. McGlynn EA. An evidence-based national quality measurement and reporting system. Med Care. 2003;41(1)(Suppl):18-115.

37. Harrold LR, Field TS, Gurwitz JH. Knowledge, patterns of care, and outcomes of care for generalists and specialists. J Gen Intern Med. 1999;14(8):499-511.

38. Vollmer WM, O’Hollaren M, Ettinger KM, et al. Specialty differences in the management of asthma. A cross-sectional assessment of allergists’ patients and generalists’ patients in a large HMO. Arch Intern Med. 1997;157(11):1201-1208.

39. Tseng FY, Lai MS. Effects of physician specialty on use of antidiabetes drugs, process and outcomes of diabetes care in a medical center. J Formos Med Assoc. 2006;105(10):821-831.

40. Stone VE, Mansouriati FF, Poses RM, Mayer KH. Relation of physician specialty and HIV/AIDS experience to choice of guideline-recommended antiretroviral therapy. J Gen Intern Med. 2001;16(6):360-368.

41. Solomon DH, Bates DW, Panush RS, Katz JN. Costs, outcomes, and patient satisfaction by provider type for patients with rheumatic and musculoskeletal conditions: a critical review of the literature and proposed methodologic standards. Ann Intern Med. 1997;127(1):52-60.

42. Smetana GW, Landon BE, Bindman AB, et al. A comparison of outcomes resulting from generalist vs specialist care for a single discrete medical condition: a systematic review and methodologic critique. Arch Intern Med. 2007;167(10):10-20.

43. Simon GE, Von Korff M, Rutter CM, Peterson DA. Treatment process and outcomes for managed care patients receiving new antidepressant prescriptions from psychiatrists and primary care physicians. Arch Gen Psychiatry. 2001;58(4):395-401.

44. Shah BR, Hux JE, Laupacis A, Zinnman B, Zwarenstein M. Deficiencies in the quality of diabetes care: comparing specialist with generalist care misses the point. J Gen Intern Med. 2007;22(2):275-279.

45. Shah BR, Hux JE, Laupacis A, Zinnman B, Booth GL. Use of vascular risk-modifying medications for diabetic patients differs between physician specialties. Diabet Med. 2006;23(10):1117-1123.

46. Shackelford DP, Griffin D, Hoffmann MK, Jones DED. Influence of specialty on pathology resource use in evaluation of cervical dysplasia. Obstet Gynecol. 1999;94(5Pt 2):709-712.

47. Schreiber TL, Elkahat A, Grimes CI, O’Neill WW. Cardiologist versus internist management of patients with unstable angina: treatment patterns and outcomes. J Am Coll Cardiol. 1999;36(2):577-582.

48. Pugh MJ, Anderson J, Pogach L, Berlowitz DR. Differential adoption of pharmacotherapy recommendations for type 2 diabetes by generalists and specialists. Med Care Res Rev. 2003;60(2):178-200.

49. Provenzale D, Omfan J, Gralnek I, Rabeckre L, Koff R, McCrory D. Gastroenterologist specialist care and care provided by generalists—an evaluation of effectiveness and efficiency. Am J Gastroenterol. 2003;98(1):21-28.

50. Nash IS, Corrato RR, Dlouhijrj Mj, O’Connor JP, Nash DB. Generalist versus specialist care for acute myocardial infarction. Am J Cardiol. 1999;83(5):650-654.

51. Melniker LA, Leo PJ. Comparative knowledge and practice of emergency physicians, cardiologists, and primary care practitioners regarding drug therapy for acute myocardial infarction. Chest. 1998;113(2):297-305.

52. McCaister FA, Magnud SR, Euriht DJ, Johnson JA. The effect of specialist care within the first year on subsequent outcomes in 24,232 adults with new-onset diabetes mellitus: population-based cohort study. Qual Saf Health Care. 2007;16(1):6-11.

53. Levetan CS, Passaro MD, Jablonski KA, Ratner RE. Effect of physician specialty on outcomes in diabetic ketoacidosis. Diabetes Care. 1999;22(11):1790-1795.

54. Ko CW, Kellely K, Meyer KE. Physician specialty and the outcomes and cost of admissions for end-stage liver disease. Am J Gastroenterol. 2001;96(12):3411-3418.

55. Janson S, Weiss K. A national survey of asthma knowledge and practices among specialists and primary care physicians. J Asthma. 2004;41(3):343-348.

56. Indridason OS, Cofman CJ, Oddone E. Is specialty care associated with improved survival of patients with congestive heart failure? Am Heart J. 2003;145(2):300-309.

57. Go AS, Rao RK, Dauterman KW, Massie BM. A systematic review of the effects of physician specialty on the treatment of coronary disease and heart failure in the United States. Am J Med. 2000;108(3):216-226.

58. Gabriel SE, Wagner JL, Zolnemietz AR, Scott CG, Luthra HS. Is rheumatoid arthritis care more costly when provided by rheumatologists compared with generalists? Arthritis Rheum. 2001;44(7):1504-1514.

59. Foody JM, Rathore SS, Wang YF, et al. Physician specialty and mortality among elderly patients hospitalized with heart failure. Am J Med. 2005;113(10):1120-1125.

60. Federman DG, Concato J, Kirner RS. Comparison of dermatologic diagnoses by primary care practitioners and dermatologists. A review of the literature. Arch Fam Med. 1999;8(2):170-172.

61. Dohmen K, Shirahama M, Shigematsu H, Irie K, Ishihashi H. Impact of health culture to extend survival of hematopoietic cell carcinoma patients with cirrhosis: a comparison with non-hematologists. Hepatogastroenterology. 2004;51(56):564-569.

62. Diette GB, Skinner EA, Nguyen TT, Markson L, Clark BD, Wu AW. Comparison of quality of care by specialist and generalist physicians as usual source of asthma care for children. Pediatrics. 2001;108(2):432-437.

63. Chin MH, Zhang J, Merrell K. Specialty differences in the care of older patients with diabetes. Med Care. 2000;38(2):131-140.

64. Casale PN, Jones JL, Wolf FE, Pei Y, Eby LM. Patients treated by cardiologists have a lower in-hospital mortality for acute myocardial infarction. J Am Coll Cardiol. 1998;32(4):885-889.

65. Backer V, Nepper-Christensen S, Nolte H. Quality of care in patients with asthma and rhinitis treated by respiratory specialists and primary care physicians: a 3-year randomized and prospective follow-up study. Ann Allergy Asthma Immunol. 2006;97(4):490-496.

66. Anderson JJ, Ruwe M, Miller DR, Kazis L, Felson DT, Prakash M. Relative costs and effectiveness of specialist and general internist ambulatory care for patients with 2 chronic musculoskeletal conditions. J Rheumatol. 2002;29(7):1488-1495.

67. Wierzchowiecki M, Poprawski K, Nowicka A, Kandziora M, Pietkowski A. [Knowledge of primary care physicians, cardiologists from cardiology clinics, internal and cardiology department physicians about chronic heart failure diagnosis and treatment] [In Polish]. Pol Merkur Lekarski. 2005;18(104):210-215.

68. Greenfield S, Rogers W, Mangotich M, Carney MF, Torlov AR. Outcomes of patients with hypertension and non-insulin dependent diabetes mellitus treated by different systems and specialties. Results from the medical outcomes study. JAMA. 1995;274(18):1436-1444.

69. Greenfield S, Nelson EC, Zublokh M, et al. Variations in resource utilization among medical specialties and systems of care. Results from the medical outcomes study. JAMA. 1992;267(12):1642-1630.

70. Rosenbllt RA. Specialists or generalists. On whom should we base the American health care system? JAMA. 1992;267(12):1665-1666.

71. Ahmed A, Allman RM, Kiefe CI, et al. Association of consultation between generalists and cardiologists with quality and outcomes of heart failure care. Am Heart J. 2003;145(6):1086-1093.

72. Katon W, Von Korff M, Lin E, et al. Collaborative management to achieve treatment guidelines. Impact on depression in primary care. JAMA. 1995;273(13):1026-1031.

73. Katon WJ, Von Korff M, Lin EH, et al. The Pathways Study: a randomized trial of collaborative care in patients with diabetes and depression. Arch Gen Psychiatry. 2004;61(10):1042-1049.
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117. Howie JG, Heaney DJ, Maxwell M. Measuring quality in general practice. Pilot study of a needs, process and outcome measure. Occas Pap R Coll Gen Pract. 1997;Feb(75):i-xii[1-32].

118. Howie JG, Heaney DJ, Maxwell M. Quality, core values and the general practice consultation: issues of definition, measurement and delivery. Fam Pract. 2004;21(4):458-468.

119. Heath I, Rubinstein A, Stange KC, van Driel ML. Quality in primary health care: a multidimensional approach to complexity. BMJ. 2009;338:b1242.

120. Ferrer RL. Pursuing equity: contact with primary care and specialist clinicians by demographics, insurance, and health status. Ann Fam Med. 2007;5(6):492-502.

121. Ferrer RL, Hambidge SJ, Maly RC. The essential role of generalists in health care systems. Ann Intern Med. 2005;142(8):691-699.

122. World Health Organization. Commission on Social Determinants of Health—Final Report. 2008. http://www.who.int/social_determinants/final_report/en/index.html. Accessed Jan 30, 2009.

123. De Maeseneer J, van Weel C, Egilman D, Mfenyana K, Kaufman A, Sewankambo N. Strengthening primary care: addressing the disparity between vertical and horizontal investment. Br J Gen Pract. 2008;58(546):3-4.

124. Stange KC. Polyclinics must integrate health care vertically AND horizontally [Editorial]. Lond J Prim Care 2008;1:42-44.

125. Miles RW. Fallacious reasoning and complexity as root causes of clinical inertia. J Am Med Dir Assoc. 2007;8(6):349-354.

126. May R. Forecast. New Sci. 2006;192(2578):49.

127. McDonald R, Harrison S, Checkland K. Incentives and control in primary health care: findings from English pay-for-performance case studies. J Health Organ Manag. 2008;22(1):48-62.

128. Campbell SM, McDonald R, Lester H. The experience of pay for performance in English family practice: a qualitative study. Ann Fam Med. 2008;6(3):228-234.

129. Committee of the American College of Rheumatology Council on Health Care Research. Role of specialty care for chronic diseases: a report from an ad hoc committee of the American College of Rheumatology. Mayo Clin Proc. 1996;71(12):1179-1181.

130. Koestler A, Smythies JR, eds. Beyond Reductionism: New Perspectives on the Life Sciences. Boston, MA: Houghton Mifflin Co; 1971.

131. Stange KC, Miller WL, McWhinney I. Developing the knowledge base of family practice. Fam Med. 2001;33(4):286-297.

132. Sturmberg JP. Systems and complexity thinking in general practice. Part 2: application in primary care research. Ann Fam Physician. 2007;36(4):273-275.

133. Sturmberg JP. Systems and complexity thinking in general practice: part 1 - clinical application. Ann Fam Physician. 2007;36(3):170-173.

134. McDaniel R, Driebe DJ. Complexity science and health care management. In: Blair JD, Myron DG, Savage GT, eds. Advances in Health Care Management. Vol 2. Stamford, CT: JAI Press; 2000:11-36.

135. Stacey RD. Complexity and Creativity in Organizations. 1st ed. San Francisco, CA: Berrett-Koehler Publishers; 1996.

136. Plsek PE, Greenhalgh T. Complexity science: The challenge of complexity in health care. BMJ. 2001;323(7313):625-628.

137. Plsek PE, Wilson T. Complexity, leadership, and management in healthcare organisations. BMJ. 2001;323(7315):746-749.

138. Meads G. Primary Care in the Twenty-First Century. Seattle, WA: Radcliffe; 2006.

139. Ferrara J. Personalized medicine: challenges in assessing and capturing value in the commercial environment. Expert Rev Mol Diagn. 2006;6(2):129-131.

140. Langreth R, Waldholz M. New era of personalized medicine: targeting drugs for each unique genetic profile. Oncologist. 1999;4(5):426-427.

141. Kalow W. Pharmacogenetics and pharmacogenomics: origin, status, and the hope for personalized medicine. Pharmacogenomics J. 2006;6(3):162-165.

142. Brook RH, Kamberg CJ, Mayer-Oakes A, Beers MH, Raube K, Steiner A. Appropriateness of acute medical care for the elderly: an analysis of the literature. Health Policy. 1990;14(3):225-242.

143. Wennberg JE, Fisher ES, Goodman DC, Skinner JB. Tracking the care of patients with severe chronic illness: the Dartmouth Atlas of Health Care 2008. The Dartmouth Institute of Health Policy and Clinical Practice Center for Health Policy Research. 2008. http://www.dartmouthatlas.org/atlases/2008_Chronic_Care_Atlas.pdf. Accessed May 23, 2009.

144. Kohn LT, Corrigan JM, Donaldson MS, eds. To Err is Human. Building a Safer Health System. Washington, DC: National Academy Press; 2000.

145. Stange KC. A science of connectedness. Ann Fam Med. (forthcoming).