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While the growth of health care costs has slowed over the past few years, lowering costs over the long term will depend on improving health care labor productivity. Over half of the \$2.6 trillion spent on health care in the United States in 2010 was wages for health care workers, and labor productivity (http://www.nejm. org/doi/full/10.1056/NEJMp1109649) has historically worsened at a rate of 0.6% per year. Simultaneously, the individual mandate, subsidized coverage, and Medicaid expansion in the Affordable Care Act (ACA), along with an aging population, will drive up the demand for health care. Reducing the rate at which health care costs grow, and the proportion of U. S. gross domestic product and public sector budgets that are consumed by health care over the long term, therefore, will require either increasing labor productivity or substantially lowering workforce salaries. The early signs are worrisome. With health care viewed as a jobs source and jobs being added faster than demand is growing, we appear to be on a path toward more workers and lower salaries, not necessarily more productivity, unless something changes dramatically.

Using data from the Bureau of Labor Statistics (BLS) and the American Medical Association, my colleagues and I found that from 1990 to 2012, the number of workers in the U.S. health system grew by nearly 75%. Nearly 95% of this growth was in non-doctor workers, and the ratio of doctors to non-doctor workers shifted from 1:14 to 1:16. On the basis of BLS median wages, this equates to

\$823,000 of labor cost per doctor. Demand and supply are not growing in tandem: from 2002 to 2012, inpatient days per capita decreased by 12% while the workforce in hospitals grew by 11%. This misalignment underlies some of the productivity decline we have observed in health care. Fortunately, we anticipate demand for health care to grow in 2014, so to the extent that jobs are not added, productivity gains are possible. Unfortunately, health care as an industry continues hiring far faster than demand is growing, (http://www. bls.gov/web/empsit/ceshighlights.pdf) adding 119,000 new workers in the first half of 2013, for example, with little increase in patient vol-

So, what are all these people doing? Today, for every doctor, only 6 of the 16 non-doctor workers have clinical roles, including registered nurses, allied health professionals, aides, care coordinators, and medical assistants. Surprisingly, 10 of the 16 non-doctor workers are purely administrative and management staff, receptionists and information clerks, and office clerks. The problem with all of the non-doctor labor is that most of it is not primarily associated with delivering better patient outcomes or lowering costs. Despite all this additional labor, the most meaningful difference in quality over the past 10 years is the recent reduction in 30-day hospital readmissions (www.nber.org/erp/2013_economic_ report_of_the_president.pdf) from an average of 19% to 17.8%, which arguably was driven by penalties imposed by the ACA and not by

organic improvements in care models. While one could interpret the expansion of non-doctor clinical labor as a source of leverage for doctors, the number of patients doctors are seeing and whose care they are managing hasn't increased.

This trend is troubling as we enter a phase of transformation in health care. Today, more than 60% of labor is nonclinical and is fragmented across various provider organizations, payer systems, and delivery models. It is highly unlikely that we can reorganize these jobs in a way that meaningfully improves productivity. This difficulty is compounded by regulations that limit the corporate practice of medicine, Stark laws, (http://www.cms.gov/Medicare/Fraud-and-Abuse/ PhysicianSelfReferral/index.html?redirect=/ physicianselfreferral/) state nurse and physician assistant scope-of-practice and licensure rules, (http://www.healthaffairs.org/healthpolicybriefs/ brief.php?brief_id=79) and billing requirements that physicians physically see patients to receive full reimbursement. Reducing regulatory hurdles represents a substantial opportunity to improve productivity by reducing fragmentation of clinical labor and delegating care to lowercost qualified providers, but the most immediate goal should be to eliminate many nonclinical jobs through standardizing and simplifying revenue-cycle processes, credentialing, supply chains, regulatory compliance, and information technology systems, which will then allow us to reengineer administrative systems (http://www. nejm.org/doi/full/10.1056/NEJMp1209711).

On the clinical side, care delivery must be designed so that the 6 clinical workers per doctor substantially contribute to a patient's care. Today, too much clinical labor is diverted from direct patient care to lower-than-license roles such as payer utilization-management roles, staffing of underutilized diagnostic centers, administrative roles, and uncoordinated care activities. In practice, little of the existing clinical labor is actually organized into patient-care teams, and few have clarity about what outcomes they are specifically working to achieve and who is responsible. Reorganizing clinical labor around direct patient care and creating unambiguous accountability for clinical outcomes together have the potential to substantially alleviate the predicted shortage of clinicians as coverage is expanded and to improve system-level productivity, outcomes, and patient experience.

Lessons can be learned from sectors such as manufacturing. Through a significant revolution, manufacturing was able to transition from direct labor to a more productive, efficient industry, (http://hbr.org/1985/09/the-hidden-factory/ ar/1) and this happened over a century, from 1855 to 1975. In addition, both production and administrative labor decreased as processes were redesigned to become more reliable, errorfree, and efficient. In health care, although, the optimal relationship among doctors, other clinical staff, and administrative labor is uncertain, it is certainly the case that there should not be more administrators than doctors and all other clinical labor combined. Rather, one would expect the ratio of nonproductive to productive labor to decline over time in health care as it has in all other productive sectors of the economy. We can also surmise that the improvement needed will take decades and must be sustained by economic incentives that are aligned with productivity far more strongly than they are today.

To reverse the decline in health care labor productivity, we must transform the system both on the supply and on the demand side. As Ari Hoffman and Ezekiel Emanuel argue in the Journal of the American Medical Association, (http://jama.jamanetwork.com/ reengineering article.aspx?articleid=1653532) is very different from implementing new technologies. For example, new innovative reimbursement models aim to reward providers for lowering health care costs on the supply side. Consider, for example, the sorts of models being tested in Arkansas (where health care providers are given a fixed budget and a set of quality measures to achieve for an entire course of care from diagnosis to recovery) and Pioneer accountable care organizations (where providers are paid a lump sum and given a set of quality goals for year of care for a patient). With these payment models, providers make more money when they invent more cost effective approaches to delivering highquality care. Simultaneously, more transparency in price and quality data can direct patients to more productive settings, (http://blogs.hbr.org/ 2013/09/a-better-way-to-encourage-price-shoppingfor-health-care/) intensifying the incentive for providers to improve on the demand side.

In the interim, workers in the health system will need to worry about their wages as more jobs are added — unless care and costs are substantially reengineered in the systems in which they work. Health care practitioners should take pride in delivering consistent and excellent clinical outcomes with fewer labor hours and lower total costs, just as leaders have in other industries. Moreover, health care leaders should also focus on replicating other sectors of the economy when it comes to reducing nonproductive labor. Finally, health care leaders and practitioners should seek to remove labor that is not di-

rectly contributing to better outcomes or delivering a hard return on investment through reductions in the cost of care. It is conceivable that shared services can emerge for processes such as credentialing, compliance, and data management and that, along with ACA-mandated revenue-cycle simplification they can substantially reduce administrative labor. In a health system where costs, out of fiscal necessity, grow more slowly, it is far more desirable to reduce nonproductive administrative labor than to reduce clinician wages.