

**USING COMPARATIVE ANALYSIS TO ADDRESS  
HEALTH SYSTEM CARICATURES**

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To learn from health care systems abroad, we must move beyond simplistic characterizations and compare different systems with respect to salient performance measures. Despite findings from recent cross-national studies suggesting that many health care systems outperform the United States, claims by U.S. public officials often fail to acknowledge the actual accomplishments of health care systems abroad. We document significant variation among the United States and France, Germany, and England, which provide universal coverage, albeit in different ways. As previously documented, the United States has the highest rate of mortality amenable to health care. We extend this work by adding two indicators: (a) access to timely and effective primary care as measured by hospital discharges for avoidable hospital conditions; and (b) use of specialty services as indicated by coronary revascularization (bypass surgery and angioplasty), adjusted for the burden of coronary artery disease. Our findings indicate that: (a) the United States suffers the gravest consequences of financial barriers to primary care; (b) in all four countries, older people (65+) receive fewer revascularizations than their younger counterparts once we account for disease burden; and (c) in France, patients receive the most revascularizations, after adjusting for the burden of disease.

Opponents of the Patient Protection and Affordable Care Act of 2010 (ACA) have denounced it as a worrisome step toward increasing government control that would lead to “socialized medicine” (1). They argue that health care systems with universal coverage resemble the worst caricatures of a national health service (NHS)—one with severe limits on health care spending resulting in waiting lists

and other obstacles that impede patients' access to health care and ration the volume of specialty services. Advocates of single-payer health systems with universal coverage are rarely more objective than their detractors as they tend to emphasize the positive attributes and overlook the problems faced by systems with universal coverage, whether they resemble NHS models or national health insurance variants.

Indeed, when we look abroad for lessons from other systems, rhetoric typically triumphs over serious assessment of existing alternatives. Despite the findings from several recent cross-national studies (2–4), claims by U.S. public officials often fail to acknowledge the actual superior performance of health care systems in other countries along many dimensions. Even more sophisticated critics of single-payer health systems assume that most systems outside the United States are fundamentally the same (5). Yet a necessary condition for learning from abroad is to begin with an accurate description of how different health care systems operate (6). We suggest that it is important to move beyond simplistic characterizations and compare salient dimensions of different systems with respect to comparable measures of health system performance.

We focus on how three European health care systems—France, Germany, and England—compare to the United States with respect to the consequences of access barriers and the use of specialized cardiac care services. We rely on three measures that reflect important dimensions of health system performance.

## CONCEPTUAL FRAMEWORK

Much of the literature comparing health care systems has focused on describing how they are financed and organized (7). Other studies seek to identify “best practices” and learn about policies or programs that might be transferred from one to another (8). Still others assess health system performance by measuring benchmark indicators and developing composite scores. The World Health Organization's assessment of 193 health care systems was based on three dimensions of performance—overall population health, responsiveness to patients, and equity of financing—all adjusted for the level of resources available (9). The Commonwealth Fund's approach, applied to a much smaller set of health care systems, is based on five broad domains (outcomes, quality, access, efficiency, and equity) as measured by more than 60 indicators and additional annual surveys (10). Our approach shares the overall goal of these studies—to assess performance. But it avoids the search for a composite score and focuses only on two, albeit critical, dimensions of performance: (a) the extent to which health systems ensure access to effective health services (i.e., those known to prevent disease, reduce avoidable hospitalizations, and decrease premature mortality); and (b) the extent to which health systems deliver specialized services, based on the case of coronary revascularization (bypass surgery and angioplasty).

We recognize that it is misleading to assess health system performance based on life expectancy at birth or infant mortality since the role of health care in improving population health is small compared to interventions aimed at social and environmental determinants (11–13). Between those who emphasize the decisive impact of social determinants of health and those who focus on access to health care, there is a middle ground—attention not only to the consequences of poor social conditions, but also to barriers in access to primary care. There is, of course, a vast literature that measures inequities in access to health care (14). Such studies rely either on comparisons of “inputs” (e.g., physicians, hospital beds, etc.) or on administrative or self-reported survey data to measure service utilization (15). In assessing the dimensions of health system performance, however, we rely rather on two indicators that measure the consequences of access barriers (avoidable mortality [AM] and hospital discharges for avoidable hospital conditions [AHC]) and one indicator that measures the use of specialty care (revascularizations adjusted for the burden of disease). All of these indicators are associated with previous studies and have been validated in different contexts (2). But they are rarely used together as a way of assessing health system performance (2).

#### *Amenable Mortality*

The concept of mortality amenable to health care (amenable mortality) attempts to capture the consequences of poor access to disease prevention, primary care, and specialty services (16). Of course, few causes of death are entirely amenable, or not amenable to health care, and as medical therapies improve, even more deaths may be classified as potentially avoidable. Nevertheless, this summary measure provides convincing evidence that the United States is not performing well in comparison to other wealthy nations. The United States has the highest rate, followed by the United Kingdom,<sup>1</sup> Germany, and France (17). Moreover, over the period 1999–2006, the United States had the lowest rate of improvement along this measure (18).

An exclusive focus on amenable mortality, however, does not allow one to disentangle the consequences of poor access to disease prevention versus primary or specialty health care services. We therefore extend Nolte and McKee’s work by supplementing the measure of amenable mortality with two indicators. One captures the consequences of poor access to primary care. The other captures differences in the extent to which health systems make specialty cardiac care available to their patients. For this measure, we do not assume that availability is

<sup>1</sup> We refer to England in this article because the health care systems across the constituent parts of the United Kingdom vary in many respects. However, since England represents 85 percent of the United Kingdom’s population, we assume that the calculations of AM for the United Kingdom apply to England, as well.

equivalent to appropriateness. But given the prevailing view that the United States always provides more high-tech care, this indicator can shed light on the veracity of such claims.

#### *Avoidable Hospital Conditions*

The hospital discharge rate for AHC (otherwise known as “ambulatory-care sensitive conditions”) is considered a valid measure of access to timely and effective primary care (19). Access to primary care reduces the probability of hospitalization for medical conditions treated effectively outside the hospital setting—before exacerbations lead to hospital admission (20, 21). Such conditions include bacterial pneumonia, congestive heart failure, and complications of diabetes and asthma. Although some studies question whether AHC can reliably distinguish health system characteristics from the socioeconomic status of their populations (22), there is broad consensus that differences in rates of AHC, among neighborhoods, reflect disparities in access to primary care, not population health status (23, 24).

#### *Revascularizations Adjusted for the Burden of Disease*

Hospital discharges for coronary revascularization, adjusted for rates of coronary artery disease (CAD), reflect the extent to which patients are referred and actually receive revascularization procedures—percutaneous transluminal coronary angioplasty (PTCA) and coronary artery bypass graft surgery (CABG). International comparisons of revascularization typically indicate that aggregate rates of these procedures are much higher in the United States than in other Organisation for Economic Co-operation and Development nations, but these estimates do not account for cross-national differences in the burden of heart disease (25).

We have developed an index to compare the use of revascularization across geographic areas while accounting for differences in disease burden (26). Although the true prevalence of CAD, in any population, will never be known since the illness may be asymptomatic, we examine mortality rates for acute myocardial infarction (AMI) as a proxy for the burden of CAD. Our index for assessing the use of these procedures is based on the ratio of age-adjusted procedure rates for the population residing in each nation to the age-adjusted AMI mortality rates. We do not assume that a higher ratio of revascularization indicates better access to appropriate cardiac interventions. Instead, we use this measure as a more accurate way to assess the volume of these services provided by a health system after accounting for the burden of disease.

#### FOUR CONTRASTING HEALTH SYSTEMS

The U.S. health care system presents a stark contrast to France, Germany, and England, all of which provide universal health care coverage, albeit in different ways. It is therefore important to note some significant contrasts in health care organization among these countries.

France and Germany are examples of statutory national health insurance systems that rely on significant mandatory payroll taxation, much like social security in the United States. England is the prototype model of a NHS that relies largely on general revenue taxation and spends considerably less on health care, as a share of gross domestic product (9.8%) in 2011, than France (11.6%), Germany (11.0%), or the United States (17.7%) (27).

In England, among all hospitals, fewer than 5 percent of beds are in private institutions. In France and Germany, although public hospitals are dominant, there is still a significant role for private institutions and most physicians in ambulatory care—general practitioners as well as specialists—work in fee-for-service private practice, as in the United States. In contrast, primary care trusts provide almost all primary care in England through a mixed reimbursement system for general practitioners.

Among all three health systems with universal coverage, unlike the United States, there are strong institutional barriers between salaried physicians in public hospitals and those working in private community-based practice. In France, some general practitioners, as well as specialists in private practice, have stronger ties to public hospitals and collaborate formally with private hospitals more often than in Germany and England, whose health systems are characterized by “strict sectorization,” with poor linkages between the hospital and ambulatory care systems (28, 29).

As in France and Germany, and in contrast to the United States, England has minimal financial barriers to primary care. In comparison to France, Germany, and the United States (for those who are well-insured), England has tighter access barriers to specialty services due to the significant gatekeeping role of the primary care trusts. Nonetheless, France, Germany, and England have all succeeded in eliminating financial barriers to health care access in comparison to the United States (30). The policy question we address here is whether such differences in health care organization affect our three measures of health system performance.

#### METHODS

##### *Data Sources*

*Population Data.* We use population data, by age cohorts, from the U.S. Census Bureau, *Institut National de la Statistique et des Etudes Economiques (INSEE)* in France, Federal Statistical Office in Germany, and Office of National Statistics in England.

*Hospital Administrative Data.* For the United States, hospital discharge data for calculating AHC and revascularizations are from the National Hospital Discharge Survey, National Center for Health Statistics; for France, from the French Ministry of Health's *Programme de Médicalisation des Systèmes d'Information* (PMSI); for England, from the Hospital Episode Statistics (HES), Department of Health; for Germany, from the "Diagnosedaten der Krankenhauspatientinnen und-patienten" database. Each country uses unique hospital procedure codes, but the codes for revascularization translate directly. The data covered the years 2004 (France), 2005 (Germany), 2003–2004 (England), and 2004–2005 (United States).

Information on coronary revascularization funded by private payments is not routinely collected in England and must be obtained by surveys. The estimated private contribution varies from 7 percent to 30 percent (31). When comparing use of revascularization, exclusion of private revascularizations, in England, does not affect our results. Even if we increase the estimates for England by 30 percent, there are still far fewer procedures there than in France, Germany, or the United States.

*Mortality Data.* To calculate AMI mortality, we rely on causes of death data coded according to version 10 of the International Classification of Diseases (ICD). For the United States, we extracted data from National Vital Statistics Reports, National Center for Health Statistics Division of the Centers for Disease Control and Prevention. For France, we obtained mortality data from *Institut National de la Santé et de la Recherche Médicale* (INSERM). For Germany, our data are from the Federal Statistical Office; for England, from the Office of National Statistics. The codes used to identify deaths from AMI were I21 and I22 (ICD-10).

#### *Analytic Issues and Limitations*

We calculated rates of AHC, revascularization, and AMI mortality for age-adjusted cohorts, employing the direct standardization method using the 2005 United Nations World Population to obtain adjustment weights (32). Weissman's original definition of AHC relies on ICD-9 (33). Of the 12 conditions included, 10 translate directly to ICD-10. Only two, neither of which are large contributors to the rate of AHC, pyelonephritis and gangrene, require interpretation. To capture pyelonephritis (ICD-9 590.0, .1 & .8), we use codes ICD-10 N10-12, 13.6, and 15, which include pyelonephritis and acute and chronic tubulo-interstitial nephritis and pyonephrosis. To capture all cases of gangrene included in ICD-9 785.4, we use R0.2 (gangrene unspecified), supplemented with I73.9 (unspecified peripheral vascular disease) and (I74.3) embolus and thrombosis of arteries of the lower extremity. These minor differences in coding have a negligible impact.

Our index (the ratio of the age-adjusted revascularization rate to the AMI mortality rate) does not assume that every person who has an AMI should receive

one of these procedures. Nor do we assume that this is the only diagnosis for which these procedures are appropriate. Our index is merely an attempt to adjust for the different burden of disease among these nations. It is possible that mortality rates do not adequately capture morbidity. We therefore conducted a sensitivity analysis in which we substitute other measures of disease burden in the denominator of our index (mortality due to all CAD, all ischemic heart disease, as well as hospitalizations for these conditions). The results did not change greatly when we used these alternative measures of heart disease. The one exception is the use of hospitalization for AMI in the denominator for England. Although mortality rates for AMI are about 20 percent higher in England than in the United States, hospital discharge rates for AMI are more than 40 percent lower. It is possible that many people whose deaths are attributed to AMI are not admitted to hospitals in England. We cannot know whether this is due to more limited access to hospitals or greater misattribution of death to AMI. Although others have questioned the validity of death certificate data, there is no evidence that officials in England are more likely to attribute other causes of sudden death (e.g., cerebral hemorrhage or cardiac arrhythmia) to AMI than are officials in these other health care systems. Indeed, we chose AMI as a measure of disease burden because there are broadly agreed-upon criteria for diagnosing heart attacks that are common in Europe and the United States (26). While our index is limited by available data, failure to consider some measure of disease burden when analyzing treatment rates is clearly misleading.

Because we do not examine clinical data, we emphasize that we do not presume to make any claims about the extent to which patients in our study obtain appropriate care, especially since the criteria for the use of coronary revascularization are underspecified. Indeed, the criteria from the American College of Cardiology suggest that an angioplasty may be appropriate if a patient remains significantly symptomatic despite maximum medical therapy. Because these criteria allow broad room for physician judgment and patient assessment of symptoms, it is difficult to determine appropriateness of intervention even *with* clinical data. Although there is evidence that some patients who receive revascularization in the United States do not benefit from them (34), other studies find that many people who need these procedures fail to receive them due to lack of insurance and other non-clinical barriers to medical care, including race (35). Hence, it is likely that the average rates for the United States, as well as our other countries, include both examples of over- and under-use. Unfortunately, it is not possible with available data to estimate the extent of either.

## RESULTS

### *Rates of AHC*

We found that for adults (20 years and older), age-adjusted hospital discharge rates for AHC were lowest in France, followed by England, Germany, and the

United States (Figure 1). The U.S. rate (13.6) is almost twice as high as in France (7.3), which suggests that access to timely and effective primary care is far greater there than in the United States

#### *Revascularizations Adjusted for the Burden of Disease*

Age-standardized rates of revascularization are much higher in Germany and the United States than in France or England. The rates in Germany and the United States are about 40 percent higher than in France and 70 percent higher than in England (Figure 2).

Once we account for the low rate of AMI mortality in France, however, it is clear that France is performing more revascularization than the United States and Germany, which had the highest age-standardized rate of revascularization and an index roughly 25 percent lower than France, among persons 35–64, and 20 percent lower among persons 65+ (Figure 3). England, in contrast, resembles more closely Germany and the United States once we adjust for AMI mortality among persons 35–64. For example, the index among persons 35–64 is about 55 percent lower than in the United States, while its age-adjusted rate of revascularization for the same age cohort is about 70 percent lower (Figure 2).

Among persons 65+, however, the index suggests that the use of revascularization is even more limited in England than previously reported (36). We find that England's age-adjusted rate of revascularization for the age cohort 35–64 is about 60 percent lower (Figure 2) while the index among persons 65+ is nearly 75 percent lower than in the United States.

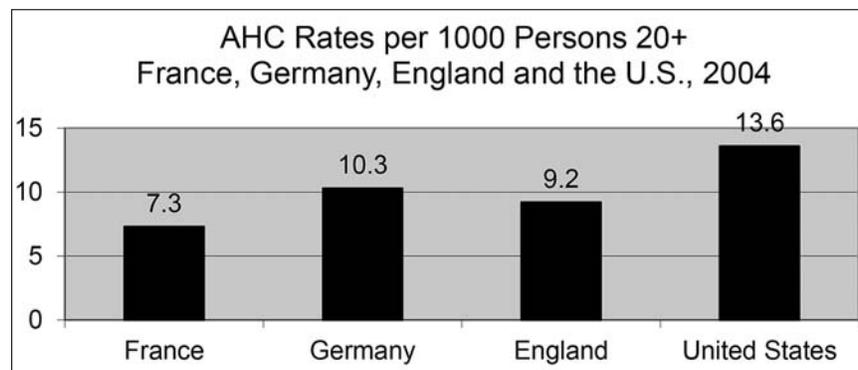


Figure 1. AHC rates per 1,000 persons 20+ in France, Germany, England, and the United States, 2004 (age-standardized, United Nations Standard Population, 2005). *Sources:* France, PMSI, 2004; Germany, Federal Office of Statistics, 2005; England, HES, 2003–2004 and 2004–2005; United States, National Hospital Discharge Survey, 2004 and 2005.

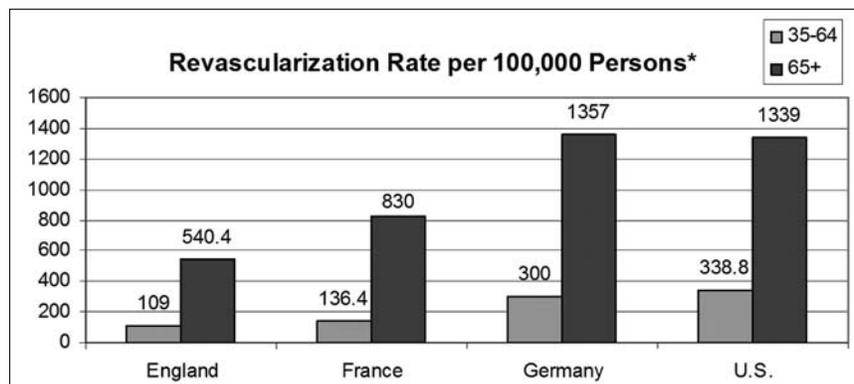


Figure 2: Revascularization rate per 100,000 persons (\*age-standardized, United Nations Standard Population, 2005). *Sources:* France, PMSI, 2004; Germany, Federal Office of Statistics, 2005; England, HES, 2003–2004 and 2004–2005; United States, National Hospital Discharge Survey, 2004 and 2005.

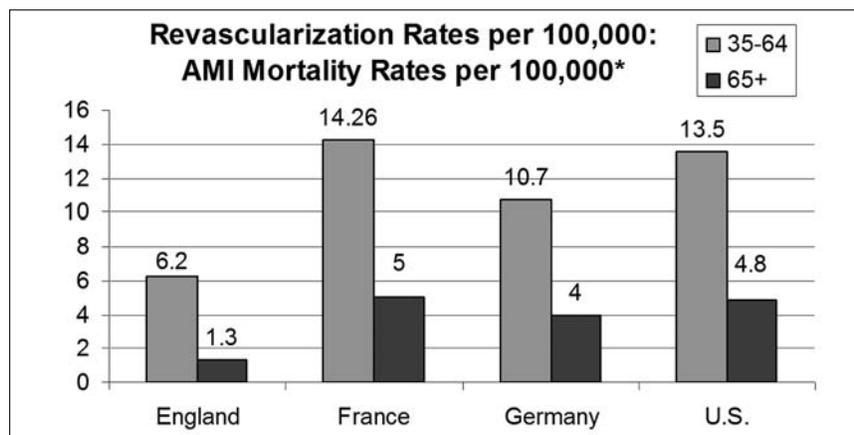


Figure 3: Revascularization rates per 100,000: AMI mortality rates per 100,000 (\*age-standardized, United Nations Standard Population, 2005). *Sources:* France, PMSI, 2004; Germany, Federal Office of Statistics, 2005; England, HES, 2003–2004 and 2004–2005; United States, National Hospital Discharge Survey, 2004 and 2005.

In all four countries, age-standardized rates of revascularization are higher among persons 65+ than among persons 35–64. In the United States, Germany, England, and France, respectively, this rate is higher by a factor of 4, 4.5, 5, and 6. Yet after adjusting for the burden of CAD mortality, the younger cohort receives more revascularization than the older one in all four countries. The index, among

persons 35–64, in England, France, the United States, and Germany, is respectively 4.7, 2.9, 2.8, and 2.7 times higher than among persons 65+.

#### SUMMARY AND DISCUSSION

We find solid evidence of important consequences from the fact that financial barriers to primary health care in the United States are so much greater than in France, England, and Germany, all of which have systems of universal coverage. Consistent with the highest rate of amenable mortality and the lowest rate of improvement along this measure from 1999 to 2006, noted earlier (10), we also find the highest rate of AHC in the United States—nearly double that of France, which provides further corroborating evidence on the longstanding problem of access to primary care in the United States compared with other Organisation for Economic Co-operation and Development nations.

Beyond documenting consequences from the fact that there are significant financial barriers to primary health care in the United States, we also demonstrate that there are significant differences in the extent to which health care systems in the United States, France, Germany, and England provide their patients with cardiac interventions. In England, although its AHC rate is not as low as in France, it appears that the NHS provides greater access to primary care than the health care systems in Germany or the United States. In Germany, although the rate of all acute care hospital discharges is lower (201 per 1,000 population) than in France (268), the AHC rate is about 30 percent higher (2). Germany appears to provide greater access to primary care than the United States, but its AHC rate is higher than England's, consistent with the observation that family medicine is poorly developed in Germany, comprising only 35 percent of office-based physicians (37). Attempts to introduce gatekeeping have had limited success. Despite ready access to specialists in Germany, after adjusting for the burden of CAD, use of revascularization is lower than in France and the United States.

Analysis of hospital-based coronary revascularization indicates that in contrast to primary care, U.S. patients receive these procedures at a high rate. Although this finding may underestimate the true U.S. rate since some angioplasty in the United States may be performed in freestanding health centers, a 2013 review found that few PTCAs are performed on a same-day basis in the United States (38). Outpatient diagnostic coronary catheterization is very common in the United States, but not interventions. Furthermore, with respect to coronary artery bypass graft, during the period of our study, we have checked the data and find that after adjustment for disease burden, the U.S. rate for this procedure is lower than in France.

The literature suggests that there is significant overuse of revascularization in the United States (39). After adjustment for the burden of CAD, however, contrary to conventional wisdom, the U.S. rate is not the highest, neither for adults (35–64 years) nor for older persons (65+). In addition, contrary to the

frequent claim that older persons are responsible for a disproportionate share of high-tech medical procedures—even in the United States, where universal coverage under Medicare begins at age 65—they receive fewer revascularizations than their younger counterparts once we account for disease burden. England is notable for having the lowest index of revascularizations after adjustment for its relatively high burden of CAD. This is consistent with previous studies of revascularization in England.

In contrast to England, it appears that France's extensive access to primary care does not come at the expense of limiting the use of revascularization services. It is clear that countries with national health insurance and strong systems of primary care do not necessarily provide fewer cardiac interventions than the United States. Of course, we do not interpret the relatively high use of revascularization in France, Germany, and the United States as an indicator of the appropriateness of cardiac care. As we have noted, there is evidence that revascularization is overused in the United States. Our findings suggest that this may be the case in France and Germany as well.

Although the ACA was adopted in 2010 and the 2012 Supreme Court ruling upheld the law, the debate about the future of health care reform in the United States will continue. Unfortunately, during these debates, health systems abroad are routinely mischaracterized. Consider, for example, a rhetorical critique of the ACA by Representative Jerry Lewis of California: "Mr. Speaker...do not allow a federally mandated program to undermine the best health care system in the world. Do not allow the Federal Government to take us down the pathway to socialized medicine. Do not allow us to be dominated by those who would have America look more and more like Europe" (U.S. House of Representatives, March 28, 2012).

We must recognize the diversity of health system models with universal coverage and develop more sophisticated methods for assessing and extending the specific dimensions of health care access on which we have shed light in this article.

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