Right-Sizing Invasive Cardiac Services in the United States

Running title: Joynt; Right-sizing invasive cardiac services in the US

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Despite the fact that the U.S. spends more per capita on health care than any other nation in the world,\(^1\) a significant proportion of Americans still lack access to high-quality, modern cardiovascular care. In fact, recent national data suggests that only about two-thirds of Medicare patients presenting with ST-segment elevation myocardial infarction receive revascularization.\(^2,3\) These numbers are even lower in rural communities,\(^4,5\) and are likely part of the reason why patients in rural areas have worse outcomes after suffering an acute myocardial infarction (MI) than those in more urban areas.\(^6\)

In this light, there is an urgent need to ensure the adequate availability of high-value invasive cardiac services, particularly in rural or semi-rural areas of the country. With these important concerns as a starting point, Horwitz et al examined the introduction of diagnostic angiography, percutaneous coronary intervention, and coronary artery bypass grafting services in the United States between 1996 and 2008. The authors studied whether new offerings of these services were leading to an expansion of access to care in areas which were previously un- or under-served.\(^7\) Simply put, were the new services being offered in the places that needed them most?

Unfortunately, the investigators found that the vast majority of invasive cardiac service expansions took place in areas where access was already established. In fact, during that time period only 10% of the patients served by the 397 hospitals that newly offered diagnostic angiography were in areas outside a 40 mile radius of an existing catheterization laboratory. The authors report that, despite a 6-8% increase in the number of hospitals providing services since 1996, the population increase in geographic access to diagnostic angiography was just one percentage point, the increase in access to percutaneous coronary intervention (PCI) was five percentage points, and the increase in access to coronary artery bypass grafting (CABG) was
four percentage points. All told, these expansions did little to address the uneven access to modern cardiovascular care that is a rightful concern for patients and policymakers.

The Problem of Underuse

The most straightforward message of this paper is that, even in this technologically advanced era of medicine, we still have inadequate access to care across wide areas of the country. As this study points out, recent expansions have probably done little to improve issues of underuse of revascularization for patients who are not fortunate enough to live near a PCI-capable or CABG-capable hospital. The clinical consequences of these access issues are particularly visible in the widening gulf in clinical outcomes between urban and rural patients with acute MI.\textsuperscript{8} Though many have called for increasing regionalization of cardiac services, and a growing number of state and federal collaboratives are designing and implementing networks for care for acute MI,\textsuperscript{9,10} we are not currently maximizing access to cardiac services in the U.S. As Horwitz et al report, expansion led to new diagnostic angiography services for just 0.16 percent of the population that could have had new access to care if expansion had been performed so as to maximize geographic access, with similar figures for PCI and CABG (0.23\% and 0.35\%, respectively).\textsuperscript{7}

The Problem of Overuse

This study is also important, however, because it elucidates one possible contributor to the flip side of the supply problem: overuse. There is increasing evidence that invasive cardiac services are often overused – there have been reports of inappropriately high rates of PCI for stable angina despite a lack of evidence for its benefit in this population,\textsuperscript{11} for example, not to mention accusations of frankly fraudulent overuse of PCI in a growing number of high-profile cases around the country. However, prior reports have often focused on the clinical drivers of overuse.\textsuperscript{11-13} Postulated contributors include overuse of stress testing, a lack of trust in
randomized trials like COURAGE, or a belief that angioplasty has a greater benefit than evidence would support.

The findings by Horowitz et al suggest an alternative explanation for overuse of these technologies, however: expansion leading to supply-induced demand. Invasive cardiac services are expensive and well-reimbursed; in today’s competitive health care climate, hospitals must compete for business by offering high-profile, high-margin, high-tech services. Indeed, it appears that efforts to compete in already-saturated health care markets, rather than an unmet clinical need, are driving the adoption of new services and technologies. The authors’ findings suggest that the financial incentives to adopt new services in places in which they already exist are clearly powerful enough to encourage hospitals to do so, leading to waste. Given the current relative lack of price competition in health care, it is likely that this is inefficient from a societal perspective, though it may be highly lucrative for the hospitals involved.

Though this study did not directly examine the impact of increased supply on the use of cardiac services, prior research suggests that the two are likely linked. There is tremendous geographic variation in the use of angiography across the country, and the variation is largely linked to the degree of discretionary use across communities.¹⁴,¹⁵ Supply may drive this variation: there is a strong association between the number of catheterization laboratories per capita and the use of angiography and revascularization in a population, and this is unrelated to clinical need (as measured by hospitalizations for acute MI).¹⁶ Additional research shows that the opening of specialty cardiac hospitals is associated with higher population-based rates of coronary revascularization within a hospital referral region despite no differences in the underlying health of the patient population.¹⁷
Right-Sizing Cardiac Services

Our invasive cardiac capabilities are too limited in some places and too expansive in others. Generally, in a competitive market, economics tells us that this mismatch should be remedied. Oversupply (i.e. in urban areas) should lead to lower prices, while undersupply (i.e. in rural areas) should lead to higher prices, and therefore more opportunity for profit, leading to more market entry. Such market mechanisms would match the needs of the population with the services needed. This is clearly not currently happening.

So why hasn’t the market for invasive cardiac services already right-sized itself, and what are the policy and clinical fixes for this problem? A definitive answer is beyond the scope of this particular investigation, but the authors’ work raises a set of interesting possibilities.

The reasons behind underuse are likely largely economic. Invasive cardiac services have high fixed costs, and for small or rural hospitals, these costs may be prohibitive. Even if these services could be financially viable in the long run, many small and rural hospitals also have more difficulty securing access to capital with which to adopt the technologies in the short run.18

There may also be real limitations in attracting the personnel needed to provide these services; rural hospitals tend to have a particularly hard time attracting specialist physicians and other highly specialized clinicians and technologists (nurses that have experience in cardiac catheterization and radiation technologists, for example).19

These are both areas in which policy can be of use. Medicare could provide cost-based reimbursement for procedures thought to be of particularly high value, as they currently do for Critical Access Hospitals,5 or the federal government could expand its programs to incent physicians and other healthcare providers to work in areas of unmet need. On the clinical side, decision support tools and other clinical tools that may help clinicians recognize when the use of
invasive cardiac services may be of benefit, as well as increasing use of quality metrics that reward hospitals for appropriately providing revascularization, may be promising strategies to reduce underuse of these technologies in areas in which it currently occurs.

In terms of over-use, the market has likely failed to limit supply because of our fee-for-service reimbursement models. The financial motivations are simple – if hospitals can add high-margin services and technologies, it behooves them to do so, whether or not that addition serves a useful clinical need. There are presently few financial checks on overuse, though policy strategies such as shifting payment models towards bundled payments and Accountable Care Organizations may change that dynamic. Further, there are few clinical checks on overuse, because unlike more typical consumer goods, the individual does not directly control his or her consumption of services – rather, his or her physicians control this consumption. The growing use of appropriateness criteria and quality metrics may represent promising strategies to reduce overuse using clinical tools.

If we hope to continue the trend of improving cardiovascular outcomes nationwide, we need to start thinking about U.S. healthcare as a system rather than as a collection of individual actors. Right now, while PCI is rampantly overused in some areas of the country, there are entire communities that are being left without access to invasive cardiac services at all. Ironically, both overuse and underuse are likely associated with worse clinical outcomes.

We need to right-size the use of invasive cardiac services in the U.S. Currently, our policy and reimbursement climate are failing to remedy the problem. Highly practical health services research in general, and this paper in particular, have an extremely important role to play in leveraging data to inform policy decisions that could ultimately benefit hundreds of thousands of Americans.
Conflict of Interest Disclosures: None.

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