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Utilization of Cesarean Sections: Comparing Hospitals in Indiana

The new healthcare reform legislation guarantees that a large number of citizens will soon have access to health insurance and healthcare. However, it is uncertain if this reform will be able to reduce costs and improve quality. The states will soon change the focus of their health policies from protecting the uninsured to guaranteeing high-quality care at lower costs. Initiatives like the Commonwealth Fund's *State Scorecard on Health System Performance*¹ will gain prominence, challenging states to avoid unnecessary care, control costs, and promote healthy lives.

The public call for more transparency and accountability in the healthcare system will also present a challenge for states. Growing evidence suggests that healthcare in the U.S. does not perform with the highest standards of quality, and that it ranks low compared with other developed countries [1,2].

Providers now face more requirements to submit performance data, and more organizations are releasing provider quality ratings to the public. One of these initiatives, supported by the U.S. Department of Health and Human Services (DHHS), is the *Hospital Compare* website.² *Hospital Compare* reports hospital quality measures based on processes and outcomes for many care services. However, because the majority of the data comes from Medicare claims and enrollment, *Hospital Compare* does not encompass services that are common to a broader spectrum of the population.



Despite the clear need for more accountability, two problems threaten the improvement of quality through public disclosure. First, the methodologies to assess quality have limitations. Different public quality reports produce conflicting ratings due to lack of homogeneity in methodologies, data source, and sample selection [3,4]. A hospital may look good under one methodology and bad under another. The lack of validation makes it difficult to discern which rating is right, and, more importantly, makes quality assessment

questionable. Quality assessment is connected to patient decisions and providers' reputation and income. Therefore, conflicting methodologies will reduce stakeholders' confidence in public ratings, risking its effectiveness as a vehicle to improve healthcare quality.

The second problem is the effectiveness of public disclosure.

Several studies question

the patient's capability to use and influence healthcare quality data. With only 12% of Americans proficient in health literacy [5], disclosing information about quality hardly empowers the average patient to choose a provider based on performance. Most patients remain unaware of publicly available quality information. Those who are aware of the available reports may not understand the information [6,7]. Although patients value the disclosure of quality information, they still rely on informal sources, such as family and friends. When it comes to choosing a healthcare provider, the evidence shows that quality plays a small role in the final decision [6].

<http://www.commonwealthfund.org/Maps-and-Data/State-Scorecard-2009.aspx>

²Hospital Compare is a website (<http://www.hospitalcompare.hhs.gov/>) created by the Centers for Medicaid & Medicare Services (CMS) and the Hospital Quality Alliance (HQA) to promote reporting of hospital quality of care.



However, while public reporting of quality information does not have a significant impact on patient decisions, it does have an impact on providers. Studies show that public disclosure may stimulate low-performance providers to improve quality by providing feedback in relation to their peers or by creating a threat to their reputation [8]. Conversely, quality in an overall geographic area could be jeopardized as public disclosure gives doctors and hospitals incentives to select patients based on risk profile, declining to treat more difficult, severely ill patients [9,10]. This negative impact on quality is clearly associated with flaws in the methodologies used to assess quality; in particular, in their ability to make providers with different case mix populations comparable.

This report compares hospitals by their use of cesarean sections. The goal is twofold: to illustrate the limitations of two common methodologies for assessing hospital quality, and to present a third methodology that is superior in validation tests. Although this report does not assess the overall performance measure for maternity care, it shows, through the case of cesarean sections, the first step towards that goal. Maternity care is a prominent sector of healthcare for which little action has been taken to increase transparency and accountability. For example, the *Hospital Compare* initiative excludes maternity care indicators, because it is based on Medicare records.

We chose cesarean sections (CS) over other maternity care measures because the public has become much more aware of this procedure today. C-sections have reached a record high in the United States. Today, nearly one-third of births are cesarean. After declines during the mid 1990s, the national average CS rate has risen by more than 50% in 11 years, from 20.7% in 1996 to 31.8% in 2007[11]. According to the OECD [12], the United States has the sixth highest c-section rate among developed countries.³ Current rates are above any obstetrical recommendation. Healthy People and the World Health Organization (WHO) recommend a CS rate of 15%, which is also close to the current average rate of the five OECD countries with the lowest CS rates.⁴ These numbers suggest that surgical deliveries are over-

used in the United States. In Indiana, the figures are similar. Although the state CS rate is below the national average (29.4% in 2007), it is still above obstetric recommendations. Moreover, detailed hospital discharge data also show a large variation in the use of CS within the state, which suggests that some hospitals are overusing CS.

CS is a recognized performance indicator for maternity care process [13]. The Agency for Healthcare Research and Quality (AHRQ) includes CS and vaginal birth after CS (VBAC) as 2 of their 25 provider level quality indicators [14]. The National Quality Forum (NQF) has endorsed CS for low-risk first birth women as a maternity care performance measure. However, when used to judge hospital performance, different organizations use different methodological approaches to present hospital CS rates. For instance, a simple and widely used measure is the *crude CS rate*, which is defined as the ratio of cesareans to total deliveries.⁵ However, hospitals differ in their case mix, making the comparison of crude CS rates across hospitals misleading. For example, hospitals that receive more high risk patients would appear to overuse cesareans, even though most of them could be clinically appropriate. To make hospitals comparable, CS rates should be calculated on patients with the same obstetric risk (risk adjustment).

Making hospitals comparable

A justifiable concern with hospital performance measures is how the patient case mix is controlled. With both process and outcome measures, variation in patient risks will result in different treatment intensities and different outcomes. For example, in the particular case of CS, two hospitals with the same quality could have different rates of CS if one is a tertiary hospital and the other is a small community hospital. An adequate methodology should fully adjust for patients' risks and produce the same performance measure for both hospitals regardless of their differences in status. This objective is compromised when risk adjustment is based on few clinical variables⁶ or when relevant clinical variables are unobserved.

“Based on the evidence and the demands that rising healthcare costs are imposing on the states, we recommend that Indiana be among the first states to promote the public disclosure of maternity care performance measures.”

³The OECD countries with the highest rates are Mexico, Italy, Turkey, Korea, and Portugal.

⁴Netherlands, Norway, Finland, Iceland, and Belgium had an average CS rate of 16.1% in 2007.

⁵For example, public data for New Jersey (<http://www.starledger.com/str/indexpage/environment/hospitals.asp>), Massachusetts (http://www.mass.gov/Eoehhs2/docs/dhcfp/qc/archives/qc1/cr_pcsect.pdf), and California (http://www.oshpd.ca.gov/HID/Products/PatDischargeData/ResearchReports/HospIPQuallnd/Vol-Util_IndicatorsRpt/) are based on crude rates.

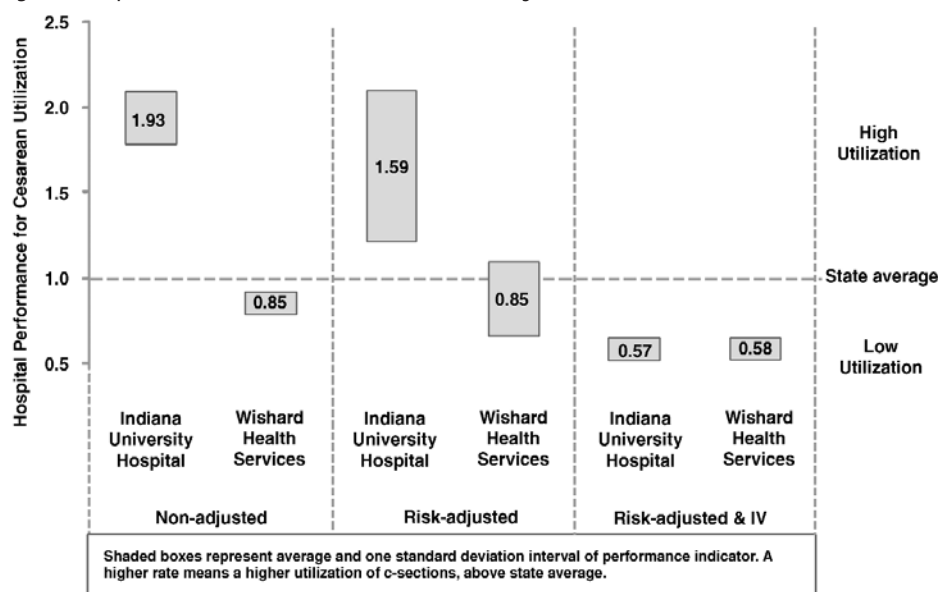
⁶For example, the AHRQ technical review suggests adjusting only for the mother's age.

Methodology

The commonly used crude CS rate method of comparing hospitals can be misleading. This is clearly demonstrated when comparing two similar teaching hospitals in Indianapolis: Wishard Health Services and Indiana University Hospital. On the one hand, Indiana University Hospital is a recognized leader in high-risk obstetrical services. It receives patients from throughout the state. On the other hand, Wishard Health Services focuses on the vulnerable population of Indianapolis. However, both hospitals have many things in common. Both are teaching hospitals affiliated with Indiana University School of Medicine. Both are located in the Indianapolis metropolitan area, very close to one another. Also, both are staffed by IU School of Medicine faculty physicians. Given their similar cultures, we should not expect significant differences in the clinical decision for cesareans.

However Wishard and IU Hospital differ significantly in their crude c-section rates, because of differences in their case mix. Crude c-section rates are higher at IU Hospital (44.7%) than at Wishard (26.6%). Expressed in terms of odds ratios (OR), the average patient has 1.93 times greater chance of having a c-section in IU Hospital compared with the rest of the hospitals in Indiana. At Wishard the same OR is 0.85, indicating that this hospital performs better than the state (see Figure 1 below).

Figure 1. Hospital Performance Measured via Three Methodologies



To control for case mix, the methodology has to include observable obstetric risks as reported in the ICD-9-CM codes. Controlling for case mix reduces the gap between Wishard and IU Hospital, but differences between both hospitals are still significant (see Figure 1).

Serving as the tertiary referral resource for the state of Indiana, IU Hospital receives patients from across the state. Many of these patients have obstetric risks that cannot be fully observed in the ICD-9-CM codes. To account for unobserved characteristics that may explain the higher c-section rates, this study estimates risk-adjusted utilization rates with instrumental variables (IV) [15,16], using travel distance as the exogenous instrument driving hospital choice. Travel time from home to the hospital reveals health risks, since healthy patients are inclined to choose hospitals that are closer to home. Conceptually, the IV estimation compares hospitals that are similar distances from patients' homes, after controlling for observed characteristics. Travel distance is extremely different for Wishard and IU Hospital patients. On average, a woman travels 14 minutes to give birth at Wishard, and only 0.20% of women travel more than 1 hour. On the other hand, the average woman travels 47 minutes to give birth at IU hospital, and nearly 25% of women travel more than 1 hour.

When travel time is included as an instrument in the IV estimation, the risk-adjusted c-section utilization rate for both hospitals becomes statistically equal (see Figure 1). Both Wishard and IU Hospital perform better than the state average, with ORs of 0.57 and .58 respectively. These estimates are now more consistent with the similar cultures and physician practice styles that IU and Wishard share.

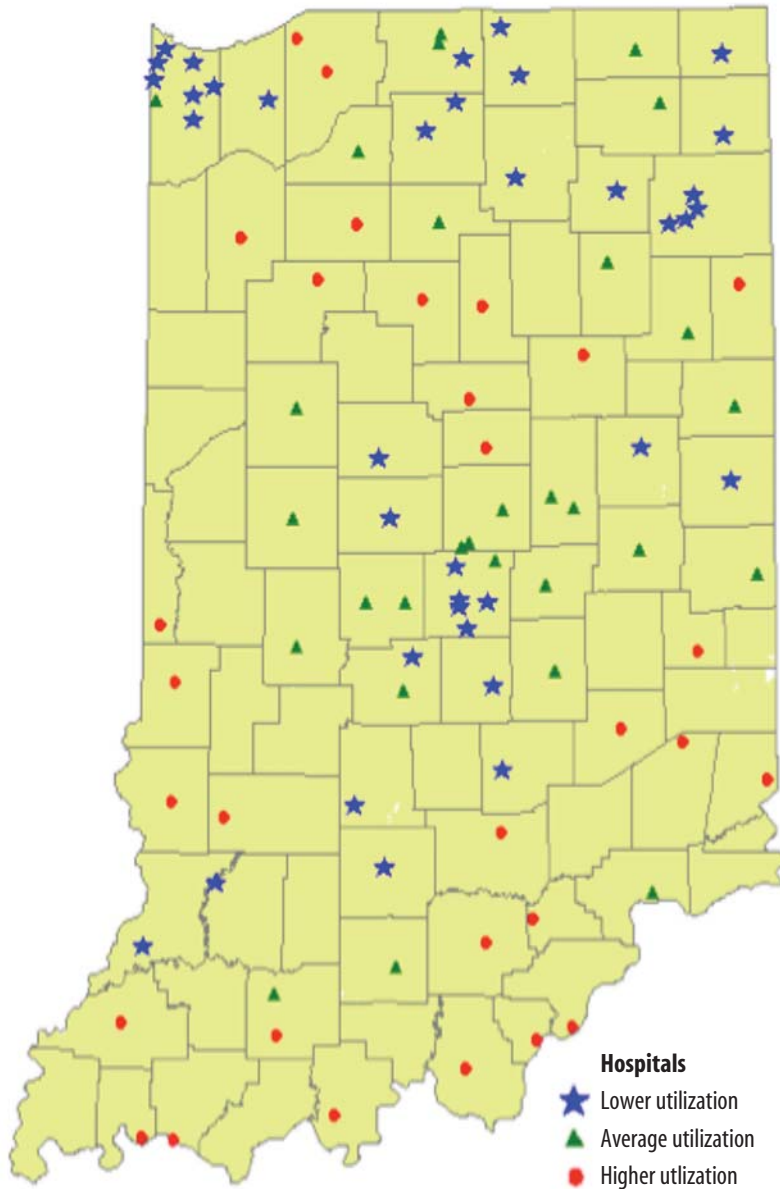
In this section, we compare three performance measures. The first measure is the simple crude CS rate. The second is the traditional methodology with risk adjustment based on observed clinical factors as used by the AHRQ and *Hospital Compare*. The third methodology fully controls for observed and unobserved patient characteristics by using an instrumental variable (IV) estimation.

We start with one illustrative example to show how the methodologies work. Box 1 compares two teaching hospitals in Indianapolis that are similar in quality but different in their case mix population. We find that only the indicator based on risk-adjusted IV estimation is able to make both hospitals comparable, regardless of the large differences in patient characteristics.

We extend the estimation to all delivery hospitals in Indiana. The data used came from discharge records of all hospitals in Indiana. The Indiana State Department of Health provided the records of all women 15 to 70 years old who were discharged after delivery in 2005, 2006, and 2007. The estimation approach allows us to interpret hospital performance indicators as odds ratios (OR). ORs indicate



Map 1. Geograph: Distribution of Delivery Hospitals and Cesarean Section Performance Indicator



Indiana: 2005-2007. Based on risk-adjusted IV methodology.

how likely a woman is to have a c-section in a given hospital compared with the rest of the state. An OR of 1 or less means that the hospital is performing equally as well or better than the state. An OR higher than 1 indicates that the hospital is performing more c-sections than other hospitals in the state. The greater the OR is above 1, the higher the indication that the hospital is

overusing CS. Map 1 shows the geographic distribution of delivery hospitals in Indiana, and it indicates the hospitals performing below, at, or above the state average based on the risk-adjusted IV methodology.

This study takes advantage of a statistically large and representative sample to identify patients that are better candidates for a c-section as appropriate candidacy is collectively viewed by doctors [17]. Although this approach is reliable at aggregate levels, it is less reliable when identifying inappropriate care at the individual patient level. A limitation is that it cannot determine whether c-sections are consistent with the patient's preferences. Although it is known that the majority of women prefer vaginal deliveries [18,19], the discharge records cannot tell anything about individual preferences. Therefore this study uses the concept of overuse rather than over-provision [20].

Validation with Patient Perception of Care, HCAHPS Survey

Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS)⁷ is a national survey that is administered to patients in order to gain their perspective on the quality of care they received [21]. The goal of the survey is to create an incentive for providers to increase quality of care by making the patient's perspective on quality publicly available. The survey can be administered by mail, telephone, a mix of mail and telephone, or interactive voice response. In order to participate, hospitals (or a survey vendor, if they choose to hire one) must complete HCAHPS training. They must

also meet the Quality Assurance Guidelines and submit a participation form that must be approved prior to participation. The survey consists of 27 questions, 18 of which aim to get patients' perspectives on different aspects of quality. The results are then reported to *Hospital Compare*, which is responsible for making them publicly available.

⁷Available at <http://www.hcahpsonline.org/home.aspx>.



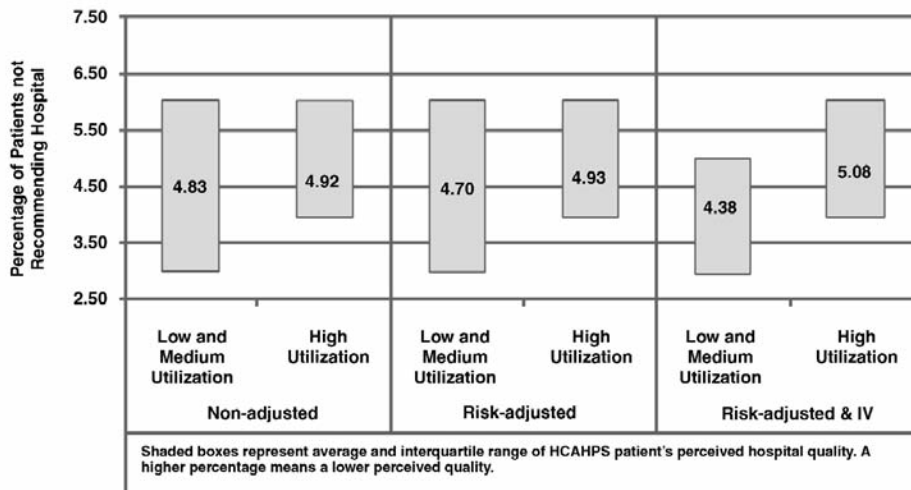
In order to further validate the performance quality indicators based on the three methodologies discussed in the previous section, we compared them with the HCAHPS results. However, a significant limitation of this method is that the survey (HCAHPS) is not administered to patients of every hospital; additionally, it is administered to all classifications of patients, not just maternity patients. Of the 101 Indiana hospitals in which CS rates were evaluated, 71 of them also participated in the HCAHPS survey. We evaluated the CS quality measures and HCAHPS survey results for these 71 hospitals. We chose the question “Would you recommend this hospital to family and friends” from the survey because it provides an overall view of quality at that facility [21].

A boxplot was constructed in order to determine if there was an association between CS quality indicators and overall hospital quality, as rated by patients. This determination was made by comparing the average HCAHPS response and the CS rating (see Figure 2). For this illustration we only evaluated the answer response “No, I would definitely not recommend the hospital”. The hospitals were classified as “Low or Medium” or “High” based

on their CS quality indicator. “Low or Medium” means the hospital performs better or equal than the state, and “High” means they perform cesareans above the state average. We suspected a greater correlation between hospitals with “High” rates of CS and the number of patients who would not recommend the hospital.

The figure shows that there is little difference between the unadjusted percent of patients who would not recommend the hospital who were in “Low or Medium” hospitals and those who were in “High” hospitals. There is a slightly larger difference when the values are adjusted for risk. However there is a greater difference when risk adjustment and instrumental variables are used. This confirmed our hypothesis that hospitals that perform more cesarean deliveries are less likely to be recommended by patients, indicating poor overall quality. This association is only observed when quality measures for CS are based on risk adjustment with instrumental variables. This methodology seems superior to others in terms of validation with patient’s perceived quality; however, a definite conclusion requires further investigation.

Figure 2. Hospital Performance Measured via Three Methodologies





Thoughts for Policymakers

This report focuses on a highly controversial maternity care indicator: cesarean sections. The increasing CS rates in the US and the large variation across hospitals suggest that cesarean sections are overused. Yet, patient preference does not seem to be driving this trend. The high c-section rates in the United States contrast with a low preference for cesareans. According to *Listening to Mothers II*, the 2006 national survey conducted for Childbirth Connection, only 10 percent of mothers who had their first c-section had requested it [18]. In the same survey, only 6 percent of women who had a vaginal delivery would choose an elective cesarean in the future. A similar result was obtained from a survey of pregnant women in Cincinnati, OH [19]. Less than 7 percent of expectant mothers chose c-section as their preferred mode of delivery. This disconnect between the higher preference for vaginal delivery and actual vaginal delivery rates may be attributed to the patient's weakness in the physician-patient relationship. Patients have an informational disadvantage, allowing providers to select the delivery method they prefer even if it is contrary to the patient's best interest.

The lack of maternity care quality measures is striking considering the U.S. ranks well below several OECD countries in many maternity quality indicators. An initiative in Congress, the *Partnering to Improve Maternity Care Quality Act of 2010* (HR 6437), seeks to standardize Medicaid reports to produce nationwide maternity care quality measures. Even if this legislation does not pass, we expect more of these initiatives at the state level, fueled by the implications of the Patient Protection and Affordable Care Act. The growth of Medicaid coverage and the role insurance exchanges will challenge states to improve quality of care and control costs.

Public reporting of hospital performance could be an effective mechanism to improve quality and reduce overuse. Transparency of hospital performance information encourages competition

among providers. It generates discipline and self-regulation through the market. However, several studies show that patients are not ready to assimilate and use this information to influence healthcare quality. Public disclosure of quality information does not empower patients in the physician-patient relationship directly, but it does so indirectly. Providers do react to public disclosure by improving quality. In the end, public reporting seems to be more effective when physicians are engaged in the process [22,23].

Based on the evidence and the demands that rising health-care costs are imposing on the states, we recommend that Indiana be among the first states to promote the public disclosure of maternity care performance measures. This must be done gradually, engaging physicians and hospitals in the process, and educating patients how to best use this information in their health-care choices. We suggest that disclosure of information be coordinated first with providers, giving low performers time to identify their problems, adjust their organization, and improve quality.

Nevertheless, a critical component of public disclosure is to gain consensus on the validity of the quality assessment methodology. Flaws in the methodology not only drive quality in the wrong direction and penalize high-performance providers; they also incentivize doctors and hospitals to select patients based on risk profile. In this report, we show how patient case mixes have to be fully adjusted to make hospitals comparable in their use of cesarean sections. We describe a methodology that is superior based on validation tests, a promising tool for additional maternity care measures. We encourage maternity care advocates in Indiana to partner in the development and extensive validation of quality measures. Reaching consensus on the best assessment and coordinating public disclosure with providers will guarantee quality improvement of maternity care in Indiana.



References

1. Institute of Medicine (U.S.). Committee on Quality of Health Care in America. (2001). *Crossing the quality chasm : a new health system for the 21st century*. Washington, D.C.: *National Academy Press*. 337 p. p.
2. Anderson G, Hussey PS. (2001). Comparing health system performance in OECD countries. *Organization for Economic Cooperation and Development. Health Affairs*, 20: 219-232.
3. Rothberg MB, Morsi E, Benjamin EM, Pekow PS, Lindenauer PK. (2008). Choosing the best hospital: The limitations of public quality reporting. *Health Affairs*, 27(6), 1680-1687.
4. Shahian DM, Wolf RE, Iezzoni LI, Kirle L, Normand S-LT. (2010). Variability in the Measurement of Hospital-wide Mortality Rates. *New England Journal of Medicine*, 363, 2530-2539.
5. Kutner M, Greenberg E, Jin Y, Paulsen C. (2006). *The Health Literacy of America's Adults: Results From the 2003 National Assessment of Adult Literacy*. Washington, DC: U.S. Department of Education.
6. Lake T, Kvam C, Gold M. (2005). *Literature Review: Using Quality Information for Health Care Decisions and Quality Improvement*, from Mathematica Policy Research.
7. Faber M, Bosch M, Wollersheim H, Leatherman S, Grol R. (2009). Public Reporting in Health Care: How Do Consumers Use Quality-of-Care Information? A Systematic Review. *Medical Care* 47: 1-8.
8. Hibbard JH, Stockard J, Tusler M. (2005). Hospital Performance Reports: Impact On Quality, Market Share, And Reputation. *Health Affairs*, 24(4), 1150-1160.
9. Werner RM, Asch DA. (2005). The Unintended Consequences of Publicly Reporting Quality Information. *JAMA: The Journal of the American Medical Association*, 293, 1239-1244.
10. Dranove D, Kessler D, McClellan M, Satterthwaite M. (2003). Is More Information Better? The Effects of "Report Cards" on Health Care Providers. *The Journal of Political Economy*, 111, 555-588.
11. Centers for Disease Control. (2009). *Births: Preliminary Data for 2007*. Centers for Disease Control and Prevention.
12. OECD. (2009). *Health at a Glance 2009: OECD Indicators*. OECD Publishing.
13. Srinivas SK, Fager C, Lorch SA. (2010). Evaluating Risk-Adjusted Cesarean Delivery Rate as a Measure of Obstetric Quality. *Obstetrics and Gynecology*, 115, 1007-1013.
14. Davies SMea (2001) Refinement of the HCUP Quality Indicators. Agency for Healthcare Research and Quality.
15. Baicker K, Buckles KS, Chandra A. (2006). Geographic Variation In The Appropriate Use Of Cesarean Delivery. *Health Affairs*, 25, 355-367.
16. Declercq E, Sakala C, Corry M, Applebaum S. (2006). *Listening to Mothers II: Report of the Second National U.S. Survey of Women's Childbearing Experiences*. New York: Childbirth Connection.
17. Bracken J, Dryfhout V, Goldenhar L, Pauls R. (2008). Preferences and concerns for delivery: an antepartum survey. *International Urogynecology Journal*, 19, 1527-1531.
18. Liu X, Mills A. (2007). Supplier-induced demand and unnecessary care, In AS Preker et al. (EDS.), *Public ends, private means: strategic purchasing of health services*. Washington, D.C.: The World Bank.
19. Terza JV, Basu A, Rathouz PJ. (2008). Two-stage residual inclusion estimation: Addressing endogeneity in health econometric modeling. *Journal of Health Economics*, 27, 531-543.
20. Geweke J, Gowrisankaran G, Town RJ. (2003). Bayesian Inference for Hospital Quality in a Selection Model. *Econometrica*, 71, 1215-1238.
21. Aron D, Gordon H, DiGiuseppe D, Harper D, Rosenthal G. (2000). Variations in risk-adjusted cesarean delivery rates according to race and health insurance. *Medical Care*, 38, 35-44.
22. Greene RA, Beckman HB, Mahoney T. (2008). Beyond The Efficiency Index: Finding A Better Way To Reduce Overuse And Increase Efficiency In Physician Care. *Health Affairs*, 27, 250-259.
23. Cammisa C, Partridge G, Ardans C, Buehrer K, Chapman B, et al. (2011). Engaging physicians in change: results of a safety net quality improvement program to reduce overuse. *American Journal of Medical Quality*, 26, 26-33.



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