

# Administrators: Do you know how your pediatric cardiac surgeries are reimbursed?



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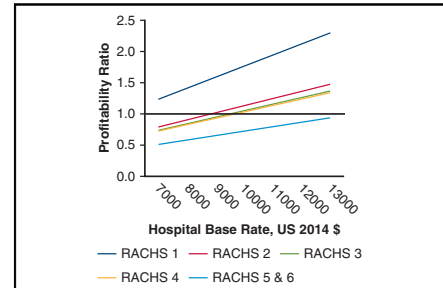
Congenital heart programs have drawn recent scrutiny, as reporters describe neonates dying or experiencing seemingly avoidable complications at alarming rates.<sup>1,2</sup> These stories shake us as providers and erode public trust. Yet, solutions are not simple.<sup>3</sup>

One factor that may contribute to the reluctance of centers to refer out congenital heart patients is the perception that open-heart surgery cases are highly profitable.<sup>2,4</sup> Under historic reimbursement, patients with long lengths of stay and high procedure burdens meant increased payments. As pediatric reimbursement shifts to Diagnosis-Related Group (DRG) payment systems, this may be changing. Under DRGs, patients with similar clinical attributes are grouped, and hospitals are reimbursed prenegotiated amounts per admission within these groups. By 2016, 40% of pediatric admissions nationally were reimbursed under DRGs (private communication, Children's Hospital Association, April 10, 2017).

DRGs for children are broad and heterogeneous. Under the 3M All Patient Refined DRG Classification System (3M, St Paul, Minn)—the most common pediatric payment system—all neonates undergoing cardiac surgery who do not require extracorporeal membrane oxygenation are grouped under just 3 DRGs: 588 (neonates <1.5 kg undergoing any major procedure, cardiac or noncardiac), 609 (neonates 1.5-2.5 kg undergoing any major procedure, cardiac or noncardiac), and 630 (neonates ≥2.5 kg undergoing a major cardiovascular procedure). These DRGs are divided into “severity levels” based on risk factors largely irrelevant to children, without consideration for cardiac anatomy or case complexity. We conducted a theoretical analysis on national data to examine potential implications of neonatal cardiac surgical case complexity on profitability of pediatric cardiac/neonatal service lines.

## METHODS

Subjects included all neonates in the 2014 Pediatric Health Information System database, DRGs 588, 609, and 630. Greater than 98% of cases were DRG severity levels 3/4; therefore, analysis was limited to these levels.



Profitability ratios for neonates ≥2.5 kg by hospital base rates & surgical case complexity.

## CENTRAL MESSAGE

Under the All Patient Refined Diagnosis-Related Group payment system, high-complexity neonatal cardiac surgeries may not be as profitable as lower-complexity neonatal cardiac surgeries.

See Commentaries on pages e155 and e156.

Expenses were estimated from standardized cost-to-charge ratio (CCR) costs. CCR costs are not synonymous with expenses, but standardized across centers and payers, they can be used to estimate relative expenses. Reimbursement was calculated as follows:

$$\text{Reimbursement} = (\text{DRG weight}) \times (\text{hospital base rate}) \times (\text{adjustment}) + \text{outlier payments}$$

DRG weights are relative values assigned to diagnostic groups and severity levels, constant across centers and payers by state. Base rates are hospital and payer-specific negotiated values. Adjustments increase reimbursements for select hospital characteristics. (Hospital base rate) × (adjustments) was estimated at \$10,000 (US 2014), range \$7000 to 13,000, from disclosed rates/payer-mix.<sup>5</sup> Outlier payments increase reimbursement when costs exceed set thresholds. Outlier thresholds for DRGs 588, 609, and 630 were \$2.5M, \$821K, and \$768K.

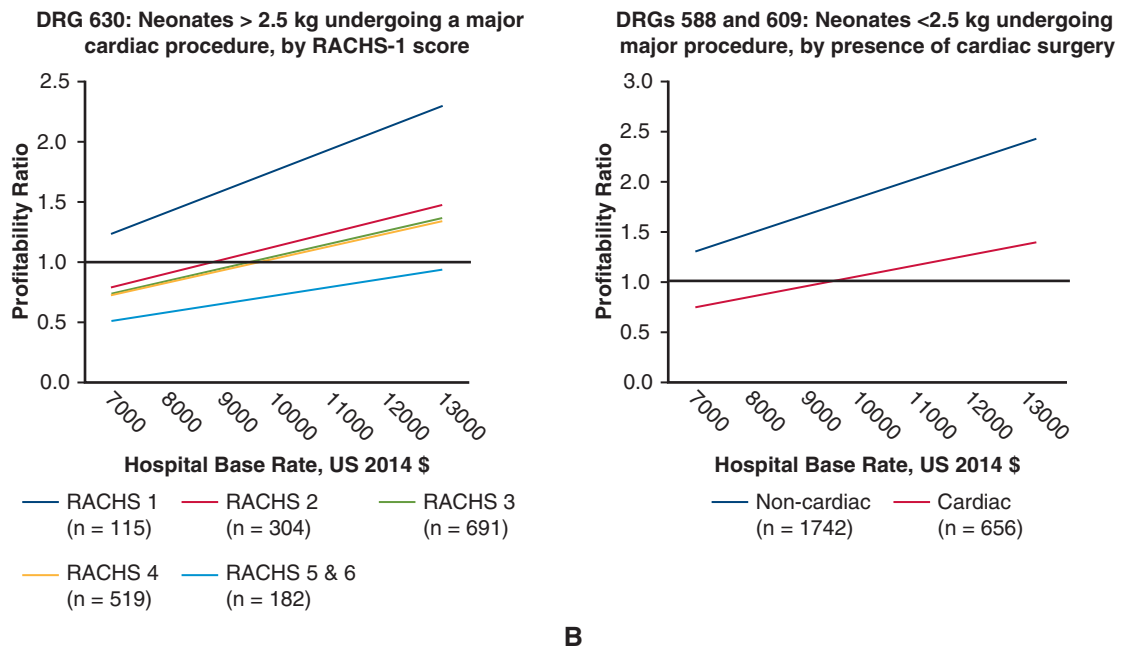
Profitability ratios assess relative profit-generating abilities of business decisions. They are not synonymous with profit. We used the following ratio:

$$\text{Profitability ratio} = (\text{reimbursement}) / (\text{expenses})$$

This work classified as nonhuman subjects research, 45CFR46.102(f).

## RESULTS

Data on 4209 neonates from 46 centers were analyzed. Fewer than 2% met outlier payment thresholds, resulting in nearly fixed reimbursement within each DRG/severity level.



**FIGURE 1.** Profitability ratios as functions of hospital base rates. A, DRG 630 (severity 3 and 4): Neonates  $\geq 2.5$  kg undergoing a major cardiac procedure, by RACHS-1 score; B, DRGs 588 and 609 (severity 3 and 4): neonates  $< 2.5$  kg undergoing major procedure—cardiac or not, by presence of cardiac surgery. Profitability ratio = (estimated reimbursement for a given hospital base-rate)/(estimated expenses). Expenses are estimated using cost-to-charge ratio based costs, standardized across hospitals and payers. It is a measure of relative profit-generating ability (not synonymous with profit). DRG, Diagnosis-Related Group; RACHS-1, Risk Adjustment for Cardiac Surgery; a measure of surgical case complexity, where RACHS 5 and 6 represent the greatest case complexity.

For neonates  $\geq 2.5$  kg undergoing a major cardiovascular procedure, estimated reimbursement at a \$10,000 base rate was \$144,000 for severity level 4 and \$66,000 for level 3. Average standardized CCR costs were 44% greater for high-complexity cases (Risk Adjustment for Congenital Heart Surgery groups 5/6) versus lower complexity cases (confidence interval, 26%-64%;  $P < .001$ )—\$259,664 versus \$168,350—despite receiving the same reimbursement. Figure 1, A, displays profitability ratios as functions of hospital base rates and case complexity.

For neonates 1.5 to 2.5 kg undergoing any major procedure—cardiac or not, estimated reimbursement at a \$10,000 base rate was \$196,000 for severity level 4 and \$77,000 for level 3. For neonates  $< 1.5$  kg, estimated reimbursement was \$289,000 for severity level 4 and \$214,000 for severity level 3. Average standardized CCR costs were 32% greater for cardiac cases versus noncardiac cases (confidence interval, 19%-45%,  $P < .001$ )—\$351,767 versus \$277,234—despite receiving the same reimbursement (Figure 1, B). Discrepancies were even greater for high-complexity (RACHS 5/6) cardiac cases (\$430,873 vs \$277,234).

**DISCUSSION**

Under historic reimbursement, pediatric cardiac cases—and particularly high-complexity cases—were associated with greater profitability. Under DRGs, this is not necessarily true. High-complexity neonatal cardiac cases may

generate similar revenue to less complex and noncardiac cases but have greater associated expenses.

For centers providing high-quality care, there may be positive reputational or financial incentives beyond what is captured in these analyses. Further, negotiated base rates, particularly for free-standing children's hospitals, may be high enough to result in significant positive financial margins even if a subset of cases is relatively less profitable, and high-quality care is an important service. That said, centers with known suboptimal outcomes may want to consider referring more complicated infants elsewhere and reallocating their resources. Such behavior may serve not only the children's best interests but also their own financial well-being.

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