

## **Complications, length of stay, and economic burden among children undergoing pectus excavatum repair**

**Authors:** E. Hope E. Hope Weissler, BA; Paymon Sanati-Mehrissy, BA; Benjamin Massenburg, BA; Hillary Jenny, BS; Peter J. Taub, MD; Peter S. Midulla, MD

**Purpose:** Pectus excavatum is the most common chest wall deformity. Repairs broadly fall into open or minimally invasive types. The authors aimed to explore the prevalence and financial implications of complications of repair.

**Methods:** The Healthcare Cost and Utilization Project Kids' Inpatient Database, the largest all-payer pediatric inpatient database, was queried by ICD-9 code for patients from 2000-2012 with a primary diagnosis of pectus excavatum admitted primarily for its repair. Independent t-tests and Mann Whitney U tests (for equal and unequal variances, respectively) as well as regressions with variables found to be significant on univariate analysis ( $p < 0.05$ ) were used to relate hospital charges and complications. Dollar values are in 2015 amounts.

**Results:** Nine thousand thirty two patients were admitted for repair, of whom 85.0% were white and 16.5% were female. The average age was 14.17 years and the average length of stay was 4.64 days. 733 patients (8.1%) had "thorascopy" co-coded. 1,543 patients (17.1%) had at least one complication, the most common of which was iatrogenic pneumothorax ( $N=964$ , 10.7%), followed by post-operative pain ( $N=436$ , 4.8%) and pleural effusion ( $N=239$ , 2.6%). There were no injuries of the heart or lungs. Using binary logistic regression controlling for race, hospital size, hospital teaching status, age, and household income quartile, complications were more likely in large hospitals (OR 1.32, 1.15-1.53) and with increasing age (OR 1.06, 1.03-1.08). The average hospital charge was \$41,015.58. Using linear regression, hospital charges were associated with western location (\$13,070.78,  $p < 0.0001$ ), age (\$429.33,  $p < 0.0001$ ), large hospital size (\$1,121.92,  $p = 0.18$ ), length of stay (\$8,254.58,  $p < 0.0001$ ), and number of procedures (\$3,296.04,  $p < 0.0001$ ) and diagnoses (\$1,750.76,  $p < 0.0001$ ).

**Conclusions:** Pectus excavatum repair is a potentially complicated procedure, with nearly one fifth of patients suffering complications. Given isolated reports of cardiac injury associated with pectus excavatum repair, it was reassuring not to find this complication in this large, national sample.<sup>1,2</sup> The reasons for more common complications in larger hospitals should be explored for potential process changes that could lead to safer procedures; it is possible that these hospitals are managing more complicated cases. Due to insensitive ICD-9 codes for types of pectus excavatum repair, conclusions cannot be drawn about the outcomes of the Nuss versus Ravitch repairs; however, this is the largest study of complications and hospital charges associated with pectus excavatum repair.

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<sup>1</sup> Schaarschmidt K, Lempe M, Schlesinger F, Jaeschke U, Park W, Polleichtner S. Lessons learned from lethal cardiac injury by nuss repair of pectus excavatum in a 16-year-old. *Ann Thorac Surg*. 2013;95:1793-5.

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<sup>2</sup> Gips H, Zaitsev K, Hiss J. Cardiac perforation by a pectus bar after surgical correction of pectus excavatum: case report and review of the literature. *Pediatr Surg Int*. 2008;24:617-620.