Head and Neck Endocrine Surgery in Children
1997 and 2000
Wayne J. Harsha, MD; Jonathan A. Perkins, DO; Charlotte W. Lewis, MD, MPH; Scott C. Manning, MD

Objectives: To characterize children undergoing parathyroid, thyroid, and thyroglossal duct cyst surgery in 1997 and 2000 using a nationally representative discharge database to determine whether rates and outcomes of these surgical treatments vary by age, sex, and health care system attributes.


Study Selection: All patients 18 years and younger undergoing head and neck endocrine (HNE) procedures were included.

Data Extraction: The sampling scheme of this database allowed for calculation of national and regional estimates using Stata 7.0.

Data Synthesis: An estimated 2077 and 1871 inpatient pediatric HNE procedures were performed nationally in 1997 and 2000, respectively. Most were performed at general (nonpediatric) teaching hospitals. There were an estimated 1102 thyroglossal duct cyst excisions, making this the most common HNE procedure and diagnosis. Thyroid lobectomy was the second most common HNE surgical treatment. Thyroid malignant neoplasm (usually treated by total thyroidectomy) was the second most common diagnosis. Neck dissections were performed in 32% of patients with thyroid malignant neoplasm. These HNE procedures accounted for more than $28 million in hospital charges in 1997 and nearly $38 million in 2000.

Conclusions: Surgical treatment trends for pediatric HNE procedures remained stable between 1997 and 2000. Thyroglossal duct cyst excision and thyroid lobectomy are the most common procedures. There were regional differences in the rates of most HNE surgical treatments. In addition, hospital charges increased between 1997 and 2000.

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Pediatric head and neck endocrine (HNE) procedures are uncommon. The existing literature consists of case series focusing on institutional experience with individual disease processes. The largest multi-institutional case series published on thyroid malignant neoplasm consisted of 329 patients. Small numbers of patients limit our ability to assess disease epidemiology, procedure rates, and the effect of factors such as patient age, sex, race or ethnicity, and geographic location. The reported incidence of pediatric thyroid malignant neoplasm is broad (range, 0.02-1.75 cases per 100,000 children per year), because of the absence of population-based studies. To our knowledge, health care utilization and costs have not been assessed for pediatric HNE procedures.

National discharge data, such as the Kids’ Inpatient Database (KID), allow estimation of specific national procedure rates performed in a defined age group. These procedures are linked to discharge diagnoses. We used the KID to characterize pediatric HNE procedures performed in 1997 and 2000. Associated data analyzed were age, sex, race or ethnicity, geographic location, hospital type, concomitant procedures (ie, tracheotomy and neck dissection), and diagnoses. Hospital charges and payer mix for select procedures were determined. Finally, we sought to detect treatment variation from 1997 to 2000.

METHODS

DATA SOURCE

This study used data from the 1997 and 2000 editions of the Healthcare Cost and Utilization Project KID, which is a federal, state, and private sector collaboration of inpatient discharge data collection. It is sponsored by the Agency for Healthcare Research and Quality, in an effort to promote an accurate analysis of pediatric discharge data. The 1997 database was drawn from the following 22 states that...
contributed discharge data to the Healthcare Cost and Utilization Project: Arizona, California, Colorado, Connecticut, Florida, Georgia, Hawaii, Illinois, Iowa, Kansas, Maryland, Massachusetts, Missouri, New Jersey, New York, Oregon, Pennsylvania, South Carolina, Tennessee, Utah, Washington, and Wisconsin. The 1997 KID contains information from 2521 hospitals and includes more than 1.9 million unweighted and more than 6.6 million weighted discharges from that year. The 2000 database includes the additions of Kentucky, Maine, North Carolina, Texas, Virginia, and West Virginia; however, Illinois was not included. These changes brought about the inclusion of 263 more hospitals, bringing the unweighted discharge total to more than 2.5 million and the weighted discharge total to more than 7.2 million. The database includes information from all community, nonrehabilitation hospitals in participating states. The design of the KID is such that 20% of uncomplicated births and 80% of all other pediatric discharges occurring during the given year were sampled. The weighted discharges are structured to represent an accurate picture of pediatric discharges in the United States.

In the 1997 KID, a pediatric discharge was defined as a discharge of a patient who was 18 years or younger on hospital admission. The inclusive age was increased to 20 in the 2000 KID. To make a more accurate direct comparison between the 2 databases, we included only discharges of patients 18 and younger from the 2000 KID. The information available in the 1997 and 2000 KID includes variables such as age at admission; disposition status; source of admission; International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) diagnoses (≤15 possible diagnoses) and procedure codes (≤15 possible procedure codes); length of stay; and total charges. The calculated charges include only the facility fees for the admission and exclude all professional fees. In the 1997 KID, only general information about the hospitals was made available. This includes the US geographic region, bed size, National Association of Children’s Hospital and Related Institutions type designation, rural or urban status, teaching status, and ownership or control of the facility. In the 2000 KID, information about individual states, counties, and hospitals is available for most of the states.

DATA ANALYSIS

Using the ICD-9-CM codes for HNE procedures (codes 06.00-06.99), we extracted the discharges from the KID in which an HNE procedure was listed among the 15 procedure codes allowed on this database. These procedures included primary and revision surgery of the thyroid and parathyroid glands and thyroglossal duct cysts (TGDCs). We examined the underlying diagnoses by using Clinical Classification Software, an Agency for Healthcare Research and Quality–developed tool designed to group patients into a reasonable number of meaningful clinical categories.9 We added diagnostic categories for children with any of the ICD-9-CM codes listed in Table 1 among their 15 discharge diagnoses.

The statistical analyses were performed using Stata 7.0 (StatCorp LP, College Station, Tex). To generate national estimates, we used counts that were weighted by hospital-specific discharge weights. The US Census estimates for 1997 and 2000 were used to generate overall population-based procedure rate estimates.10,12

RESULTS

An estimated 2077 thyroid, parathyroid, and TGDC procedures were performed in 1997, with an estimated 1871 procedures performed in 2000 (Table 2). Procedure rates were 2.8 per 100 000 child-years in 1997 and 2.5 per 100 000 child-years in 2000. The most common procedure in both years was TGDC excision (estimated national rate, 0.81 per 100 000 child-years in 1997 and 0.69 per 100 000 child-years in 2000) (Table 3). In 1997, the estimated thyroid lobectomy rate was 0.53 per 100,000 child-years, with total thyroidectomy less frequently performed. In 2000, thyroid lobectomy (an estimated 352 cases) and total thyroidectomy (an estimated 346 cases) were performed with nearly equal frequency. In both years, fewer than 30 total parathyroidectomy procedures were recorded in the KID, and partial parathyroidectomies were rare, at 0.13 per 1 000 000 child-years.

Table 1. International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) Diagnostic Codes Extracted From the Kids’ Inpatient Database

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>ICD-9-CM Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malignant neoplasm of the trachea</td>
<td>162.0</td>
</tr>
<tr>
<td>Malignant neoplasm of the thyroid gland</td>
<td>193</td>
</tr>
<tr>
<td>Benign neoplasm of the thyroid gland</td>
<td>226</td>
</tr>
<tr>
<td>Goiter, nontoxic</td>
<td>242.0-242.2</td>
</tr>
<tr>
<td>Goiter, toxic</td>
<td>242.0-242.3</td>
</tr>
<tr>
<td>Thyrotoxicosis</td>
<td>242.4-242.9</td>
</tr>
<tr>
<td>Chronic thyroiditis</td>
<td>245.2-245.3</td>
</tr>
<tr>
<td>Branchial remnant</td>
<td>744.41 and 744.24</td>
</tr>
</tbody>
</table>

Female subjects were more likely to undergo an HNE procedure (female-male ratio, 1.7:1; P < .001) and 3.9 times more likely to undergo a thyroid or parathyroid procedure (P < .001) (Table 4). In the group of female subjects aged 10 to 18 years, the rate of thyroid and parathyroid surgery more than doubled compared with the group younger than 10. In contrast, the TGDC excision rate was significantly higher among male subjects (P = .02). Specifically, boys 10 years and younger were 25% more likely to undergo TGDC excision. However, in the population older than 10, TGDC excision was slightly more common among female subjects (P = .051).

The mean ages of children undergoing TGDC excision were 6.4 years in 1997 and 6.6 years in 2000 (Figure and Table 4); the median age in both years was 5. The mean ages at surgery for all other HNE procedures were 13.3 years in 1997 and 13.4 years in 2000; the median age in both years was 15. The rate of HNE procedures among the population aged 10 to 18 years was nearly twice that of those younger than 10 (P = .009) (Table 2).

The procedure rates were consistent for the Hispanic, white non-Hispanic, and black non-Hispanic populations, with an annual rate of approximately 2 per 100 000 child-years (Table 2). The rates reported for Asian/Pacific Islanders and Native Americans were much lower. Further delineation of racial differences is difficult, as some states do not disclose race or ethnicity data in their discharge data provided to the KID.

The primary diagnosis listed for those undergoing TGDC excision was TGDC (Table 5). Primary diagnoses for each of the thyroid and parathyroid procedures varied greatly. In 1997 and 2000, the most common reason for performing a total thyroidectomy was...
primary thyroid malignant neoplasm. Partial thyroidec-
tomy was performed primarily for toxic goiter in 1997
and for toxic and nontoxic goiters in 2000, while in both
years thyroid lobectomy was performed chiefly in asso-
ciation with the diagnosis of nontoxic goiter. Indica-
tions for performing these HNE procedures were con-
sistent in the 2 years studied.

Patients who underwent HNE procedures and had a
diagnosis of primary thyroid malignant neoplasm were
further characterized. There were 113 cases of malig-
nant thyroid neoplasm reported in the 1997 KID and 162
cases in the 2000 KID, yielding national estimates of 253
(95% confidence interval [CI], 221-286) cases in 1997
and 316 (95% CI, 274-359) cases in 2000. The rates of
thyroid malignant neoplasm were 0.35 (95% CI, 0.30-
0.38) per 100 000 child-years in 1997 and 0.42 (95% CI,
0.37-0.48) per 100 000 child-years in 2000. The mean
ages of these children were 13.8 years in 1997 and 14.9
years in 2000. The median ages were 13 years in 1997
and 16 years in 2000. Female subjects comprised 81%
of this population in 1997 and 73% in 2000. In 1997, thy-
roid malignant neoplasm was most commonly treated sur-
gically with total thyroidectomy (61%), followed by thy-
roid lobectomy (21%) and partial thyroidectomy (13%).
In 2000, 58% were treated with total thyroidectomy, 24%
with thyroid lobectomy, and 12% with partial thyroid-
ectomy. Concomitant neck dissections were performed
in 29% of patients in 1997 and in 34% of patients in 2000,
for an overall rate of 32%. Only 1 child (in 2000) who
had the diagnosis of thyroid malignant neoplasm died dur-
ning hospitalization.

In 1997, there were 39 neck dissections done in con-
junction with HNE procedures, and there were 62 in 2000.
Most notably, 32% of HNE procedures associated with
the diagnosis of thyroid malignant neoplasm included a
neck dissection. The percentage of total thyroidecto-
myies accompanied by neck dissections ranged from 20%
to 28%. The other procedures had low rates of concomi-
tant neck dissections (≤5.2% of partial thyroidectomies
in 2000). In the unadjusted data, there were 10 trache-
otomies performed during HNE hospitalizations in 1997
and 2000, and there were 7 deaths after HNE proce-
dures. The numbers of tracheotomies and deaths were
too small to permit accurate national estimates or fur-
ther delineation of patient characteristics.

More than 65% of all HNE procedures were per-
formed at teaching institutions in 1997 and more than
76% in 2000 (Table 6). Most HNE surgical treatments
were performed in general, nonchildren’s hospitals, fol-
lowed by children’s units of general hospitals. Only a small

### Table 2. Demographic Characteristics and Estimated Incidence for Children 18 Years and Younger Who Underwent Head and Neck Endocrine Procedures

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>1997</th>
<th>2000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. ± SE*</td>
<td>Rate (95% CI)†</td>
</tr>
<tr>
<td>Total</td>
<td>2077 ± 137</td>
<td>2.8 (2.5-3.2)</td>
</tr>
<tr>
<td>Age group, y‡</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;10</td>
<td>745 ± 78</td>
<td>1.9 (1.5-2.3)</td>
</tr>
<tr>
<td>10-18</td>
<td>1331 ± 66</td>
<td>3.9 (3.5-4.2)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>837 ± 72</td>
<td>2.2 (1.8-2.6)</td>
</tr>
<tr>
<td>Female</td>
<td>1240 ± 67</td>
<td>3.5 (3.1-3.8)</td>
</tr>
<tr>
<td>Age group by sex, y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;10</td>
<td>435 ± 54</td>
<td>2.2 (1.7-2.7)</td>
</tr>
<tr>
<td>10-18</td>
<td>402 ± 25</td>
<td>2.3 (2.0-2.6)</td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;10</td>
<td>311 ± 25</td>
<td>1.6 (1.4-1.9)</td>
</tr>
<tr>
<td>10-18</td>
<td>929 ± 47</td>
<td>5.5 (5.0-6.1)</td>
</tr>
<tr>
<td>Race or ethnicity§</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White non-Hispanic</td>
<td>976 ± 71</td>
<td>2.0 (1.7-2.3)</td>
</tr>
<tr>
<td>Black non-Hispanic</td>
<td>240 ± 28</td>
<td>2.2 (1.7-2.7)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>233 ± 32</td>
<td>2.1 (1.5-2.7)</td>
</tr>
<tr>
<td>Asian/Pacific Islander</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Native American</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>91 ± 12§</td>
<td>7.6 ± 2.2§</td>
</tr>
<tr>
<td>Region</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northeast</td>
<td>628 ± 77</td>
<td>4.7 (3.6-5.9)</td>
</tr>
<tr>
<td>Midwest</td>
<td>399 ± 46</td>
<td>2.3 (1.8-2.9)</td>
</tr>
<tr>
<td>South</td>
<td>537 ± 67</td>
<td>2.1 (1.6-2.6)</td>
</tr>
<tr>
<td>West</td>
<td>513 ± 74</td>
<td>3.0 (2.1-3.9)</td>
</tr>
</tbody>
</table>

Abbreviation: CI, confidence interval.
* Number is weighted national estimate.
†Rate is per 100 000 child-years.
‡The mean ± SD ages were 11.2 ± 5.9 years in 1997 and 11.5 ± 5.8 years in 2000.
§Not all admissions recorded race or ethnicity in the Kids’ Inpatient Database, leading to national estimate inaccuracies.
||Fewer than 30 procedures recorded in the Kids’ Inpatient Database.
of $7191.98 in 1997 and $8968.31 in 2000, yielding
TGDC excisions. Thyroid lobectomy incurred charges
2000, despite the drop in the estimated number of
than $3.6 million. These charges were $3.9 million in
more than $28 million in 1997 and nearly $38 million
in 2000. The mean charges for total thyroidectomy
were $10 989.79 in 1997 and $13 767.39 in 2000. These
yielded national hospital charges of more than $3.4 mil-
national total hospital charges for thyroid lobectomy of
more than $2.8 million dollars in 1997 and $3.1 million
in 2000. The mean charges for total thyroidectomy
were $10 989.79 in 1997 and $13 767.39 in 2000. These
yielded national hospital charges of more than $3.4 mil-
0.67
0.12
0.10
0.12
0.03
0.05
0.03
0.08
0.08
0.08
0.08
0.08
Cyst Excision
Thyroid Lobectomy
Substernal thyroidectomy††††
Lingual thyroidectomy 0 0
Parathyroid
Total parathyroidectomy††††
Partial parathyroidectomy
Total parathyroidectomy ††††
Partial parathyroidectomy

Abbreviation: CI, confidence interval.
*Rate is per 100,000 child-years.
†Fewer than 30 procedures recorded in the Kids’ Inpatient Database.

Comment

In the KID database, pediatric HNE surgical treatments occurred at the rates of 2.8 per 100,000 child-
years in 1997 and 2.5 per 100,000 child-years in 2000. There were no significant changes in 1997 and 2000 in
the rates of these procedures; age, sex, and race or eth-

Table 3. National Incidence of Pediatric Head and Neck Endocrine Procedures

<table>
<thead>
<tr>
<th>Procedure</th>
<th>No. ± SE</th>
<th>Rate (95% CI)*</th>
<th>No. ± SE</th>
<th>Rate (95% CI)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thyroglossal duct cyst excision</td>
<td>592 ± 63</td>
<td>0.81 (0.64-1.00)</td>
<td>510 ± 59</td>
<td>0.69 (0.53-0.84)</td>
</tr>
<tr>
<td>Thyroid Lobectomy</td>
<td>391 ± 23</td>
<td>0.53 (0.47-0.60)</td>
<td>352 ± 27</td>
<td>0.47 (0.40-0.55)</td>
</tr>
<tr>
<td>Partial thyroidectomy</td>
<td>312 ± 22</td>
<td>0.43 (0.37-0.49)</td>
<td>225 ± 17</td>
<td>0.30 (0.26-0.35)</td>
</tr>
<tr>
<td>Total thyroidectomy</td>
<td>1058 ± 59</td>
<td>1.49 (1.34-1.65)</td>
<td>777 ± 47</td>
<td>0.91 (0.84-0.98)</td>
</tr>
<tr>
<td>Thyroidectomy</td>
<td>315 ± 21</td>
<td>0.43 (0.37-0.49)</td>
<td>346 ± 28</td>
<td>0.47 (0.39-0.54)</td>
</tr>
<tr>
<td>Parathyroidectomy</td>
<td>94 ± 8</td>
<td>0.13 (0.11-0.15)</td>
<td>97 ± 10</td>
<td>0.13 (0.10-0.16)</td>
</tr>
<tr>
<td>Total</td>
<td>2077 ± 137</td>
<td>2.8 (2.5-3.2)</td>
<td>1871 ± 131</td>
<td>2.5 (2.2-2.9)</td>
</tr>
</tbody>
</table>

*Data are given as rate (95% confidence interval) per 100,000 child-years unless otherwise indicated.

Table 4. Rates of Procedures by Sex and Age*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Thyroglossal Duct Cyst Excision</th>
<th>Total Thyroidectomy</th>
<th>Partial Thyroidectomy</th>
<th>Thyroid Lobectomy</th>
<th>Partial Parathyroidectomy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male*</td>
<td>0.93</td>
<td>(0.66-1.20)</td>
<td>0.67</td>
<td>(0.46-0.88)</td>
<td>0.20</td>
</tr>
<tr>
<td>&lt;10 y</td>
<td>1.40</td>
<td>(0.92-1.80)</td>
<td>1.10</td>
<td>(0.76-1.40)</td>
<td>0.28</td>
</tr>
<tr>
<td>10-18 y</td>
<td>0.90</td>
<td>(0.30-0.59)</td>
<td>0.70</td>
<td>(0.13-0.36)</td>
<td>0.28</td>
</tr>
<tr>
<td>Female*</td>
<td>0.68</td>
<td>(0.52-0.84)</td>
<td>0.70</td>
<td>(0.51-0.89)</td>
<td>0.67</td>
</tr>
<tr>
<td>&lt;10 y</td>
<td>0.91</td>
<td>(0.71-1.10)</td>
<td>0.92</td>
<td>(0.68-1.16)</td>
<td>0.24</td>
</tr>
<tr>
<td>10-18 y</td>
<td>0.42</td>
<td>(0.27-0.57)</td>
<td>0.46</td>
<td>(0.28-0.63)</td>
<td>1.4</td>
</tr>
</tbody>
</table>

*Data are given as rate (95% confidence interval) per 100,000 child-years unless otherwise indicated.

proportion of HNE surgical treatments were performed in children’s hospitals.

Regional differences in population-based procedure rates were apparent (Table 7). This was most promi-
nent in TGDC excision. In 1997, there were 2.0 TGDC excisions per 100,000 child-years performed in
the Northeast, compared with 1.0 per 100,000 child-years in the West. In 2000, the Northeast and West continued
to have higher rates of TGDC excision. The population-
rate of procedures performed in the South was consistently lower than the rates for other regions in
both years studied.

Hospital charges for all HNE procedures totaled more than $28 million in 1997 and nearly $38 million
in 2000. In 1997, the mean hospital charge for a TGDC excision was $6229.80, yielding a national total of more
than $3.6 million. These charges were $3.9 million in
2000, despite the drop in the estimated number of TGDC excisions. Thyroid lobectomy incurred charges of $7191.98 in 1997 and $8968.31 in 2000, yielding

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nicity of the patients; diagnoses; types of surgery; geographic region; health care system attributes; or death rates. Except for TGDC excision, female subjects were significantly more likely to have undergone HNE procedures. This rate difference between the sexes was most pronounced in the population aged 10 to 18 years, in which the rate of surgery was more than 5 per 100,000 child-years among female subjects. The 2 most common diagnoses associated with HNE procedures were TGDC and primary thyroid malignant neoplasm. Parathyroid disorders and procedures were uncommon. The use of this national pediatric discharge database allows accurate estimates of pediatric procedure rates and comparisons between multiple variables.

There are few reports on TGDC epidemiology. The most comprehensive review to date reports equal rates of TGDC among male and female subjects. We found that TGDC is more common among male subjects 18 and younger, especially among the younger population, with the rates of TGDC between the sexes being nearly equal among older children. One difference between these studies is the exclusion of patients older than 18 years in our study, accounting for the previous finding that TGDC was equally prevalent among male and female subjects.

We found a narrower range in the incidence of pediatric thyroid cancer than the 0.02 to 1.75 cases per 100,000 children per year that was previously reported. Our data confirm that thyroid malignant neoplasm is more common among adolescent girls. It remains unclear if cervical node metastasis from thyroid malignant neoplasm is more common among children than adults. The National Cancer Data Base, which includes data from patients of all ages, indicates a rate of concomitant neck dissection with thyroid malignant neoplasm of 5.7% to 17.6%, depending on the histologic type of neoplasm. Our finding of a 32% rate of neck dissections among children is higher. This raises the question of whether this is because of increased neck metastases in children or differences in disease management. Children have slightly higher rates of papillary carcinoma and follicular variant papillary carcinoma, which are associated with increased nodal metastasis. However, this does not completely explain the discrepancy between pediatric and adult neck dissection rates. There may also be a difference in thyroid tumor biology in children vs adults.

A third possible explanation is that surgeons may be more aggressive in the treatment of thyroid cancer in children.

Most pediatric HNE procedures were performed in teaching institutions and in general, nonchildren’s hospitals. The percentage of HNE procedures performed at teaching institutions increased from more than 65% in 1997 to more than 76% in 2000. It is unclear whether this increase represents a change in referral patterns or the change in states represented in the 2000 KID. We also found that the population-adjusted rates of HNE procedures are higher in the Northeast and West; this was most noticeable for TGDC excision, thyroid lobectomy, and parathyroidectomy. Whether this is because of regional differences in the rates of HNE disorders or differences in disease management (ie, inpatient vs outpatient surgery) is not clear. At Children’s Hospital and Regional Medical Center, 37% of TGDC excisions between 1997 and 2000 were done on an outpatient basis (S.C.M., unpublished data, 2002). Therefore, differences in outpatient and inpatient TGDC surgery could explain these regional differences.

Figure. Age distribution plots for thyroglossal duct cyst (TGDC) excision and other head and neck endocrine (HNE) procedures.

Table 5. Numbers of Procedures by Primary Diagnosis

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Thryroglossal Duct Cyst Excision</th>
<th>Total Thyroidectomy</th>
<th>Partial Thyroidectomy</th>
<th>Thyroid Lobectomy</th>
<th>Partial Parathyroidectomy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997 (n = 298)</td>
<td>2000 (n = 285)</td>
<td>1997 (n = 129)</td>
<td>2000 (n = 170)</td>
<td>1997 (n = 150)</td>
<td>2000 (n = 116)</td>
</tr>
<tr>
<td>Malignant neoplasm</td>
<td>0  0</td>
<td>69  94</td>
<td>15  19</td>
<td>24  39</td>
<td>1  2</td>
</tr>
<tr>
<td>Benign neoplasm</td>
<td>3  2</td>
<td>4  9</td>
<td>33  21</td>
<td>59  55</td>
<td>4  4</td>
</tr>
<tr>
<td>Goiter, nontoxic</td>
<td>0  3</td>
<td>17  23</td>
<td>38  26</td>
<td>64  59</td>
<td>1  1</td>
</tr>
<tr>
<td>Goiter, toxic</td>
<td>0  0</td>
<td>30  36</td>
<td>43  26</td>
<td>7  4</td>
<td>1  1</td>
</tr>
<tr>
<td>Thyrotoxicosis</td>
<td>0  0</td>
<td>3  2</td>
<td>3  1</td>
<td>1  1</td>
<td>1  2</td>
</tr>
<tr>
<td>Chronic thyroiditis</td>
<td>0  0</td>
<td>7  18</td>
<td>14  11</td>
<td>18  15</td>
<td>1  1</td>
</tr>
<tr>
<td>Branchial remnant</td>
<td>4  2</td>
<td>0  0</td>
<td>1  2</td>
<td>4  1</td>
<td>0  2</td>
</tr>
<tr>
<td>Thyroglossal duct cyst</td>
<td>286* 255*</td>
<td>0* 0*</td>
<td>3 6*</td>
<td>6* 2</td>
<td>1* 6*</td>
</tr>
</tbody>
</table>

*The diagnostic codes did not always match the procedure codes.
To our knowledge, hospital charges for HNE disorders are unreported in the literature. Hospital charges for pediatric HNE procedures were more than $28 million in 1997 and nearly $38 million in 2000. This represents a mean annual increase of 14% per patient from 1997 to 2000 (about $2200 per patient per year). During this period, the mean rate of inflation in the United States was 2.51%. A 1999 New England Journal of Medicine article reported that in 1997 hospital spending increased by 2.9% and physicians' services expenditures increased by 4.4%. Therefore, the mean increase in hospital charges between 1997 and 2000 was almost 6 times greater than general inflation.

This study has the following limitations. First, there may be institutional and regional variance in inpatient HNE procedures. If some HNE procedures are performed as outpatient surgery, this would change the calculated rate of surgery. It also could be a potential explanation for the otherwise unexplained regional differences. Second, we assumed that the indication for surgery was the first diagnosis listed among the multiple discharge diagnoses. This assumption may be incorrect. In addition, the KID lacks unique patient identifiers; therefore, there is no way of knowing whether a patient was discharged on multiple occasions throughout the year. This could also change the calculated procedure and diagnosis rates. Discharge coding may also differ among hospitals, states, and regions. However, using a limited number of ICD-9-CM codes to extract the data reduces this potential bias in diagnostic coding differences.

In conclusion, this study presents the national and regional rates of pediatric HNE procedures. For unclear reasons, there are demonstrable differences in the rates of HNE surgical treatments between male and female subjects and in the rates of neck dissections in children compared with adults. Between 1997 and 2000, hospital charges for pediatric HNE procedures increased dramatically. Future monitoring of pediatric discharge data, containing outpatient data and unique patient identifiers, should clarify some of the questions raised by this research.

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REFERENCES


Announcement

Trial Registration Required

As a member of the International Committee of Medical Journal Editors (ICMJE), Archives of Otolaryngology–Head & Neck Surgery will require, as a condition of consideration for publication, registration of all trials in a public trials registry (such as http://ClinicalTrials.gov). Trials must be registered at or before the onset of patient enrollment. This policy applies to any clinical trial starting enrollment after July 1, 2005. For trials that began enrollment before this date, registration will be required by September 13, 2005, before considering the trial for publication. The trial registration number should be supplied at the time of submission.

For details about this new policy, and for information on how the ICMJE defines a clinical trial, see the editorial by DeAngelis et al in the June issue of Archives of Otolaryngology–Head & Neck Surgery (2005;131:479-480). Also see the Instructions to Authors on our Web site: www.archoto.com.