Committee Report: Population-to-Pediatrician Ratio Estimates: A Subject Review

Committee on Careers and Opportunities

Many pediatricians evaluating practice opportunities are interested in population-to-provider ratios insofar as they have obvious implications for demand for services and economic viability of practice. Managed-care systems are intensely interested in determining the optimal staffing ratio of children or enrollees to full-time equivalent (FTE) pediatrician. This statement summarizes available information relating to staffing ratios of children to FTE pediatricians and provides formulas that can be of assistance in evaluating an area's demand for pediatricians.

PREVIOUS WORK FORCE STUDIES

In 1980, the Graduate Medical Education National Advisory Committee (GMENAC) produced a report detailing estimates for supply of and requirements for health professionals for 1990. The GMENAC used an adjusted, needs-based method to estimate requirements for various specialties and also used its own model to estimate the future supply of physicians by specialty. Although the GMENAC's method has been criticized,1 the ideal ratio of child population to general pediatrician arrived at by the GMENAC was 2033:1.2

In 1991, the US Bureau of Health Professions contracted with the consulting firm of Abt Associates to update the needs-based requirements model of the GMENAC for seven physician specialties, including pediatrics. Abt estimated requirements based on ideal levels and types of medical care (preventive and curative) without regard to barriers posed by ability to pay, access, availability, or lack of knowledge. Abt Associates recommended a ratio of child population to general pediatrician of 2430:1.3

STAFFING RATIOS

Most of the available staffing ratio information comes from health maintenance organizations (HMOs) or from practices serving privately insured patients; therefore, it is based on children currently under the care of physicians. Staffing ratios of children to FTE pediatricians from a variety of HMOs are summarized in the Table. These ratios vary from the ratio of 1400:1 found in the private setting of 91 practices that belong to the American Academy of Pediatrics (AAP) PROS Network, a nationwide net-work of 700 clinicians engaged in office-based research. Definitions of the ratios in these estimates vary somewhat according to the age criteria used. Pediatricians also must keep in mind that HMO staffing ratios are different from population ratios, which encompass all children, including those who do not have a usual source of care and those who receive care from other physicians. Furthermore, the number of active patients must be distinguished from the number of inactive patients when examining staffing ratios.

Children enrolled in prepaid group practices have been found to use preventive health care services at a higher rate than children in fee-for-service arrangements. In general, children enrolled in prepaid group practices make four to five visits per year, compared with three visits per year made by children in fee-for-service practices.45

Ratios such as those presented in the Table should be viewed with caution. As the Table demonstrates, ratios are variable among HMO practices. Greater or smaller numbers of children per pediatrician are not necessarily an indication of the quality of care. Such differences are often a result of a number of factors, including the level of automation in a practice, the productivity of physicians, the ability to delegate specific tasks to nonphysician providers, and the health status and/or psychosocial and behavioral status of patients.

METHODOLOGY FOR EVALUATING AN AREA'S DEMAND FOR A PEDIATRICIAN

Two models based on current use and productivity of physicians are discussed in this section.68 These models incorporate an area's total or child population and the number of local pediatricians and other physicians who see children. This information often can be obtained from city or county departments of health, school districts, local libraries, and chambers of commerce.

Both of the following models estimate an area's demand for pediatricians but differ with regard to the variables involved and the end product. The models do not suggest an ideal number of children per pediatrician based on need or an appropriate number of visits that should be made by children but, instead, reflect the status quo and as such may represent underuse according to some standards.9 Furthermore, because pediatric subspecialty service work force assessments are beyond the scope of this analysis, for the two models, we conceptualize pedi-
Dr. Atkins services as only those provided by nonhospital-based general pediatricians.

Model of Hicks and Glenn

The model of Hicks and Glenn focuses on providers considering entrance to a market and is therefore designed to estimate the population necessary to support a pediatrician. The model requires knowledge of visit rates to pediatricians and the number of weeks worked per year per pediatrician. The model controls for visits by children to nonpediatrician providers through the visit rates. Therefore, it is not necessary to know the number of family physicians, for example, in the area.

The visit rates and productivity figures provided in the articles by Hicks and Glenn may not be consistent with current estimates. Therefore, in the following description of the model, more recent information is used.

**Step 1**

\[
\text{Population size} = \frac{\text{office visits/wk} \times \text{weeks worked/y}}{\text{visits per capita/y}}
\]

This example will provide three population estimates, demonstrating the versatility of this model for incorporating different work styles and/or patient care demands. The 25th, 50th, and 75th percentiles of the number of ambulatory visits general pediatricians have per week will be used. On average, there are 0.31 visits per capita to a pediatrician in an ambulatory setting per year (AAP Department of Research tabulations from the 1990 Health Interview Survey data tape). General pediatricians work an average of 47 wk/y. The median number of ambulatory visits general pediatricians have per week is 110, the 25th percentile is 85 visits per week, and the 75th percentile is 150, based on AAP Department of Research, Periodic Survey No. 21. The number of weekly visits is multiplied by the number of weeks worked per year to calculate the number of visits per year. This number is then divided by the number of visits per capita to derive the population size necessary to obtain the desired productivity, given the average number of visits to pediatricians by the population.

Please note: These figures represent population sizes, not practice sizes. Some children may not be receiving care, or they may be receiving care from physicians in other specialties, eg, family physicians or internists.

**Step 2**

Population <22 y = population size \( \times 0.32 \)

Currently, 32% of the US population is younger than 22 years. If we assume that the population derived in step 1 is representative of that in the United States, there would be 5337 children and adolescents of a population of 16,677 (for the 50th percentile example). (Estimates in step 2 are from the AAP Department of Research tabulations from the 1990 Health Interview Survey data tape.) As a check on the calculations, these individuals would have to visit the pediatrician approximately 0.97 times per year to generate 5170 visits, which is close to the child and adolescent national visit rate of 0.99 per year to pediatricians in ambulatory settings.

Factors affecting estimates generated by this model include competition, productivity, and visit rates. Clearly, if pediatricians see more or fewer patients per year than the average FTE because of the age distribution of their patients, different intensities in levels of care required, or the pediatricians' personal preferences, the required population figures would increase or decrease, respectively. Also, rural populations tend to have 12% fewer physician encounters than more metropolitan populations; therefore, a larger population would be necessary to generate the desired number of encounters in a rural area. In addition, pediatricians in nonmetropolitan areas tend to see more patients per week than do urban pediatricians. The health status of the patient population also will affect visit rates, because chronically ill children visit physicians at least twice as often as the overall child population. Finally, the explanation incorporates national figures based on the fact that approximately 40% of all children's and adolescents' visits to physicians are to pediatricians (AAP Department of Research tabulations from the 1990 Health Interview Survey data tape). The remaining 60% of visits are to family physicians, internists, otolaryngologists, orthopedists, dermatologists, and others.

The model of Hicks and Glenn assumes that there are other physicians of other specialties in the area but that there is not significant overlap of services. If a community of 9000 has two general/family practitioners (G/FPs) but no pediatricians, it is likely

<table>
<thead>
<tr>
<th>Ages of Children, y</th>
<th>Children per Pediatrician in HMO</th>
<th>Visits/y Divided by Visits per Capita</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-18</td>
<td>885-1105:1*</td>
<td></td>
</tr>
<tr>
<td>0-17</td>
<td>1300:1†</td>
<td></td>
</tr>
<tr>
<td>0-14</td>
<td>1157:1‡</td>
<td></td>
</tr>
<tr>
<td>0-11</td>
<td>1200:1§</td>
<td></td>
</tr>
<tr>
<td>Unknown</td>
<td>1125:1‖</td>
<td></td>
</tr>
<tr>
<td>Unknown</td>
<td>1750:1¶</td>
<td></td>
</tr>
<tr>
<td>Unknown</td>
<td>1200:1¶</td>
<td></td>
</tr>
</tbody>
</table>

* From a staff model Midwestern health maintenance organization (HMO).
† From an Independent Practice Association model New England HMO.
‡ The average number of HMO enrollees younger than 15 years per full-time pediatrician from 33 different HMOs, 1992. Group Health Association of America, Inc. HMO Industry Profile; 1993. Washington, DC: Group Health Association of America.
§ From a staff model Midwestern HMO.
‖ Ratios of children per pediatrician for two different group model HMO practices advertising for pediatricians in the Northeast.
¶ From a staff and group model New England HMO.
that all pediatric care is being handled by the G/FPs. On average, G/FPs have 118.6 visits per week and work an average of 47 wk/y, totaling 5574 visits per year.\textsuperscript{10} Using the same model, one G/FP needs a total service area population of 4160 to generate an average of 5574 ambulatory visits per year at 1.33 visits per capita, based on AAP Department of Research tabulations and those of Gonzalez.\textsuperscript{10} Obviously, if a similar community, equally as small, already has a pediatrician, then, by this model, there would not be a need for an additional one.

**Model of Miller and Associates**

The model of Miller et al\textsuperscript{8} is designed to assist pediatricians and community leaders in estimating the primary-care needs of patients in the community and the economic feasibility of establishing a pediatric practice. The model requires information on the visit rates of children to physicians, as well as age breakdowns of the area’s child population.

**Step 1**

Physician visits = visit rate
\[ \times \text{No. of children in each age group} \]

The visit rates provided in the article\textsuperscript{8} are dated; more current approximations of ambulatory visits to all physicians for 1990 are as follows (AAP Department of Research tabulations from the 1990 Health Interview Survey data tape).

<table>
<thead>
<tr>
<th>Age, y</th>
<th>Average Visit Rate/y</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–5</td>
<td>4.19</td>
</tr>
<tr>
<td>6–10</td>
<td>1.56</td>
</tr>
<tr>
<td>11–14</td>
<td>1.82</td>
</tr>
<tr>
<td>15–21</td>
<td>2.03</td>
</tr>
</tbody>
</table>

One must calculate how many physician visits by children and adolescents will be made in a community by multiplying these visit rates by the number of children in each age group. If such age distributions are unavailable, then an age-adjusted overall visit rate of 2.52 for children 0 to 21 years of age will suffice. As stated previously, about 40% of all children’s and adolescents’ visits are to pediatricians.

**Step 2**

No. of pediatricians in the community
\[ \times \text{average visits/y to pediatricians} \]

No. of G/FPs in the community
\[ \times \% \text{ of visits made by children and adolescents} \]
\[ \times \text{average visits/y to G/FPs} \]

Next, one must determine the number of visits that the area’s child health physicians can accommodate. For pediatricians, the median productivity of 5170 visits per year is used (AAP Department of Research, Periodic Survey No. 21). An estimate of the number of visits to G/FPs from children must be included. As stated above, on average, G/FPs have 118.6 visits per week and work an average of 47 wk/y, totaling 5574 visits per year.\textsuperscript{10} Approximately one fifth (21.2%) or 1182 of these visits come from children 0 to 21 years of age (AAP Department of Research tabulations from the 1990 Health Interview Survey data tape). One must factor in this number, multiplied by the number of family and general practitioners in the area.

**Step 3**

Subtract from the results of step 1 (the expected number of total visits to be made by the community’s children) the results of step 2 (number of visits that can be managed by the area’s physicians) to get the number of visits that currently are not being accommodated by local physicians. Divide this value by the average number of visits per year per pediatrician to derive the number of additional pediatricians an area can support.

**Example**

An area has 11 655 children in the following age groups, generating 29 000 total visits:

**Step 1:**

\[ \text{Total Visits} = \text{Age, y} \times \text{No. of children} \times \text{Visit Rate} \]

<table>
<thead>
<tr>
<th>Age, y</th>
<th>No. of children</th>
<th>Visit Rate/y</th>
<th>Total Visits</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–5</td>
<td>3391</td>
<td>1.41</td>
<td>4811</td>
</tr>
<tr>
<td>6–10</td>
<td>2681</td>
<td>1.56</td>
<td>4110</td>
</tr>
<tr>
<td>11–14</td>
<td>2016</td>
<td>1.82</td>
<td>3690</td>
</tr>
<tr>
<td>15–21</td>
<td>3567</td>
<td>2.03</td>
<td>7241</td>
</tr>
</tbody>
</table>

**A.** 29 300 total visits

**Step 2:**

This community has 2 pediatricians and 8 general/family practitioners

\[ 2 \times 5170 \text{ visits} = 10340 \]
\[ 8 \times (0.212 \times 5574) \text{ visits} = 9453 \]

**B.** 19 793 accommodated visits

**Step 3:** The remaining potential ambulatory visits in this area equal \( A - B \), or 9507 visits. Dividing this remainder by the average number of visits per year a pediatrician can accommodate (9/5170) results in the number of additional pediatricians the area could potentially support (1.8), given that there are no other child health care providers that have not been accounted for.

Obviously, the same factors (productivity, visit rate, and competition) that influence the model of Hicks and Glenn\textsuperscript{6,7} are apparent here.

**DISCUSSION**

**Insurance Effects**

Current estimates of the use of pediatric services reflect national averages across a broad array of types of insurance coverage, ranging from no coverage to first-dollar coverage, private insurance. Approximately 86% of US children are covered by private or public health insurance plans.\textsuperscript{13} Insurance coverage plays a significant role in the use of services. For example, it has been shown that insured children are more likely to see physicians for acute illnesses than are those without insurance.\textsuperscript{14} In fact, it is estimated that implementation of universal health insurance would increase the number of pediatric contacts by 5% to 15%.\textsuperscript{15,16}

**Managed-care Implications**

In using the models of Hicks and Glenn\textsuperscript{6,7} and Miller et al,\textsuperscript{8} it is important to keep in mind the differences in
use among fee-for-service patients and those enrolled in managed-care organizations. Data on use from HMOs and other managed-care systems have certain inherent limitations. To the extent that managed-care organizations have healthier than average populations enrolled in their plans, use would be expected to be lower than what is observed for the general population. Additionally, most managed-care plans have implemented elaborate utilization review programs to control the demand for and provision of services. On the other hand, evidence indicates that, from the standpoint of patients, prepaid coverage (especially when out-of-pocket expense is minimal or absent) results in a lower threshold for seeking care. One study found that overall visit rates for children enrolled in an HMO were about 20% higher and preventive visits were 40% higher than for those with the cost-sharing, fee-for-service plan, whereas hospital admission rates were about 17% lower for the HMO group.

Approximately 34% of all individuals with health insurance coverage are enrolled in managed-care plans. Visit rates to pediatricians may increase with an increase in enrollment of children in managed-care plans. Although adjustment factors to extrapolate from HMOs to the overall US population have been estimated, the features unique to managed-care organizations and their enrollees make it difficult to generalize from their use patterns to the general population. However, because the nation seems increasingly headed toward managed-care systems as the predominant mode of health services delivery, the experience of HMOs to date is of obvious importance.

CONCLUSION

This statement is intended to assist pediatricians, health care administrators, and policymakers in evaluating an area's or a population's demand for pediatricians; it is not meant to recommend an ideal number of children per pediatrician based on need. This statement provides a variety of numbers to work with, ranging from low ratios, reflecting the number of children currently in the health care system that can be seen realistically by pediatricians (see Table), to high ratios, reflecting the current use of pediatricians by the entire population younger than 21 years of age (see the models of Miller et al and Hicks and Glenn). In applying the models, it is important to keep in mind the several previously discussed factors that affect the ratio of children per pediatrician. Other factors that also must be considered when examining ratios are differences in physician productivity that may vary according to gender, personal characteristics or lifestyles, and geographic location. In addition, local differences in demand for pediatric services will vary according to child health status and use of services. Finally, universal access to health care and/or managed care would increase the demand for pediatric services. Limitations in available data prevent the ability of the models to be used for subspecialty care or for outpatient care provided in hospitals.

There is currently a lack of information examining ratios, quality of care, and health outcomes. Studies linking these three issues are greatly needed. Also needed are studies that focus on the appropriate number of children per pediatric subspecialist.

REFERENCES

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