Differences in Admission Rates of Children With Bronchiolitis by Pediatric and General Emergency Departments

David W. Johnson, MD*§; Carol Adair, PhD‡; Rollin Brant, PhD‡; Joanne Holmwood, BS; and Ian Mitchell, MB*

ABSTRACT. Objective. It is uncertain whether pediatric and general emergency departments have different admitting practices regarding children with bronchiolitis. The objective of this study was to quantify the differences in admission practices between pediatric and general emergency departments of children with bronchiolitis in 1 North American metropolitan area, controlling for various factors such as clinical severity, comorbid conditions, and socioeconomic status.


Setting. Five emergency departments (1 pediatric and 4 general) serving the Calgary Health Region, which encompasses ~850,000 people.

Patients. All children residing within the region who visited a regional emergency department and were diagnosed to have bronchiolitis (International Classification of Diseases, Ninth Revision code 466.1, primary or secondary diagnosis).


Results. The medical charts of 3091 children diagnosed to have bronchiolitis during the study period were reviewed. Of this number, 2496 children were evaluated at the pediatric emergency department, and 629 (25%) were admitted. The remaining 595 (19%) were evaluated at the general emergency departments, and 221 (37%) were admitted. Controlling for age, gender, estimated family income based on postal code, medical comorbidity, and clinical severity estimated by presenting respiratory rate and room air oxygen saturation, population-standardized estimates for admission rates at the pediatric and general emergency departments were 24% (standard error: 1%) and 43% (standard error: 2%), respectively.

Conclusion. Children diagnosed to have bronchiolitis at the Calgary Health Region’s pediatric emergency department were about half as likely to be admitted to the hospital as children diagnosed at the region’s general emergency departments. Pediatrics 2002;110(4). URL: http://www.pediatrics.org/cgi/content/full/110/4/e49; bronchiolitis, hospitalization rates, practice variation, emergency department.

ABBREVIATIONS. CHR, Calgary Health Region; ICD-9, International Classification of Diseases, Ninth Revision; CI, confidence interval.

Bronchiolitis is an extremely common childhood disease that accounts for a significant proportion of pediatric hospitalizations. Investigators, using the technique of small-area analysis, have found marked variations in hospitalization rates of children with bronchiolitis with reports of up to sixfold differences in rates per 100,000 children. This degree of variation is not unique to bronchiolitis, in that substantial variations in rates have been documented for a number of surgical procedures and diseases. Although controversy exists as to which factors, in general, are most responsible for the variability in medical practices, in most cases differences in health care access and socioeconomic factors account for at least some proportion of the variability. Likewise, in the case of bronchiolitis, McConnochie et al have shown that physician density, unemployment rate, and income are moderately to strongly correlated with hospitalization rates in New York State. When wide variations in hospitalization rates exist, some investigators think that, in general, the variability is primarily attributable to differences in physician practice. Although it seems likely that at least some proportion of the differences in hospitalization rates for bronchiolitis is attributable to differences in practice styles, no studies have been published on this topic. Furthermore, no studies have specifically explored whether there are differences between the admitting practices of pediatric and general emergency department medical staffs.

Establishing whether there are differences between pediatric and general emergency departments in admitting practices for common childhood illnesses is important for many reasons, but especially because of its implications for health care costs. Because, for example, hospitals that perform more coronary angioplasty procedures have been demonstrated to have better outcomes, it would be reasonable to expect that pediatric emergency physicians, who evaluate many more children with bronchiolitis than physicians who work in general emergency departments, would have less uncertainty about which children actually need admission and consequently would admit a smaller proportion of the children they evaluate.
Although it is reasonable to expect that institutions devoted to caring for children do yield some cost efficiencies, during the last decade public attention has been primarily focused on the high costs associated with operating children’s hospitals. This is because mounting financial pressures on children’s hospitals have resulted in numerous threatened closures and mergers. Two recent studies have suggested that much of the reason why children’s hospitals are in financial difficulty is because of the high costs associated with caring for children with chronic diseases.

We speculated that a comparative analysis of the health care services provided by pediatric and non-specialty hospitals—with adjustment for case mix—would demonstrate that Children’s hospitals are cost-efficient. Because hospitalization accounts for the majority of health care costs, we decided to address this broader question by focusing on hospitalization rates of children with bronchiolitis.

Therefore, the specific objective of our study was to quantify the differences in admission practices between pediatric and general hospital emergency departments of children with bronchiolitis in 1 North American metropolitan area, adjusting for various confounders such as clinical severity, comorbid conditions, and socioeconomic status.

METHODS

Design

Our study was that of a retrospective cohort design and was approved by the University of Calgary Conjoint Health Research Ethics Board. Initial patient information was downloaded from a database maintained by the Calgary Health Region (CHR) of all emergency department visits to CHR institutions, and additional data were abstracted by direct audit of medical charts. (The Alberta provincial government requires all Regional Health Authorities within the province to maintain and submit electronic information summarizing all emergency department visits).

Setting and Patients

Our study population was drawn from those children who resided within the CHR (as determined by the residential postal code). The CHR encompasses a discrete geographic area that contains the city of Calgary and surrounding bedroom communities and had a total population of ~850,000 people at the end of the study period. Because the area surrounding the CHR is sparsely populated, virtually all medical care received by CHR residents is obtained within the Region. (For example, in 1998, 93% of all emergency department visits to Alberta hospitals for bronchiolitis by CHR residents were to CHR emergency departments (Alberta Health & Wellness data.).

One pediatric and 4 general emergency departments were operational at the following hospitals during the study period (April 1, 1992, to March 31, 1997): the Alberta Children’s Hospital, the Peter Lougheed Hospital, the Rockyview Hospital, the Bow Valley Hospital, and the Foothills Hospital. (A sixth emergency department, located in Holy Cross Hospital, closed in October 1994. During the part of the study period it was open, this emergency department evaluated and diagnosed 6 children to have bronchiolitis. These children’s medical charts were not available for review, and therefore have not been included in our results.)

During the 5-year study period, the 5 emergency departments evaluated between 68,964 and 77,447 visits per year by children younger than 18 years, with the pediatric emergency department at the Alberta Children’s Hospital accounting for just over 50% of these visits. Two community hospitals, Peter Lougheed Hospital and Rockyview Hospital, accounted for 30% to 40% of the pediatric visits. For most of the study period, each had pediatric hospital beds to which their respective emergency department staff could admit children. Although the 2 tertiary/quaternary care adult hospitals, Foothills Hospital and Bow Valley Hospital, accounted for 10% to 20% of pediatric visits, most were by older children or adolescents. Neither of these institutions had pediatric hospital beds.

Children were included in our study if they resided within the CHR, attended 1 of the CHR emergency departments during the 5-year study period, and were assigned an ICD-9 code 466.1 (bronchiolitis). All children who were treated at CHR institutions, but who resided outside the CHR, were excluded.

Data Accuracy

To assess whether our reliance on ICD-9 coding had introduced a bias into our study, we examined whether health record analysts coded charts in the same way at each of the hospitals. We did this first by assessing whether all charts that were assigned an ICD-9 code of 466.1 met a predefined definition of bronchiolitis. (A child was considered to have bronchiolitis if the emergency physician wrote as the discharge diagnosis on the chart the specific term “bronchiolitis,” or if wheezing was noted on physical examination, the child was <2 years of age, and had either no previous history of wheezing or a nasopharyngeal aspirate that was positive for respiratory syncytial virus.) Second, to determine how many cases of bronchiolitis were misclassified by Health Records Analysts as another disease, we reviewed approximately 100 randomly selected charts from each hospital (except for Foothills Hospital, which had very few visits by young children) that had a discharge diagnosis of a respiratory disease similar to bronchiolitis (e.g., ICD-9 code 493, which is the code for asthma). The same definition of bronchiolitis was used for this review.

To assess whether study data were consistently abstracted from medical charts, the principal investigator and the 2 record analysts independently reviewed 30 charts selected at random, and then compared results.

To ensure that emergency department visits or hospitalizations to different institutions were not by the same child, we reviewed all visits and hospitalizations for children with the same date of birth and gender to determine whether they were in fact the same child. All visits or hospitalizations occurring within 7 days of each other by the same child were assumed to be attributable to the same disease episode. Transfers from one emergency department to another emergency department that resulted in a hospitalization were considered to be an admission from the initial emergency department. For those visits that resulted in the patient being discharged from the hospital, all but the initial emergency department visit were considered to be return visits.

Statistical Methods

For the primary analysis, we used a multiple logistic model with hospital disposition (admit vs discharge home) as the depen-
dent variable and emergency department visited (pediatric vs general) as the independent variable of interest (S-Plus 5.1 for Unix; Insightful Corporation, Seattle, WA). In carrying out the multiple logistic analyses, we used the modeling strategy advocated by Kleinbaum.\textsuperscript{34} Specifically, variables were chosen first based on clinical plausibility. Second, the chosen variables were assessed as to whether significant interaction existed. And last, after all confounding variables were included in the model, any remaining variables were excluded if doing so improved precision.

The following controlling variables were evaluated in our multiple logistic model: age (months), gender, estimated family income (Canadian dollars [$] per year), time of day of visit (hour), year of visit, medical comorbidity (classified as none, congenital heart disease, prematurity, or “other”), room air oxygen saturation (%), and respiratory rate (breaths per minute). We included “the year of emergency department visit” given the substantial changes that occurred in the CHR during the study period (eg, reduction in total health care spending, closures of health care facilities, rapid population growth). We also explored whether “the time of day” the child was assessed was an important variable, because one of the community emergency departments did not have 24-hour coverage during the study period. We purposely did not explore whether the types or amounts of drug therapy provided were important explanatory variables because of the lack of consistent evidence for both a clear-cut and sustained benefit from bronchodilators or corticosteroids.\textsuperscript{35-43} (We have, however, reported on institutional differences in the types of treatment provided.)

Apparent nonlinear behavior in the continuous variables was accommodated through the use of polynomial splines.\textsuperscript{44} Subjects with incomplete data were included in the analysis using multiple imputation.\textsuperscript{45} Because odds ratios do not accurately reflect relative rates for dichotomous events that are common—which is the case for hospitalization rates—we chose to report our primary outcome in the form of population standardized estimates.\textsuperscript{46}

Regarding other comparative analyses, dichotomous variables were analyzed by Fisher exact test. Continuous variables were first plotted to assess for normal distribution, and then analyzed by the two-tailed test or by the Mann-Whitney U test, as appropriate. All statistical tests were 2-tailed.

RESULTS

There were a total of 3109 emergency department visits to a CHR institution between April 1, 1992, and March 31, 1997, that were assigned a discharge diagnosis of bronchiolitis (ICD-9 code 466.1). Of these, 18 charts (11 from the pediatric emergency department and 7 from the general emergency departments) were not available for audit, and were excluded from our analysis. The charts from the remaining 3091 visits by children were audited and are included in our analysis. A total of 850 of these children (28%) were admitted to hospital for further observation and treatment. The pediatric emergency department evaluated 81% (2496/3091) of the CHR visits; 25% (629/2496) of these children were admitted. The 4 general emergency departments evaluated the remaining 19% (595/3091) of visits; 37% (221/595) of these children were admitted. Only 10 of the 850 admissions involved a transfer from one hospital to another. The characteristics of the patients evaluated at the pediatric and general emergency departments are detailed in Table 1.

<table>
<thead>
<tr>
<th>TABLE 1. Patient Characteristics</th>
<th>Pediatric Emergency Department</th>
<th>General Emergency Departments</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (mo)* ( (3091/3091[100%])^\dagger )</td>
<td>5.7 (3.1–10.0)</td>
<td>7.6 (4.2–13.7)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>(3091/3091 [100%])$^\dagger$</td>
<td>Gender (% male)</td>
<td>60%</td>
<td>60%</td>
</tr>
<tr>
<td>Annual estimated family income based on postal code* ( (2893/3091 [94%])^\dagger )</td>
<td>$55,913</td>
<td>$49,171</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>($49,171–$72,309)</td>
<td>($46,634–$55,303)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cases with complete data (%)</td>
<td>95%</td>
<td>89%</td>
<td>.012</td>
</tr>
<tr>
<td>Medical comorbidity ( (3091/3091 [100%])^\dagger )</td>
<td>Congenital heart disease ( (n, %) )</td>
<td>(25, 0.8%)</td>
<td>(0, 0%)</td>
</tr>
<tr>
<td>Premature ( (n, %) )</td>
<td>(156, 6.3%)</td>
<td>(30, 5.0%)</td>
<td></td>
</tr>
<tr>
<td>Other ( (n, %) )</td>
<td>(21, 0.8%)</td>
<td>(4, 0.7%)</td>
<td></td>
</tr>
<tr>
<td>Two or more categories ( (n, %) )</td>
<td>(64, 2.6%)</td>
<td>(9, 1.5%)</td>
<td></td>
</tr>
<tr>
<td>Respiratory rate* ( (breaths per minute) ) ( (3024/3091 [98%]) )</td>
<td>51 (42–60)</td>
<td>48 (38–59)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Cases with complete data (%)</td>
<td>98%</td>
<td>96%</td>
<td></td>
</tr>
<tr>
<td>Oxygen saturation* (%) ( (2460/3091 [80%])^\dagger )</td>
<td>94 (91–96)</td>
<td>94 (92–96)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Cases with complete data (%)</td>
<td>81%</td>
<td>75%</td>
<td></td>
</tr>
</tbody>
</table>

* Median (25th–75th percentile).
† Number of cases with complete data/total number of cases (percentage of cases for which data is complete).

Data Completeness and Accuracy

Of the 3091 cases included in our analysis, 72% (2235/3091) had data for all 10 variables that we entered into our multiple logistic regression model. Approximately 3% (996/30910) of all data elements were missing. The distribution of missing data between the pediatric and general emergency departments is detailed in Table 1. The variable with the most missing data were “oxygen saturation,” in which 20% of cases were not documented in the medical chart (and presumably not done). The majority (329/631) of children missing “oxygen saturation” values had low respiratory rates (40 breaths per minute or less).

Of the 3091 charts coded as having a discharge diagnosis of bronchiolitis (ICD-9 code 466.1), 3054 cases (99%) met our definition. There were no significant differences between institutions. We reviewed 377 charts that were randomly selected from the 3, 210 patients that had a discharge diagnosis that potentially should have been coded as bronchiolitis (including codes ICD-9 466.0 [acute bronchiitis];
Continuous and multicategorical variables were reduced to 2 categories based on clinical plausibility. ED indicates emergency department; PED, pediatric emergency department; GED, general emergency department.

DIFFERENCES IN ADMITTING PRACTICES FOR BRONCHIOLITIS

Bivariate Associations Between Each of the Potential Confounding Variables, the Independent Variable (Emergency Department Type), and the Dependent Variable (Patient Disposition)

Hospitalization Rates (Unadjusted and Adjusted Analysis)

The unadjusted relative risk for hospitalization after a visit to the pediatric emergency department as compared with one of the general emergency departments was 0.63 (95% confidence interval [CI]: 0.56–0.71). The bivariate associations between the type of emergency department (pediatric vs general), hospital disposition (admit vs discharge home), and each of the potential confounding variables are shown in Table 2. In other words, Table 2 shows the strength and direction of the relationship that the independent (emergency department type) and dependent (patient disposition) variables have with each of the potential confounding variables. For example, families with a lower estimated annual income were more than twice (2.44) as likely to visit a general emergency department than families with a higher estimated annual income, and children who had an oxygen saturation at presentation of <90% were >6 times (6.08) as likely to be admitted to hospital than those children presenting with an saturation of >90%. A multiple logistic model including the following variables—age, gender, mean income based on postal code, year of assessment, medical comorbidity, respiratory rate, and oxygen saturation on room air—yielded an odds ratio of 0.28 (95% CI: 0.22–0.36; P < .001). (All variables initially hypothesized to be clinically important were included except for the variable “time of day assessed.”) The Hosmer-Lemeshow goodness-of-fit for this model was good (P = .50).

Our multiple logistic model yielded population standardized estimates for the pediatric and general emergency departments of 24% (standard error: 1%) and 43% (standard error: 2%), respectively (P < .001). These results suggest that if all 3091 patients had been evaluated at the pediatric emergency department, then 742 would have been admitted (108 fewer than actually occurred); whereas if all 3091 patients had been evaluated at the general emergency departments, then 1329 (43%) would have been admitted to hospital (479 more than actually occurred).

Drug Therapy

A smaller proportion of children evaluated in the pediatric emergency department were administered bronchodilators both during their assessment (1342/2496, 54% vs 422/589, 72%; P < .001) and at discharge (498/1867, 27% vs 131/374, 35%; P = .001) than in the general emergency departments, whereas a slightly larger proportion of children evaluated at the pediatric emergency department were administered corticosteroids during their assessment (191/2496, 8% vs 26/589, 5%; P = .005) and at discharge (49/1867, 3% vs 6/374, 2%; P = .36) than in the general emergency departments.

Table 2. Bivariate Associations Between Each of the Potential Confounding Variables, the Independent Variable (Emergency Department Type), and the Dependent Variable (Patient Disposition)

<table>
<thead>
<tr>
<th>Type of ED (General ED Versus Pediatric ED)</th>
<th>Potential Confounding Variables*</th>
<th>Relative Risk (95% CI)</th>
<th>Type of ED Associated With Increased Risk</th>
<th>Disposition From ED (Hospitalization Versus Discharge Home)</th>
<th>Potential Confounding Variables*</th>
<th>Relative Risk (95% CI)</th>
<th>Disposition Associated With Increased Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Younger age (&lt;6 mo vs ≥6 mo)</td>
<td></td>
<td>1.47 (1.28–1.72)</td>
<td>PED</td>
<td>Hospitalization</td>
<td>Younger age (&lt;6 mo vs ≥6 mo)</td>
<td>1.35 (1.26–1.45)</td>
<td>Hospitalization</td>
</tr>
<tr>
<td>Male gender</td>
<td></td>
<td>1.00 (0.83–1.20)</td>
<td>Neutral</td>
<td>Hospitalization</td>
<td>Male gender</td>
<td>1.01 (0.94–1.08)</td>
<td>Hospitalization</td>
</tr>
<tr>
<td>Lower estimated annual family income (&lt;median vs ≥median)</td>
<td>2.44 (2.08–2.86)</td>
<td>PED</td>
<td>GED</td>
<td>Hospitalization</td>
<td>Lower estimated annual family income (&lt;median vs ≥median)</td>
<td>1.13 (1.04–1.21)</td>
<td>Hospitalization</td>
</tr>
<tr>
<td>Later assessment year (≥Apr 1, 1995 vs &lt;Mar 31, 1995)</td>
<td>1.43 (1.23–1.64)</td>
<td>PED</td>
<td>Hospitalization</td>
<td>Hospitalization</td>
<td>Later assessment year (≥Apr 1, 1995 vs &lt;Mar 31, 1995)</td>
<td>1.09 (0.99–1.20)</td>
<td>Hospitalization</td>
</tr>
<tr>
<td>Evening/night assessment time (6 PM–6 AM vs 6 AM–6 PM)</td>
<td>1.41 (1.22–1.64)</td>
<td>GED</td>
<td>Hospitalization</td>
<td>Hospitalization</td>
<td>Evening/night assessment time (6 PM–6 AM vs 6 AM–6 PM)</td>
<td>1.12 (0.95–1.33)</td>
<td>Discharge Home</td>
</tr>
<tr>
<td>Presence of medical comorbidity</td>
<td>1.43 (1.08–1.84)</td>
<td>PED</td>
<td>Hospitalization</td>
<td>Hospitalization</td>
<td>Presence of medical comorbidity</td>
<td>1.22 (1.18–1.27)</td>
<td>Hospitalization</td>
</tr>
<tr>
<td>Higher respiratory rate (&lt;60 vs ≥60 breaths per min)</td>
<td>1.23 (1.03–1.47)</td>
<td>PED</td>
<td>Hospitalization</td>
<td>Hospitalization</td>
<td>Higher respiratory rate (&lt;60 vs ≥60 breaths per min)</td>
<td>1.43 (1.33–1.52)</td>
<td>Hospitalization</td>
</tr>
<tr>
<td>Lower oxygen saturation (&lt;90% vs ≥90%)</td>
<td>1.18 (0.95–1.45)</td>
<td>PED</td>
<td>Hospitalization</td>
<td>Hospitalization</td>
<td>Lower oxygen saturation (&lt;90% vs ≥90%)</td>
<td>6.08 (5.14–7.19)</td>
<td>Hospitalization</td>
</tr>
</tbody>
</table>

ED indicates emergency department; PED, pediatric emergency department; GED, general emergency department.
* Continuous and multicategorical variables were reduced to 2 categories based on clinical plausibility.
Return for Medical Care

A significantly larger proportion of children evaluated and discharged from the hospital from the pediatric emergency department returned to an emergency department for repeat evaluation within 7 days of the initial evaluation than the proportion of children evaluated at the general emergency departments that returned (225/1867, 12% vs 23/374, 6%; \( P = .001 \)). In addition, a larger proportion of patients initially discharged from the pediatric emergency department returned and were admitted to hospital within 7 days than those evaluated at the general emergency departments (75/1867, 4.0% vs 12/374, 3.2%); however, this difference was not statistically significant (\( P = .56 \)). None of the patients who returned either died or were thought to be in sufficient distress to be admitted to an intensive care unit.

DISCUSSION

We found that, with adjustment for case-mix (patient demographics, medical comorbidity, and clinical severity), physicians working at the Alberta Children’s Hospital Emergency Department admitted approximately half as many children diagnosed with bronchiolitis as physicians working at the CHR general emergency departments. Likely as a result, at least in part, of this lower admission rate, children discharged from the Alberta Children’s Hospital Emergency Department were more likely to return for repeat evaluation than children discharged from the Regional general emergency departments. Although we do not know how parents weighed these differences in practice patterns, we did not identify any significant morbidity or mortality that occurred as a result.

Our study is the first published to our knowledge that explores whether hospitalization rates for children with bronchiolitis vary, at least in part, because of physician practice styles, and more specifically, whether pediatric and general emergency departments have different admitting practices. Several studies have been published, however, that examine differences between pediatric and general emergency departments in the management of bronchiolitis and, as well, several other diseases.47–53 Although several studies used surveys to assess opinions regarding various management strategies,47–49 some also used a retrospective methodology to establish actual differences in practice patterns between pediatric and general emergency physicians.50–53

In general, retrospective studies are thought to provide poorer quality data than that obtained from a prospective study design. In this particular case, however, we think that our study design, which combined the use of both a secondary electronic database and medical chart audit, has yielded the most accurate answer possible. There are several reasons why this is the case. First, selection bias—the bias that results from examining a study population that is not broadly representative of the entire population—is unlikely. This is because our study population likely represents virtually all emergency department visits by children residing within the Calgary Region for bronchiolitis. Second, significant confounding of our results is also unlikely given that we were able to adequately control for most potential confounding variables. Numerous studies of children with bronchiolitis have established that several comorbid conditions (prematurity, chronic lung disease, congenital heart disease, and immunodeficiencies) and clinical parameters (presenting oxygen saturation on room air) accurately predict the severity of clinical disease.25,26,29–33 Furthermore, these comorbid conditions and clinical parameters are consistently documented in medical charts and can be reliably abstracted. Other studies have shown that family income is an important predictor of hospital utilization rates, and that individual family socioeconomic status can be reliably inferred from aggregate family socioeconomic status based on postal code.4,23,53–58 Third, information bias—the bias that occurs in assessing the association between exposure and outcome as a result of error in measurements—is not an issue given that both the “exposure” (the emergency department visited) and the “outcome” (hospital admission versus discharge) are unequivocal. In contrast, a prospective study design, by virtue of the fact that study participants frequently modify their behavior when they know they are being observed, could easily produce a significant bias unless emergency physicians were kept completely unaware of the study question.

Can we generalize our findings in Calgary to other North American cities? There are several potential reasons why this may not be the case. First, the vast majority (81%) of CHR children diagnosed with bronchiolitis during the study period were evaluated at the pediatric emergency department, whereas the remaining small proportion of children (19%) was split among the 4 general emergency departments. Given the small number of children diagnosed with bronchiolitis at each general emergency department, it is not surprising that physicians who work in these institutions err on the side of caution and admit more readily. Although many other North American cities have a similar skewing of emergency visits by children to pediatric facilities, some urban general emergency departments, however, do see large volumes of young children. Given more experience, general emergency physicians may have admission rates similar to our pediatric emergency physicians. Second, given the radical difference in how Canadian and American health care are financed, it is quite possible that different financial incentives may result in different physician practices.

Our study has several limitations that are important to discuss. First, the general emergency department that evaluates the largest number of children in the CHR serves a community in which ~10% of families speak limited English. Although adjustment for estimated family income may have indirectly adjusted for this factor (English as a second language), we cannot be certain to what extent it did so. Therefore, this factor possibly was responsible, to some degree, for the higher admission rates by the general emergency departments.
A second limitation is that we were unable to evaluate whether physicians at each of the emergency departments used the same criteria for diagnosing bronchiolitis. Only a small proportion of children had viral testing performed, and children’s past history of wheezing were often inadequately documented in the medical chart. Consequently, in most cases, we had to take physicians’ diagnoses of bronchiolitis at face value. Although we think it is unlikely that differences in diagnostic criteria used by physicians accounts for the marked difference in hospitalization rates, we cannot be certain.

A third potential limitation of our study is that we were unable to assess the impact of the different practice patterns—a lower rate of hospitalizations and a higher rate of return visits at the pediatric emergency department—on the families themselves. We cannot be certain how, on average, families whose child had a marginal indication for admission would have viewed admission to hospital versus staying at home. In general, because hospitalizations are known to have a significant psychological impact on children and, as well, result in significant adverse events, we would expect that, for most parents, being discharged from the hospital would be most desirable. However, research on other topics comparing physician and parental weighing of alternatives has demonstrated significant differences. Therefore, some authors have suggested it is important to directly assess parents’ preferences regarding admission to hospital in a case such as this where there are marginal medical indications.

A fourth limitation is that because our study was not designed to formally determine health care costs, we cannot precisely compare the relative cost-efficiencies of pediatric versus general emergency departments for the treatment of bronchiolitis. Nonetheless, based on a previously published Canadian study by Langley et al. that found that the small proportion of patients with respiratory syncytial virus who are hospitalized (0.7% of all diagnosed patients) account for 62% of all direct (payer) health care expenditures for children with respiratory syncytial virus, our data strongly suggests that the health care costs per patient generated from assessments at the pediatric emergency department would have been qualitatively less than the costs per patient generated from assessments at the general emergency departments.

Our results—that physicians who work at the Alberta Children’s Hospital Emergency Department admit substantially fewer children diagnosed to have bronchiolitis than physicians who work at the CHR general emergency departments—are consistent with the hypothesis that greater experience and expertise yield overall cost efficiencies. And more to the point, our results, placed in the context of previous research, provide an example of how children’s hospitals and emergency departments may yield cost savings for the health care system.

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Differences in Admission Rates of Children With Bronchiolitis by Pediatric and General Emergency Departments

David W. Johnson, Carol Adair, Rollin Brant, Joanne Holmwood and Ian Mitchell

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