Duration of Illness in Ambulatory Children Diagnosed With Bronchiolitis

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Objectives: To measure the duration of illness in ambulatory children diagnosed with bronchiolitis and to examine clinical predictors of duration of illness.

Design: Validation inception cohort study. Duration of follow up was 28 days.

Setting: A primary-level ambulatory department of a public sector children's hospital in Cape Town, South Africa.

Patients: One hundred eighty-one children aged 2 to 23 months who went to the hospital as their first contact for that episode of illness, and had a clinical diagnosis of bronchiolitis were enrolled consecutively on weekday mornings if their guardian stated that they were contactable by telephone.

Main Outcome Measure: Resolution of symptoms, as judged by the guardian, measured by twice-weekly telephone interviews.

Results: Median duration of illness (calculated as the reported duration of symptoms before initial hospital visit plus the time from first consultation to recovery) was 12 days (95% confidence interval, 11-14 days). After 21 days, 18% were still ill and after 28 days, 9% were still ill. Sixty-two patients (34.2%) had unscheduled consultations within 28 days, a median of 13 days after the first consultation. There was no association of duration of illness with age, sex, z score for weight for age, or respiratory rate.

Conclusions: Ambulatory children diagnosed with bronchiolitis recover with few complications, but the resolution of symptoms may take several weeks. Providing parents with this information could help reduce the high rate of unscheduled return visits as observed in this cohort.


The long-term prognosis of children with bronchiolitis has been studied1-3 but little is known about the duration of the acute illness. It is important for clinicians to know the typical course of bronchiolitis when entertaining alternative diagnoses. Parents, too, need to know when to expect their child’s recovery, as unfulfilled expectations of rapid recovery are likely to cause anxiety and discouragement.

Standard pediatric textbooks offer contradictory information on the issue: “Recovery is complete in a few days”4; “full recovery may take about 2 weeks”5; “wheezing and hypoxia may last for as long as 3 or 4 weeks.”6 The duration of hospitalization for bronchiolitis has been reported from clinical trials,7-9 but this information is of questionable generalizability because of highly select groups of hospitalized patients and variations among hospitals’ management practices. Furthermore, hospital discharge does not imply full recovery. We were unable to identify any reports on duration of illness or time to recovery in bronchiolitis.

This report describes the course of illness in bronchiolitis in ambulatory children and assesses the potential predictors of duration of illness.

Of 512 patients younger than 2 years who were eligible for the trial, 258 (50.4%) were diagnosed with bronchiolitis. Upper respiratory tract infection was diagnosed in 75 patients (14.6%), pneumonia in 62 patients (12.1%), nonspecific lower respiratory tract conditions in 49 patients (9.6%), recurrent wheeze or asthma in 25 patients (4.9%), other diagnoses in 20 patients (3.9%), and no diagnosis was recorded in 23 patients (4.5%). Of those with a diagnosis of bronchiolitis, follow-up was attempted for the 181 patients (70.2%) whose guardians stated that they were con-
SUBJECTS AND METHODS

The study was conducted in the general outpatients department of the Red Cross Children’s Hospital, Cape Town, South Africa. At the time of the study, this department provided a 24-hour walk-in service. As part of a randomized controlled trial of chest radiography in acute lower respiratory tract infections in children,10 a trained professional nurse screened all waiting patients on weekday mornings. From September 12, 1995, to September 12, 1996, she identified children aged 2 to 23 months whose visit to the hospital was seen as their first contact for that episode of illness with cough plus tachypnea, but without poor drinking, chest indrawing, cyanosis, abnormal level of consciousness, or stridor. The inclusion criteria were those of the World Health Organization for lower respiratory tract infections to be treated at home. Tachypnea was defined according to World Health Organization criteria as a respiratory rate of 50 breaths or more per minute in children aged 2 to 11 months, and 40 breaths or more per minute in children aged 12 months or older.11 The nurse assessed the exclusion criteria by interviewing the guardian and examining the child. Children meeting the case definition were included in this study if they received a diagnosis of bronchiolitis and if the guardian stated that they were contactable by telephone. All eligible children were enrolled, whether or not they were eventually entered into the trial. The diagnosis of bronchiolitis was made on clinical grounds (with or without the use of chest radiography) by 1 of 52 physicians working in the general outpatient department of the hospital. The median (25th-75th percentile) time spent working in the outpatient department was 12 months (range, 1-38 months) and time since registration as a medical practitioner was 5 years (range, 2-17.5 years). Seventeen practitioners (33%) possessed a postgraduate pediatric qualification; 3 practitioners (10%) were specialist pediatricians. No diagnostic criteria for bronchiolitis were prescribed, so as not to interfere with usual clinical practice in the trial. The data-capture form completed by the clinicians listed explicit options for diagnosis, including “recurrent wheeze” and “pneumonia.” Viral culture tests and antigen detection were not performed. In another survey of children younger than 2 years admitted to the same hospital with a diagnosis of a lower respiratory tract infection (performed during a period similar to our study period of 1995-1996), 16.4% of the children had respiratory syncytial virus infection detected by enzyme immunoassay. There was no difference in detection rates according to diagnosis (bronchiolitis, pneumonia, laryngotracheitis, or other illness).12

Resolution of symptoms and use of health services other than those available at Red Cross Children’s Hospital were measured by twice-weekly structured telephone interviews until recovery (as judged by the guardian), or for 28 days after enrollment. A single interviewer conducted the interviews. A participant was regarded as lost to follow-up after 3 consecutive unsuccessful attempts to establish contact at suitable times during a period of at least 2 days. Respondents were asked, “Is [child’s name] completely well yet?” If the answer was “yes,” the next question was, “on what day was he or she last sick?” The duration of the illness was taken as the reported duration of symptoms before enrollment, plus the time to recovery after enrollment. Potential predictors of the duration of illness (respiratory rate, age, sex, and z score for weight for age) were assessed using the Cox proportional hazards regression model. Use of services at Red Cross Children’s Hospital was measured from hospital records. Categorical data were compared using the uncorrected chi-square analysis or Fisher exact tests. A 2-tailed α level of .05 was regarded as significant.

Written informed consent for inclusion into the study was obtained from the guardian. All physicians gave verbal consent to participation. The study was approved by the Ethics and Research Committee of the University of Cape Town.

tactable by telephone. Three of the 181 patients were enrolled during the 17 days of the clinical trial that overran a completed year. A summary of the clinical characteristics of the children is included in the Table. Chest radiographs were performed in 82 patients. Routine radiologists’ reports revealed normal results in 13 patients (15.8%), showed abnormalities consistent with bronchiolitis in 64 patients (78.0%), and reported pneumonia in 5 patients (6.1%). One hundred forty (77.3%) of 181 guardians were successfully contacted. Of the 140 children contacted, 125 were followed up to recovery, 8 remained ill 28 days after enrollment, and 7 were lost to follow-up before their recovery. Complete follow-up was thus achieved in 133 (73.5%) of the 181 patients for whom it was attempted. No deaths were reported. The 95% confidence interval (CI) for the estimate of any serious event not recorded in this sample is 0% to 2.6%.

There was no significant difference in the duration of illness in patients being treated with and without chest radiography (P = .25 using the log-rank test). Both groups were thus analyzed together. The survival curve for the time from the onset of symptoms to recovery is shown in the Figure. The median duration of illness was 12 days (95% CI, 11-14 days). Thirty-nine percent of the patients were still ill after 14 days of having symptoms, 18% after 21 days, and 9% after 28 days. Symptoms present in the 11 children not completely well at 28 days after the onset of illness included cough in 9 children (81.8%), noisy breathing in 7 (63.6%), and fever in 3 (27.3%). There was no association between duration of illness and age, sex, z score for weight for age, or respiratory rate.

Four patients (2.2%) were admitted to the hospital at the first consultation because of the severity of illness as assessed by the clinician. Nine children (5.0%) were admitted at a subsequent consultation within 28 days of enrollment. Sixty-two patients (34.2%) had a total of 82 subsequent unscheduled consultations within 28 days; 50 patients visited the Children’s Hospital (60 visits); and 18 patients (including 6 who also visited the hospital) visited other health facilities such as primary care clinics and private physicians (22 visits). The median time from the enrollment consultation to the first unscheduled visit was 13 days (16 days from the onset of symptoms).

The 177 children discharged to their homes were prescribed an average of 3.2 drugs. Eighty-five patients prescribed, so as not to interfere with usual clinical practice in the trial. The data-capture form completed by the clinicians listed explicit options for diagnosis, including “recurrent wheeze” and “pneumonia.” Viral culture tests and antigen detection were not performed. In another survey of children younger than 2 years admitted to the same hospital with a diagnosis of a lower respiratory tract infection (performed during a period similar to our study period of 1995-1996), 16.4% of the children had respiratory syncytial virus infection detected by enzyme immunoassay. There was no difference in detection rates according to diagnosis (bronchiolitis, pneumonia, laryngotracheitis, or other illness).12

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Table. Clinical Characteristics of 181 Children Aged 2-23 Months Enrolled in the Study

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Number of Patients</th>
<th>Clinical Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-11 months</td>
<td>117</td>
<td>Cough in 96 (81.8%)</td>
</tr>
<tr>
<td>12-23 months</td>
<td>64</td>
<td>Cough in 59 (92.1%)</td>
</tr>
</tbody>
</table>

Figure. Survival curve for the time from the onset of symptoms to recovery.

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### Comparison of Baseline Characteristics, Management, and Subsequent Outcome of Children With and Without Telephones

<table>
<thead>
<tr>
<th></th>
<th>Children With Telephones (n = 181)</th>
<th>Children Without Telephones (n = 77)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Baseline characteristics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median respiratory rate per minute (interquartile range)</td>
<td>60 (54-63)</td>
<td>62 (56-70)</td>
<td>.01</td>
</tr>
<tr>
<td>Males</td>
<td>93 (51.4)</td>
<td>47 (61.0)</td>
<td>.15</td>
</tr>
<tr>
<td>Median age, mo (interquartile range)</td>
<td>6.0 (3.8-9.9)</td>
<td>5.7 (3.3-10.8)</td>
<td>.63</td>
</tr>
<tr>
<td>Mean z score for weight for age (SD)</td>
<td>0.2 (1.08)</td>
<td>0.0 (1.13)</td>
<td>.42</td>
</tr>
<tr>
<td>Median duration of symptoms before enrollment (interquartile range)</td>
<td>4 (2-6)</td>
<td>3 (2.0-6.5)</td>
<td>.59</td>
</tr>
<tr>
<td>Physicians’ perceived need for chest radiograph†</td>
<td>22 (13.0)</td>
<td>8 (11.4)</td>
<td>.74</td>
</tr>
<tr>
<td>Chest radiographs performed</td>
<td>80 (44.2)</td>
<td>36 (46.8)</td>
<td>.71</td>
</tr>
<tr>
<td><strong>Management</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional tests ordered‡</td>
<td>5 (2.8)</td>
<td>7 (9.1)</td>
<td>.05</td>
</tr>
<tr>
<td>Mean No. of drugs per prescription (SD)‡</td>
<td>3.2 (0.87)</td>
<td>3.2 (0.88)</td>
<td>.93</td>
</tr>
<tr>
<td>Antibiotic use‡</td>
<td>83 (46.9)</td>
<td>34 (44.2)</td>
<td>.69</td>
</tr>
<tr>
<td>Admission at first consultation</td>
<td>4 (2.2)</td>
<td>0 (0)</td>
<td>.32</td>
</tr>
<tr>
<td>Follow-up appointments within 28 days‡</td>
<td>8 (4.5)</td>
<td>5 (6.5)</td>
<td>.54</td>
</tr>
<tr>
<td><strong>Outcome</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unscheduled visits to hospital within 28 d</td>
<td>50 (27.6)</td>
<td>20 (25.9)</td>
<td>.79</td>
</tr>
<tr>
<td>Subsequent admissions within 28 d</td>
<td>9 (5.0)</td>
<td>5 (6.5)</td>
<td>.76</td>
</tr>
<tr>
<td>Subsequent chest radiographs within 28 d</td>
<td>10 (5.5)</td>
<td>7 (9.1)</td>
<td>.29</td>
</tr>
</tbody>
</table>

*All values are number of children (percentage), unless otherwise indicated.
†Data are missing for 12 children with and 7 children without a telephone.
‡Data are excluding 4 study patients admitted at first consultation.

Of the 15 variables assessed with respect to baseline characteristics, treatment, and subsequent use of the Children’s Hospital, patients stated to be contactable by telephone differed significantly from those who were not in 2 of the variables (respiratory rate and number of diagnostic tests ordered) (Table).

### Comment

This is the first report, to our knowledge, on duration of illness and parental health-seeking behavior during bronchiolitis. The children in this ambulatory sample recovered with few complications, but resolution of symptoms took longer than 14 days in approximately 40% of patients. A large proportion of subjects thus took longer to recover than the “few days” or “about 2 weeks” described in standard pediatric textbooks. The sample is too small to provide precise information on rare serious outcomes.

Although the study was performed at a teaching hospital, the sample is likely to represent ambulatory children with bronchiolitis attending a primary health care facility, as only unreferral children with mild to moderate disease were studied. Another survey performed around the time of this study found that 85% of unreferral children seen in the general outpatient department of the hospital could have been seen more appropriately at a community health center.

No objective or explicit criteria were used to judge recovery, since recovery is appropriately a parent’s decision. It is possible that some children both recovered and then became ill again in the 2 or 3 days between telephone calls. This would have resulted in an overestimate of duration of illness, but given the short duration between calls, seems unlikely to have meaningfully affected the findings.

A potential limitation of the study is that no diagnostic criteria for bronchiolitis were specified. Bronchiolitis is generally viewed as a clinical diagnosis and this sample represents bronchiolitis as diagnosed by a large number of physicians with a wide range of training and clinical experiences. “Recurrent wheeze” was an alternative diagnosis on the data-capture form completed by clinicians, so asthma and other chronic lung diseases were largely excluded from the sample. The lack of association of duration of illness with the clinical variables we assessed (respiratory rate, age, weight for age, and sex) provides limited evidence that the natural history of bronchiolitis may not vary greatly with differences in case definition. We thus suggest that these data are applicable to ambulatory children with a clinical diagnosis of bronchiolitis. This is not necessarily a description of duration of illness seen in respiratory syncytial virus infection because causative viruses were not identified.

Patients’ whose guardians stated that they were contactable by telephone were similar to those who did not with respect to baseline characteristics, treatment, and...
hospital-based outcome. The 2 statistically significant differences between groups could have resulted from the large number of hypothesis tests performed in the comparison. The difference least likely to be due to chance \((P = .01)\) was in respiratory rates of 60 breaths and 62 breaths per minute, which is not a clinically meaningful difference. The children in this study thus seem to be broadly representative of children with a diagnosis of bronchiolitis who are ill enough to be brought for medical attention, but well enough to be treated at home thereafter.

Almost 40% of children made subsequent unscheduled visits for health care within 28 days. The relatively long delay from initial consultation to return visit (median delay, 13 days) and the low admission rate (9.3% of visits) suggests that the bulk of visits were because of slow recovery rather than acute deterioration. The usual practice in the department at the time of the study was to inform parents that recovery could take up to 2 weeks. This advice was unduly optimistic. Counseling parents to expect a longer duration of illness with gradual improvement, could reduce anxiety and the high rate of return visits.

It is concluded that ambulatory children diagnosed with bronchiolitis recover with few complications, but the resolution of symptoms may take several weeks. This information is important in counseling parents and could help reduce the high rate of unscheduled return visits observed in this cohort. Age, weight for age, sex, and respiratory rate are not clinically useful predictors of time to recovery. These findings should be confirmed using more specific diagnostic criteria and assessing a greater number of clinical predictors of duration of illness.

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