LDH Levels May Predict Bronchiolitis Severity

BY MIRIAM E. TUCKER

FROM THE ANNUAL MEETING OF THE SOCIETY FOR ACADEMIC EMERGENCY MEDICINE

BOSTON – Higher levels of nasopharyngeal lactate dehydrogenase were associated with decreased odds of hospitalization in a prospective, observational, multicenter cohort study of samples from 277 children under 2 years of age who presented to the emergency department with bronchiolitis.

"Despite identified risk factors for severe disease, the difficulty and uncertainty of determining the appropriate level of supportive care for children with bronchiolitis is well documented by the large variability in hospital admission practices.

"Admission rates for infants with bronchiolitis are significantly different between pediatric and general EDs and even among pediatric ED attending physicians. There is also wide variation in thresholds for pediatric intensive care unit admission and intubation," said Dr. Jonathan M. Mansbach, a hospitalist physician at Children's Hospital Boston.

Recent studies suggest that lactate dehydrogenase (LDH), a membrane-associated protein released from injured cells that is a marker of inflammatory response, correlates with innate immunity and could therefore be used as a predictor of disease severity.

In one recent single-center study of 98 children aged less than 2 years presenting to the ED with bronchiolitis, serum LDH was not predictive of admission, but higher levels of nasopharyngeal LDH were associated with an 81% reduced risk of hospital admission (Pediatrics 2010;125:e225-33).

The current study is part of the larger Multicenter Airway Research Collaboration (MARC), a program of the Emergency Medicine Network.

VITALS

Major Finding: For the entire 0- to 8,400-U/mL range, higher LDH values were associated with a lower rate of admission for 24 hours or longer.

Data Source: Prospective, observational, multicenter cohort study of samples from 277 children under 2 years of age who presented to the emergency department with bronchiolitis.

Disclosures: Dr. Mansbach said he had no relevant financial disclosures.

The primary aim of the MARC-25 Virology Study is to describe virology of children presenting to the ED with bronchiolitis using nasopharyngeal aspirate (NPA) samples (Acad. Emerg. Med. 2008;15:111-8).

Nasopharyngeal aspirate samples were collected between December 2005 and March 2006 at 14 centers in 10 states.

The 277 children had a median age of 6 months. More than half (61%) were boys; 37% were Hispanic, 31% white, 28% black, and 4% other.

The median value of NPA LDH was 7 U/mL but the range was wide, 0-8,400 U/mL.

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"Nasopharyngeal LDH is a new test. Therefore, when considering the actual values for LDH, please remember that there are no known standards," Dr. Mansbach commented.

Of the study cohort, 45% (125 children) were admitted to the hospital, and of those, 74% (93) were admitted for longer than 24 hours.

For the entire 0- to 8,400-U/mL range, higher LDH values were associated with a lower rate of admission for 24 hours or longer.

However, there were two outlier patients. With those two removed, the LDH range dropped to 0-1,000 and the inverse relationship between LDH and admission remained, but there was a blunting of the association at higher levels of LDH.

The rest of the analysis was limited to patients with the two most common viral etiologies, respiratory syncytial virus (64%) and rhinovirus (16%).

The low frequency of infections with human metapneumovirus and influenza did not affect the results, he noted.

In the 176 children with RSV, the median LDH values were higher but not significantly higher than in the 101 children without RSV, 8 vs. 4 U/mL ($P = .53$).

However, in the 44 children with rhinovirus, median LDH values were significantly higher than in children without rhinovirus, 14 vs. 5 U/mL ($P = .03$).

Moving from the first to the third LDH quartile after adjustment for common variables associated with illness severity (age less than 2 months, sex, history of intubation, retractions, oxygen saturation 94% or below), there was a fairly linear drop in the odds of admission.

With the quartile of 1.33 U/mL and below as the referent 1.0, those with LDH levels 1.34-6.6 U/mL had an adjusted odds ratio of admission of 0.58 ($P = .23$, confidence interval 0.24-1.4), while the adjusted odds ratio for those with LDH 6.7-43.2 U/mL was 0.23 ($P = .002$, CI 0.09-0.58).

The difference was no longer significant for LDH of 43.3 U/mL or above ($P = .33$, CI 0.28-1.5).

Stratification by virus or site did not change the outcomes, Dr. Mansbach added.

"We do not know why the association is blunted at the highest level of LDH, and more research will be needed to sort through this aspect of our findings.

"Remember that the test still shows that higher levels of LDH are associated with fewer admissions. It was just blunted, with slightly lower magnitude, so it could still be clinically useful," he said in an interview. ■

RSV, Rhinovirus Coinfection Linked to Longer Hospital Stays

BY MIRIAM E. TUCKER

FROM THE ANNUAL MEETING OF THE SOCIETY FOR ACADEMIC EMERGENCY MEDICINE

BOSTON – Coinfection with both respiratory syncytial virus and rhinovirus was common and associated with increased length of stay in a prospective multicenter study of over 2,000 children under 2 years of age who were hospitalized with bronchiolitis.

The clinical value of testing for an infectious etiology in a child with bronchiolitis is unclear. Indeed, the recommendation is not to test (Pediatrics 2006;118:1774-93).

Some experts argue however, that testing may be useful for the influenza treatment or to identify the beginning of the viral "seasons" and which viruses are circulating, Dr. Jonathan M. Mansbach, a hospitalist physician at Children's Hospital Boston, said at the meeting.

Additionally, Dr. Mansbach said that the 70% frequency of coinfection seen in this study raises questions about the effectiveness of inpatient cohorting by viral etiology, which some researchers contend is of use. Moreover, the findings suggest that hospitals consider adding RV to respiratory viral panels, the hospitalist commented.

The 16-center study enrolled consecutive children between November and March during 2007-2010.

Of the total 2,207 children enrolled, 83% were located on the ward while 17% were admitted to the intensive care unit. Of those 377, 42% were intubated or given continuous positive airway pressure. Overall mean length of stay was 2 days.

The patients had a median age of 4 months; 59% were male, 61% were white, 24% black, and 15% other races. A third (36%) were of Hispanic ethnicity.

The three most common viral etiologies identified by polymerase chain reaction were RSV-A (43%) RSV-B (30%), and RV (26%). Adenovirus, human metapneumovirus, and the coronaviruses were all 7%-8%, and only 6% of the children had no virus detected. (These figures add up to more than 100 because of a 30% rate of coinfections.) The low-frequency infections did not affect results, so subsequent analysis focused on RSV (subtypes A and B) and RV, Dr. Mansbach said.

VITALS

Major Finding: Of 564 children infected with rhinovirus, 70% had RSV coinfection. Rhinovirus alone was associated with a lower chance of being hospitalized 3 or more days compared with RSV-A or RSV-B alone (odds ratio 0.4). RSV-RV coinfection was associated with a significantly greater chance of being hospitalized for 3 or more days, compared with RSV-A or RSV-B alone (OR 1.3).

Data Source: Prospective multicenter study of 2,207 children under 2 years of age who were hospitalized for bronchiolitis.

Disclosures: Dr. Mansbach reported no relevant financial disclosures.

Of the 940 children in whom RSV-A was identified, it was the only virus in 66%, while one or more additional viruses were identified in the other 34%. Similarly, 68% of the 664 RSV-B infected patients had only one virus identified, while 32% were coinfected.

Rhinovirus was somewhat different, however, in that just 30% of 564 had only that and 70% had coinfections.

For children with both RSV-A and RSV-B, the likelihood of having a length of stay of 3 or more days did not differ between those who had the single virus infection and those who were coinfected (48% vs. 49%, respectively, for RSV-A, and 47% and 54% for RSV-B). There was a significant difference with rhinovirus, however, with 28% of those with the single infection and 46% with coinfections hospitalized 3 or more days, after comparing with RSV-A or RSV-B alone (odds ratio 1.3).

Rhinovirus alone was associated with a lower chance of being hospitalized 3 or more days compared with RSV-A or RSV-B alone (OR 0.4).

Clustering by site did not affect the results.

In a preliminary analysis, controlling for acute severity as defined by ICU, continuous positive airway pressure, or intubation also did not materially change the results, Dr. Mansbach said. ■