Severe Acute Respiratory Illness in Sub-Saharan Africa

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(See the major article by McMorrow et al on pages 853–60.)

Severe acute respiratory illness (SARI) is one of the world’s most common causes of pediatric hospitalization and mortality, with severe outcomes disproportionately affecting the poorest countries, such as those in sub-Saharan Africa [1]. Despite the public health and clinical importance of SARI, most sub-Saharan African countries have had weak surveillance for overall and cause-specific SARI hospitalization and mortality. For example, a 2011 report documented that data on influenza epidemiology in sub-Saharan Africa through 2010 were sparse and concentrated in a handful of countries [2]. Similarly, a 2010 article on global influenza burden included data from only 4 African countries [3]. Subsequent efforts have included meetings on influenza in Africa [4–6] and support for influenza surveillance, data analysis, and reporting from the World Health Organization (WHO) [7] and the US Centers for Disease Control and Prevention through the African Flu Alliance [6]. These activities have resulted in an increasing number of reports from Africa [8].

The latest addition to this body of knowledge is the report by McMorrow et al in this issue of The Journal of Infectious Diseases. This article reports aggregated data on SARI deaths in sub-Saharan Africa by collecting data derived from national influenza surveillance systems. Results included an influenza-specific SARI case-fatality ratio (CFR) of 1.8% that was 50% lower than among influenza virus–negative cases. Surprisingly, this effort at comprehensive data collection from all of sub-Saharan Africa over a 3-year period yielded only 57 influenza virus–positive deaths, among which 19 occurred in children aged <5 years. This result is at odds with the estimates from a global review of the influenza burden, which reported up to 111 500 annual pediatric deaths due to influenza, mostly in developing countries [3].

The largest limitation documented by the authors was inclusion of data from only 8 of 46 WHO African Region member states. Eighteen countries did not receive an invitation, based on lack of reporting to the WHO’s FluNet system. Of the 28 countries that were invited to participate, 5 did not provide information, 11 did not collect data on SARI hospitalization, and 1 had <1 year of data. Of the 11 countries with appropriate data, 8 provided usable information. Among these 8 countries, only 4 conducted prospective national SARI mortality surveillance, while 3 conducted nonsystematic sentinel site surveillance, and 1 conducted a retrospective review of medical charts.

Among the 8 participating countries, 924 of 1073 deaths (86%) due to SARI of any etiology occurred in just 2 countries: Kenya and South Africa (which historically have had robust surveillance systems [1]). Both Kenya and South Africa reported higher CFRs overall (2.9% and 4.0%, respectively) and for influenza (1.9% and 2.5%, respectively) than other countries, with the exception of Madagascar.

Other issues with interpretation exist. First, the study did not include community surveillance, and in settings with poor hospital access this may lead to underestimation of the mortality burden. Since hospital access may vary by age group and residence, this will confound the comparison of results by these factors. Second, the most severely ill persons may not have been enrolled in surveillance, and presentation for care with critical illness may differ by pathogen and age group. Third, influenza virus and other respiratory viruses may contribute to a causal chain of mortality (eg, by promoting bacterial infection) but be absent at the time of presentation for medical care. It is possible that this occurs more commonly among the most severe cases, which would lead to the observed decrease in CFR among influenza virus–positive versus influenza virus–negative cases. Additionally, it is possible that infection duration differs for different pathogens, obscuring their relative importance as causes of SARI hospitalization and mortality, and for different age groups. Fourth, different SARI case definitions by time and place may have affected CFRs or pathogen distribution. Fifth, different sample collection techniques (nasopharyngeal swab, oropharyngeal swab, and nasal aspirate) may have affected pathogen detection.
In sum, with the exception of findings for Kenya and South Africa, McMorrow et al clearly document the still inadequate SARI mortality surveillance existing throughout sub-Saharan Africa. This frustrating situation makes it difficult to assess the absolute and relative burden associated with different pathogens and within different age strata. This, in turn, prevents development of appropriate public health interventions. Key questions include the potential benefit for African countries of routine use of current influenza vaccines or future vaccines against pathogens such as respiratory syncytial virus, the potential benefit of routine virologic testing and increased use of antiviral therapy, and the relative benefit of immunization versus improving hospital access and etiology-specific or nonspecific case management (eg, oxygen therapy for hypoxia).

One possibility for addressing this data gap is to use modeling based on seasonal excess mortality, as has been done in the United States and elsewhere. However, many tropical African countries do not have clearly defined influenza seasons [1]. Additionally, to the extent that seasonality exists, the relative contribution of different etiologies is unknown and likely varies by time and place. Another possibility is to assess overall community-based SARI mortality, using a combination of verbal autopsies and hospital surveillance, and then apply etiology-specific CFRs from tested cases. However, this approach does not address many of the limitations described above. Moreover, verbal autopsies may have low specificity for SARI.

An alternative is to support an increased number of robust surveillance studies at representative locations across Africa. Components of such studies would include improving hospital access, conducting community-based mortality surveillance, implementing consistent case definitions, conducting systematic testing of all cases by using standard methods, and including internal and external laboratory quality assurance. One limitation of this approach is that such intensive surveillance inevitably alters disease epidemiology, including lowering the risk of mortality. For vaccine-preventable etiologies, another option is to conduct a vaccine probe study [9], as has been proposed for influenza [10]. Vaccine probe studies were instrumental in driving public health policy for pneumococcal and Haemophilus influenzae type b conjugate vaccines, as well as rotavirus vaccine.

These types of more robust studies would not replace the obligation of countries to conduct national SARI surveillance. Rather, they would complement national surveillance systems by anchoring the interpretation of local data. Because of the expense of such studies, implementation likely will require partnerships with external funders. Given the importance of SARI as a cause of mortality in Africa, the return on this investment is likely to be large in terms of efficient use of resources for public health policy.

Note

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