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ABSTRACT

Anticipatory surveillance for mass gatherings: a novel application of mass media surveillance

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Objective
To present the value of early media-based surveillance for infectious disease outbreaks during mass gatherings, and enable participants and organizers to anticipate public health threats.

Introduction
Public health and medical research on mass gatherings (MGs) are emerging disciplines. MGs present surveillance challenges quite different from routine outbreak monitoring, including prompt detection of outbreaks of an unusual disease. Lack of familiarity with a disease can result in a diagnostic delay; that delay can be reduced or eliminated if potential threats are identified in advance and staff is then trained in those areas. Anticipatory surveillance focuses on disease threats in the countries of origin of MG participants. Surveillance of infectious disease (ID) reports in mass media for those locations allows for adequate preparation of local staff in advance of the MG. In this study, we present a novel approach to ID surveillance for MGs: anticipatory surveillance of mass media to provide early reconnaissance information.

Methods
First, we identify the geographic focus and scope of symptomology for the surveillance system. The ideal anticipatory surveillance system monitors for both diseases and symptoms in all countries of origin of visitors to the MG, preferably well in advance. These locations may be identified through study of historic air travel patterns or travel visa distribution. Local media sources are likely to report early signs of an outbreak and therefore are a critical component of the system. Disease inclusion criteria may be on the basis of virulence, R_0 value, herd immunity, or diversity of serotype distribution. For a novel disease, mass media keywords searches based solely on disease names will miss a potential threat; broad search terms must also be included (for example, 'sick' or 'ill').

Figure 1 Image of alert display for FIFA 2010.

Traditional mass media surveillance systems like HealthMap may examine tens of thousands of internet addresses hourly. Those systems must maintain a high level of specificity to avoid a flood of irrelevant material. For an anticipatory surveillance system, geographic restriction reduces the number of sources examined. After constructing the catalog of media, a multi-step automated search process with lower specificity ultimately achieves greater sensitivity than large-scale mass media surveillance.

Finally, human review of the data set flags potentially important articles.

Results
We have created anticipatory surveillance systems for two MGs: the 2010 Winter Olympics in Vancouver[1] and the 2010 FIFA World Cup in South Africa. We created internet accessible maps displaying potentially important public health alerts from the selected geographic focus (Figure 1). Through inclusion of context important information on the maps (for example stadium locations or high volume countries), these maps provide public health and medical specialists timely, context-rich surveillance intelligence that is normally inaccessible to them.

These anticipatory surveillance systems identified the danger of measles in Oceania before the Winter Olympics;

British Colombia experienced a subsequent measles outbreak of the same variant.

Conclusions

Anticipatory surveillance is a logical extension of research in MGs. High volume, automated internet search technology supports a level of surveillance inconceivable at the start of MG studies. Geographic restriction of sources allows for an expanded dictionary of disease related keywords. Multi-step review, both automated and human, improves both sensitivity and specificity of the system.

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Reference

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