

Development and validation of a simple outbreak alert system to improve measles control in the Democratic Republic of the Congo

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Background

Measles remains a substantial infectious disease burden in the Democratic Republic of the Congo (DRC) and the country faces annual epidemics. While outbreak alert systems can offset the severity of these epidemics by minimising response delays, there is currently limited consensus on which system to use and how it should be implemented. Here we propose and evaluate a simple alert system composed of two thresholds : the weekly and triweekly number of suspected cases.

Methods

A large number of potential threshold combinations were considered and several indicators were used to assess performance, including the risk of an alert being false and the proportion of outbreak cases that the system is expected to capture. Performance outcomes were evaluated using historical surveillance data from 2015 to 2020. The variability of performance over time was also assessed.

Results

In total, 20 threshold combinations were considered, including 8 possible weekly thresholds and 7 possible triweekly thresholds. Among these, two combinations were selected as the most performant. The first and more sensitive system combined a weekly threshold of 10 cases with a triweekly threshold of 15 and the second combined 20 with 35. While the highly sensitive system captured 10% more cases (85% of all cases compared to 76%), it also experienced a 25% higher risk of false alert (68% compared to 43%). While absolute outcomes for both systems were somewhat variable over time, their relative performance remained consistent.

Conclusion

This analysis presents a simple and evidence based alert system to improve response times for measles outbreaks in DRC. By relying only on suspected cases and basic calculations, it can be implemented easily and is not subject to the delays associated with lab confirmation. Ongoing work is being done to evaluate whether the thresholds proposed here can be reapplied in other contexts.

Alert systems can offset the severity of measles outbreaks by reducing response delays. Here we propose and evaluate a deliberately simple possible system for DRC.

