Metrics for Use in Evaluation of Hospital Respirator Programs

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Abstract

Objective: The respirator is used in the hospital setting as a component of the master occupational infection prevention and control programs that protect healthcare personnel from workplace hazards. These multi-tiered programs address the hazards at all levels through administrative policies, engineering controls and PPE. This study asks what information to gather: (1) to monitor respirator use in hospitals as part of a national pandemic response, and (2) from a broader perspective, to create a foundation for PPE systems research for the purpose of informing policy, certification, and standard setting. Methods: To provide the context for data recommendations hospital respirator surveillance activities were superimposed upon patient care and healthcare personnel workflow. Data was identified from associated systems. Metrics were then created from the data that were representative of selection, availability, training, fitting, use, disease outcomes, and confounding factors. Recommendations for the surveillance metrics most representative of respirator programming are made based upon data quality, availability, and representativeness. Results: The sample data set recommended as a starting point for national surveillance of hospital respirator use is presented. For hospitals, metrics to serve as a foundation for a surveillance system are recommended that would answer questions regarding agents, respirators, healthcare personnel, organizational factors and work tasks. Conclusion: A national system of respirator surveillance capable of monitoring respirator utilization should be created with the capability monitoring respirator activities and confounders necessary to evaluate respirator program effectiveness and therefore inform policy.

Methods

Metric Determination
1. Vanderbilt databases were reviewed to determine the types of data collected from the Respiratory Infection Prevention & Control Program.
2. A model was developed of hospital respirator surveillance activities that occurred during the workflow of interactions between patients and healthcare personnel in the hospital setting.
3. Data was identified from associated systems.
4. Metrics were created from that data that were representative of selection, availability, training, fitting, use, disease outcomes and confounding factors.
5. Recommended metrics are representative of the entire system of respirator health and safety programs, and are chosen for data quality, availability and representativeness.

Results

Occupational infection prevention and control programs are layered within 3 tiers of healthcare operations: primary preventive services that occur prior to patient care; patient care; and infection surveillance.

Discussion

Identifying what data represents respirator use and effectiveness is the first step in the development of a surveillance system. Collecting and analyzing the data, then acting on the information and disseminating it are part of a public health response. Having reviewed how respirator surveillance occurs in the hospital setting, the challenge is to determine how to accomplish respirator surveillance on a national scale for the purposes of a disaster preparedness response and ongoing evaluation.

When considering the construction of a National PPE Surveillance System, it is necessary to make distinctions about the type of data that could be collected. It would be simplest to collect counts of various factors related to PPE, such as number of masks, number of fit tests or number of employees trained. However, to understand the effectiveness of the system that promotes and supports a hospital respirator program, it is better to have measures that capture the context of the system in which PPE measures are embedded. The ability of the respirator to protect healthcare workers is affected by the properties of the hazard, the type of work performed, organizational culture, the availability of appropriate environmental controls, and the knowledge/attitudes/beliefs of the healthcare worker.

References