Universal Masking of Patients and Visitors to Prevent Nosocomial Respiratory Viral Infections in Malignant Hematology Inpatient Units

Vishnuka Arulsundaram¹, Kelsey Houston¹, Elisa Vicencio¹, Carly Rebelo¹, Alon Vaisman¹,², and Susy Hota¹,²

¹Infection Prevention and Control, University Health Network; ²Department of Medicine, University of Toronto, Canada

Background

Patients with hematologic malignancies are at increased risk for respiratory virus infections (RVI) and may experience prolonged asymptomatic viral shedding, contributing to transmission and outbreaks (1). Previous studies have found that masking of individuals in direct care of Bone Marrow Transplant recipients reduces the incidence of RVI (2). However, evidence for reducing RVI risk through universal masking (UM) of malignant hematology (MH) patients is limited.

Methodology

This pre-post study examined the effects of UM in MH units of a 170-bed adult tertiary cancer hospital in Toronto, Canada. The pre-intervention phase ran from January 1, 2015 to February 28, 2017 and post-implementation phase, from March 1, 2017 to September 30, 2019. The UM policy required:

- All patients and visitors to wear a surgical mask whenever ambulating outside of their rooms, regardless of respiratory symptoms.
- Staff were not required to wear surgical masks outside of additional precautions.
- RVIs included lab confirmed, symptomatic infections with Influenza A/B, respiratory syncytial virus, metapneumovirus, and parainfluenza 1-4.
- The primary outcome of interest was nosocomial RVI incidence post-intervention compared to pre-intervention; secondary outcomes included the number of RVI outbreaks, as well as their duration and case counts.
- RVI incidence rates pre- and post-intervention were compared using Wilcoxon rank sum test. Secondary outcomes were analyzed using descriptive statistics.

Results

- Nosocomial RVI incidence decreased significantly after implementing the UM policy and the number of cases involved in RVI outbreaks also decreased (Table 1).
- Over the study period, the volume of mask consumption increased by approximately 70% as a result of the UM policy.
- Compared to the pre-implementation period, there was a 14% increase in nasopharyngeal swab orders post-implementation.
- Staff influenza vaccination rates, hand hygiene compliance and infection control policies remained stable throughout the study.

Conclusions

To our knowledge, this is the first study to demonstrate a reduction in RVI incidence with UM in a MH patient population. While we were unable to directly measure compliance with the intervention, increased mask utilization post-intervention implied adherence to the policy.

- Limitations of our study include the inability to precisely report mask utilization due to the use of masks for this policy as opposed to use for Droplet Precautions.
- Other confounding variables during the post-implementation period that may have affected the outcome include extensive promotion of annual flu campaigns in some years, the addition of 11 inpatient beds (Sept 2017), implementation of the UM policy in the outpatient settings of the hospital (Feb 2017) and the addition of a full-time infection control practitioner (May 2018).
- Our experience suggests that UM in MH inpatients may be an effective RVI prevention strategy. Further rigorous study is warranted.

Next steps will include:
- An official written UM policy for staff reference
- An escalation algorithm for staff when patients/visitors non-adherent to UM
- A patient and visitor experience survey to optimize UM policy

Table 1: Indicators of RVI transmission pre- and post-implementation of universal masking policy on malignant hematology units

<table>
<thead>
<tr>
<th></th>
<th>Pre-implementation</th>
<th>Post-implementation</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nosocomial RVI Cases (n)</td>
<td>107</td>
<td>80</td>
<td>N/A</td>
</tr>
<tr>
<td>Nosocomial RVI Incidence (n/1000 patient days)</td>
<td>2.00</td>
<td>1.11</td>
<td>0.033</td>
</tr>
<tr>
<td>RVI Outbreaks (n)</td>
<td>3</td>
<td>2</td>
<td>N/A</td>
</tr>
<tr>
<td>RVI Cases during Outbreaks (n)</td>
<td>23</td>
<td>11</td>
<td>N/A</td>
</tr>
</tbody>
</table>

References


Figure 1: Patient Visitor Education Handout for UM Policy

How to put on a mask

1. Take a mask out of the box. Make sure there are no tears in the mask.
2. Hold the mask by the ear loops.
3. Place each ear loop around each ear.
4. Gently pinch the stiff edge on the top of the mask around your nose.
5. Pull the bottom of the mask over your chin.
6. To remove the mask, hold the ear loops, lift it away from your face. Put it in the garbage and throw your hands.

Figure 2: Unit Entrance Signage with Masks for UM Policy

How to put on a mask

1. Take a mask out of the box. Make sure there are no tears in the mask.
2. Hold the mask by the ear loops.
3. Place each ear loop around each ear.
4. Gently pinch the stiff edge on the top of the mask around your nose.
5. Pull the bottom of the mask over your chin.
6. To remove the mask, hold the ear loops, lift it away from your face. Put it in the garbage and throw your hands.