Impact of Norovirus Testing Changes on Hospital-Acquired Norovirus Infections

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Background:
Norovirus is highly contagious and can spread rapidly through healthcare facilities. Controlling transmission can be challenging. Early diagnosis allows for infection prevention measures to be implemented in a timely manner. The objective of this study was to determine the effect of decreasing barriers to norovirus testing on hospital-acquired (HA) cases.

Methods:
A before-after study was conducted evaluating the impact of increasing the availability of norovirus testing on HA infections. From 1/1/2012 to 10/16/2017, all norovirus tests required the approval from the laboratory medicine resident, and testing was performed once a day. A polymerase chain reaction (PCR) system that required a two-step process was used. On 10/17/2017, the laboratory began using a PCR that performs testing in one step, allowing the laboratory to perform testing more frequently. Approval of the laboratory medicine resident was no longer required. HA norovirus rates and percent of positive test pre and post-implementation were compared using chi-square analysis. HA cases were defined as patients admitted without signs or symptoms of norovirus infection. A Mann-Whitney U test was used to compare the average number of infections per cluster pre and post-implementation. A cluster was defined as two or more associated cases. No other relevant infection prevention interventions were implemented during this time frame.

Results:
After implementation of the new testing methodology, there was a significant decrease in percent of positive norovirus test between the study periods (9.4 % (46/487) pre-implementation vs. 5.4 % (11/205) post-implementation, p=0.049). There was no difference in the proportion of norovirus infections that were HA between the study periods (Figure 4) (37% (17/46) pre-implementation vs. 55% (6/11) post-implementation, p=0.16). There was no decrease in the number of cases associated with a cluster between the study periods (Figure 5) (3.6 cases/cluster pre-implementation vs. 2.5 cases/cluster post-implementation, p=0.86).

Conclusions:
There was a significant decrease in percent of positive norovirus tests between the study periods (Figure 3) (9.4 % (46/487) pre-implementation vs. 5.4 % (11/205) post-implementation, p=0.049). There was no difference in the proportion of norovirus infections that were HA between the study periods (Figure 4) (37% (17/46) pre-implementation vs. 55% (6/11) post-implementation, p=0.16). There was no difference in the number of cases associated with a cluster between the study periods (Figure 5) (3.6 cases/cluster pre-implementation vs. 2.5 cases/cluster post-implementation, p=0.86).

METHODS
- Setting: Barnes Jewish Hospital, 1,315 bed tertiary care facility
- A before-after study was conducted evaluating the impact of increasing the availability of norovirus testing (Figure 1)
- Pre-intervention (1/1/2012-10/15/2017):
  - All norovirus tests required the approval from the laboratory medicine resident
  - Testing was performed once a day
  - Norovirus testing changed from a two-step process to one step
  - Approval of the laboratory medicine resident was no longer required
  - Percent of positive test and HA norovirus rates were compared using chi-square analysis
  - HA cases were defined as patients admitted without signs or symptoms of norovirus infection
  - A Mann-Whitney U test was used to compare the average number of infections per cluster pre and post-implementation
  - A cluster was defined as two or more associated cases
  - No other relevant infection prevention interventions were implemented during this time frame

RESULTS
- There was a significant decrease in percent of positive norovirus tests between the study periods (Figure 3) (9.4 % (46/487) pre-implementation vs. 5.4 % (11/205) post-implementation, p=0.049)
- There was no difference in the proportion of norovirus infections that were HA between the study periods (Figure 4) (37% (17/46) pre-implementation vs. 55% (6/11) post-implementation, p=0.16)
- There was no difference in the number of cases associated with a cluster between the study periods (Figure 5) (3.6 cases/cluster pre-implementation vs. 2.5 cases/cluster post-implementation, p=0.86)

FIGURE 1. SUMMARY OF NOROVIRUS TESTING CHANGES

Testing period Molecular Test Specifications
Pre-Intervention (1/1/2012 to 10/15/2017) Roche LightCycler
- Overnight extraction (2-3 hours)
- RT-PCR (4-6 hours)
- Result ~24 hours after collection
- Detects norovirus GI and GII genogroups
- Overnight extraction ~2 hours
- RT-PCR ~ 2 hours
- Results ~ 24 hours after collection

Post-Intervention (10/16/2017 to 8/30/2018) Cepheid GeneXpert
- Extraction and RT-PCR coupled (~2 hours)
- Detects norovirus GI and GII genogroups
- Extraction and RT-PCR coupled ~ 2 hours
- Results ~ 4 hours after collection

FIGURE 2. NOROVIRUS TEST RESULTS OVER TIME

FIGURE 3. POSITIVE TEST (%)

FIGURE 4. HA CASES (%)

FIGURE 5. AVERAGE CLUSTER SIZE

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