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Brief Report

Implementation of remote video auditing with feedback and compliance for manual-cleaning protocols of endoscopic retrograde cholangiopancreatography endoscopes

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A pilot initiative to assess the use of remote video auditing in monitoring compliance with manual-cleaning protocols for endoscopic retrograde cholangiopancreatography (ERCP) endoscopes was performed. Compliance with manual-cleaning steps following the initiation of feedback was measured. A video feed of the ERCP reprocessing room was provided to remote auditors who scored items of an ERCP endoscope manual-cleaning checklist. Compliance feedback was provided in the form of reports and reeducation. Outcomes were reported as checklist compliance. The use of remote video auditing to document manual processing is a feasible approach and feedback and reeducation increased manual-cleaning compliance from 53.1% (95% confidence interval, 34.7-71.6) to 98.9% (95.0% confidence interval, 98.1-99.6).

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Of the annual 11 million endoscopic procedures performed in the United States, more than 500,000 are related to endoscopes used to perform endoscopic retrograde cholangiopancreatography (ERCP).¹ Reports of endoscope-related infections are usually associated with failures in reprocessing and defective equipment.²⁻⁴ However, since 2012 at least 35 reports of multidrug-resistant bacterial infections have been linked to ERCP endoscopes despite no documented reprocessing lapses.^{5,6} The Food and Drug Administration determined that the complexity of these instruments can impede proper cleaning, necessitating greater scrutiny of endoscope reprocessing and, in particular, the steps of manual cleaning.^{7,8} Health system leadership at Northwell Health is committed to ensuring ongoing adherence to the steps of manually cleaning ERCP endoscopes outlined by the Society Gastroenterology Nurses and Associates and ERCP endoscope manufacturer's instructions for use (IFU) as part of a restructured comprehensive quality program for reprocessing. We performed a pilot study to investigate the feasibility of use

of remote video auditing (RVA) with zoom digital cameras and feedback in the assessment of compliance with the ERCP endoscope manual-cleaning protocol.

METHODS

This project was approved by the institutional review board of our organization. This pilot study was conducted at a community teaching hospital in Queens, NY. Video from cameras in the endoscope reprocessing room was transmitted to offsite auditors (Arrowsight Inc, Mt Kisco, NY) trained in recognizing and timing ERCP endoscope manual-cleaning milestones. Auditors had high-resolution views of the sink and were able to zoom in for audits of manual cleaning of components such as the elevator mechanism and recesses (Fig 1).

When auditors observed an endoscope (Olympus TJF-Q180V Duodenoscope, PA) placed in the reprocessing sink followed by the initiation of precleaning, compliance with processing each item of the checklist was electronically scored as pass or fail and the duration of cleaning was recorded. Between September and November 2015, compliance with the original 15-step manual processing checklist was audited. During the final week of January 2016, final audit

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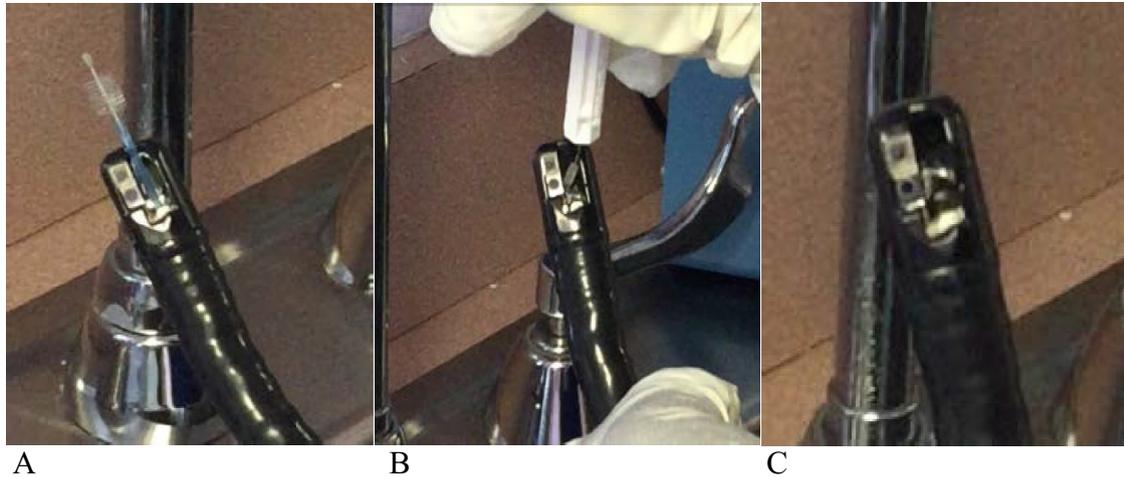


Fig 1. Process of manually cleaning endoscopic retrograde cholangiopancreatography endoscopes. (A) Cleaning the bottom of the tip opening with a long brush. (B) Lowering the tip elevator to clean the tip opening. (C) Leaving the elevator in middle of the tip opening to ensure sterilization of both sides of the elevator.

criteria for an updated 40-step checklist were approved and an observer trained in the checklist details was present during processing. The 40-step checklist, shown in [Table 1](#), consolidated all of the detailed IFU steps provided by the endoscope manufacturer's IFU. RVA performance feedback via text alerts, reeducation, and performance reports were provided to stakeholders from February-May 2016. Descriptive statistics comprising estimates of checklist compliance, ranges, and respective 95% confidence intervals (CIs) were calculated. Data were analyzed using Stata 14.0 (StataCorp, College Station, TX).

RESULTS

From September 2015-September 2016, 352 audits of manual cleaning of ERCP endoscopes, comprising a total of 7,715 audit steps, were completed. From September-November 2015, compliance with the original 15-step audit was 84.40% (95% CI, 79.59%-89.20%; $n = 4,420$) increasing from 69.57% (95% CI, 62.4%-76.8%) during the first week of audits to a range of 80.45% (95% CI, 64.31%-74.35%) to 89.43% (95% CI, 85.74%-92.24%) for the remainder of this time period. Compliance with the revised 40-step checklist was 53.1% (95% CI, 34.7-71.6; $n = 116$) during the first week of initiation of RVA feedback. During the remaining 28 postfeedback weeks, compliance with the checklist was 98.9% (95% CI, 98.1%-99.6%; $n = 3,179$).

DISCUSSION

The proficiency of health care personnel (HCP) to complete recommended ERCP endoscope manual reprocessing steps is critical to the development and continued implementation of updated reprocessing protocols. HCP were included in the plan to introduce cameras for the purpose of learning about potential errors to improve endoscope cleaning to reduce the risk of infection. As part of our intervention, an infection preventionist (IP) was assigned to oversee adoption of a revised manufacturer checklist. Monthly meetings were held with stakeholders to explore the use of RVA as part of the adoption process for the revised checklist. Endoscopy department employees and supervisors responsible for ERCP endoscope reprocessing received education, including an education session with the scope manufacturer. Direct observation sessions with an IP were carried out to help validate updated scope reprocessing practices and a trained observer was provided to employees to provide guidance and increase familiarity with the process. Following both

Table 1

Endoscopic retrograde cholangiopancreatography (ERCP) endoscope remote video auditing (RVA) milestones of the 40-step checklist

ERCP endoscope RVA audit checklist	Step
1. Personal protective equipment donned	Preparation
2. Buttons removed from endoscope	
3. Sink fill	Leak test
4. Leakage tester connected	
5. Leakage tester preparation	
6. Connecting cap attached to venting connector	
7. Leak test	
8. Leakage tester detached I	
9. Leakage tester detached II	
10. Sink preparation	Brushing forceps elevator and recess
11. Scope and outer tubing wash	
12. Forceps elevator clean lowered	
13. Forceps elevator clean Raised	
14. Elevator rinse and inspection	
15. Distal end cleaned	
16. Instrument channel clean 45° insert	Brush the channels
17. Instrument channel clean 45° return	
18. Suction channel clean straight insert	
19. Suction channel clean straight return	
20. Biopsy channel clean insert	
21. Biopsy channel clean return	
22. Suction cylinder opening clean	
23. Instrument channel opening brush clean	
24. Single use brush disposal	
25. Suction preparation	Suction
26. Suction	
27. Forceps elevator clean lowered	
28. Forceps elevator clean raised	
29. Elevator rinse	
30. Recess flush raised	
31. Recess flush lowered	
32. Magnifying glass inspection	
33. Inspect brush and discard	
34. Scope buddy preparation	Endoscopy automated flushing device
35. Scope buddy run I	
36. Drain sink and refill	
37. Scope buddy run II	
38. Scope buddy run III	
39. Scope dry	
40. Swab test color	Swab test

initiation of RVA and RVA with feedback, daily and weekly performance reports were sent to the endoscopy department managers and the lead technician. We believe the improved compliance we observed with RVA was in part the result of employee engagement

and collaboration. We also worked to ensure emphasis was placed on team performance. Data were solely used to direct improvement activities, HCP were not singled out as individuals, video footage was deleted every 24 hours, and HCP-directed improvements were critical steps in recruiting ongoing support of HCP. The use of offsite auditors dedicated to assessment with 5% of their observations reviewed by quality auditors ensured accurate data that continue to sustain HCP confidence in the reported data. The cost of implementing RVA for this project had 3 elements: video system costs of approximately \$6,000; setup and onsite consulting training fee of \$15,000, and a daily service charge of approximately \$2 per procedure.

Our leadership has committed to the implementation of RVA at all organizational sites given the anticipated improvements in infection prevention practices and patient safety. Our study demonstrates that RVA represents a reasonable approach to approximate ERCP endoscope manual processing compliance and the introduction of performance feedback resulted in high compliance. The cleaning of ERCP endoscopes is a reproducible, repeatable process that can be observed with the use of RVA, observations scored, and results used to achieve ongoing adherence to the manufacturer's IFU to minimize the risk of contamination. This study supports previous findings that show process improvements with use of RVA with feedback.⁹⁻¹¹ We will continue to study the long-term efficacy and acceptability of large-scale RVA of ERCP endoscope reprocessing at multiple sites and its influence on HCP compliance. We will also continue to improve RVA technical capabilities.

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