SATURDAY, MAY 22, 2021
Clinical Endoscopic Practice 1
Lecture

ID: 3526786

COMPARING THE IMPACT OF REUSABLE AND SINGLE-USE DUODENOSCOPES USING LIFE CYCLE ASSESSMENT

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Comparing the Impact of Reusable and Single-Use Duodenoscopes Using Life Cycle Assessment. Introduction: Multidrug-resistant infections have been linked to contaminated duodenoscopes, prompting post-market surveillance investigations by the FDA. Although economic models have been demonstrated for single-use duodenoscopes, its large-scale effects on the environment and public health are not known. Our aim was to perform a Life Cycle Assessment (LCA) comparing "cradle-to-grave" environmental effects of reusable and single-use duodenoscopes. Methods: Our LCA model included granular quantitative environmental effects of production, transportation, disposal, and high-level disinfection of reusable duodenoscopes, using SimaPro 9.1.0 and the IMPACT 2002+ life cycle impact assessment method. We evaluated 3 duodenoscopes: 1) reusable duodenoscope (Olympus TJF-Q180V); 2) duodenoscope with disposable endcaps (Olympus TJF-Q190V); and 3) single-use duodenoscope (Boston Scientific Exalt Model D). We assumed an infection rate of 0.02% and also considered ICU stay to treat infections from contaminated duodenoscopes, with sensitivity analysis. The primary outcome was carbon dioxide emissions (kg). Results: Performing ERCP with a single-use duodenoscope consumes 467 MJ and releases 29.3 kg of CO2, which is 20 times more than using a reusable duodenoscope (26.8 MJ and 1.55 kg CO2) or a duodenoscope with disposable endcaps (23.4 MJ and 1.37 kg CO2). Figure 1 compares the CO2 emission of the 3 types of duodenoscopes. When analyzing effects on human health (not counting direct impact from infections due to insufficient data), ecosystems, and resource consumption are considered, the single-use duodenoscope still performs 18 to 65 times worse than the other two duodenoscopes (Figure 2). Most of the impact of the single-use duodenoscope effects comes from the duodenoscope's production, which accounts for 96% of the energy consumption and greenhouse gas emission. On the other hand, duodenoscopes with disposable endcaps perform slightly better than the reusable duodenoscope in all categories. Limitations: Our exploratory modeling will require further refinement, integration with economic metrics, and validation. Conclusion: In our preliminary analysis, single-use duodenoscopes may come at a higher environmental cost compared to reusable duodenoscopes.

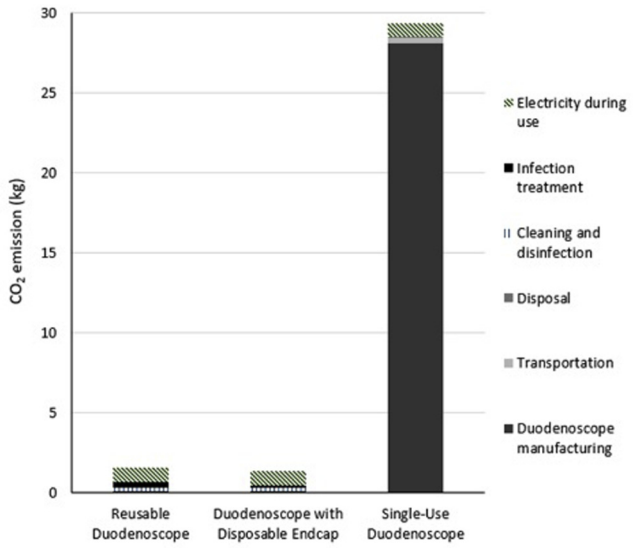

Fig 1. Comparison of the CO_2 emission of an ERCP procedure using three types of duodenoscope, showing the contribution of different life-cycle-stages (manufacturing, transportation, disposal, cleaning, infection treatment, and electricity during use).

CO2 Emission

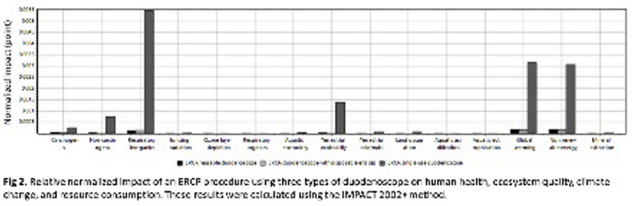

Fig 2. Relative normalized impact of an ERCP procedure using three types of duodenoscope on human health, ecosystem quality, climate change, and resource consumption. These results were calculated using the IMPACT 2002+ method.

Normalized Impact

SUNDAY, MAY 23, 2021
Clinical Endoscopic Practice 1
Poster

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PREDICTORS OF POOR OUTCOMES IN PATIENTS WITH NON-VARICEAL UPPER GASTROINTESTINAL BLEEDING UNDERGOING UPPER ENDOSCOPY

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Background: Guidelines recommend that patients presenting with non-variceal upper gastrointestinal bleeding (NVUGIB) should undergo esophagogastroduodenoscopy (EGD) within 24 hours of presentation. While there is consensus regarding timing of EGD, there is limited information regarding predictors of poor outcomes in patients who undergo EGD. We sought to determine the independent predictors of poor outcomes (mortality, acute kidney injury, shock) in patients with NVUGIB who underwent EGD. Methods: We conducted a retrospective cohort study using the Nationwide Inpatient Sample (NIS) from 2015-2017. Inclusion criteria were: i) a principal diagnosis of NVUGIB ii) admission in 2015-2017 iii) patients who underwent EGD during the admission. Exclusion criteria were age < 18 years and elective admission. The primary outcomes were the rates of mortality, shock and acute kidney injury (AKI) in NVUGIB patients who underwent EGD. Secondary outcomes were independent predictors of developing mortality, AKI and shock. Unadjusted odds ratio for the outcomes were calculated using univariate analysis and subsequent multivariate analysis was used to adjust the results for potential confounders. Results: A total of 310,735 patients were admitted with NVUGIB and underwent EGD from 2015-2017. The mean age was 67 years and 44.3% were female (Table 1). The all-cause in-hospital mortality rate was 1.2%, while 20.1% and 3.7% of patients developed AKI and shock, respectively. The mean length of stay was 4.15 (± 0.016) days incurring $43,541.44 (± 204.78) in mean total hospitalization charges (Table 2). Independent predictors of mortality (Table 3) were age, Charlson comorbidity index, and medium to large hospital bed size. Protective factors included female gender, black and Hispanic ethnicity, and median income in the second to fourth quartiles. Independent predictors for AKI (Table 4) were age, Charlson comorbidity index, black ethnicity, Medicare, and urban teaching/non-teaching hospitals. Independent predictors of shock (Table 5) included Charlson comorbidity index, tobacco use, urban teaching/non-teaching hospitals, and medium to large hospital bed size. Conclusions: Our analysis shows that Charlson co-morbidity index (CCI) is an independent predictor for poor outcomes in patients undergoing EGD for NVUGIB. While several scoring criteria exist for triaging patients with NVUGIB, there is currently no clear consensus regarding which one to use for routine clinical practice. CCI can be easily calculated based on a patient's history alone and can provide useful information suggesting that patients with high CCI might benefit from more aggressive management.