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The provision of ERCP services in the United States is a radiating concern

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Despite being the highest-risk mainstream endoscopic procedure offered by gastroenterologists, the provision of ERCP services in the United States remains mystifying. Although demand for the procedure has essentially plateaued and emergency ERCP is rarely indicated,[1] little effort has been made to consolidate ERCP services in high-volume facilities and with high-volume providers. The majority of ERCP providers perform this complex and unpredictable intervention less than twice per week, many in facilities with comparably low volume.[2] The predominant reasons ERCP has failed to concentrate include balancing the obligations of delivering comprehensive night and weekend coverage while minimizing the exposure of a limited number of providers to ERCP call, and hospital systems striving to deliver comprehensive care to the majority of their customer base (patients) while avoiding the loss of potential "downstream revenue," (eg, cholecystectomy). Even without adjustment for procedure complexity—but particularly after doing so—the outcomes (technical success, hospitalization, and adverse event rates) of ERCP are better when the procedure is performed by an endoscopist who performs more than 2 per week and in a facility with comparable volume.[2,3] There is now evidence that unsuccessful ERCP may even result in higher short-term mortality in the setting of acute biliary pancreatitis.[4] Liao et al[5] now confirm another volume-dependent quality measure of ERCP in their retrospective cohort study of 331 ERCPs: radiation exposure.

On a per-ERCP basis, the authors tracked floroscopy time and various measures of radiation exposure from the patients' perspective. The study was conducted at a tertiary-level academic medical center that included 9 ERCP providers, 7 (78%) of who perform fewer than 200 ERCPs annually and were classified as low-volume. This ratio of high-volume to low-volume endoscopists is reflective of the ERCP workforce in the United States.[3] The authors chose 200 ERCPs as a cutoff point based on a previous study associating this threshold with increased use of floroscopy.[6] It is probable that use of floroscopy, along with other relevant outcome measures, steadily improves as provider annual volume approaches 200.[3,6,7] Nevertheless, each of the authors' measures of patient radiation exposure—total radiation dose, dose area product, and effective dose—was significantly higher when the ERCP was performed by a low-volume provider. The differences were augmented after the authors adjusted for procedural complexity.

DISCLOSURE

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Whether the risks of radiation exposure are perceived or real, patients are sensitive to them, especially when the indication for the medical procedure requiring ionizing radiation is questionable or the dose of radiation is greater than necessary. A report from the National Research Council estimates that among 100 individuals, cancer from unrelated causes will develop in 42, but cancer will develop in 1 additional person as a direct result of a single, low-dose exposure to ionizing radiation, typically defined as 100 mSv.[8] Stated alternatively, the number-needed-to-harm by low-dose ionizing radiation is 100. These and other estimates of risk after low-dose exposures are guesstimates because true cause-and-effect relationships can be difficult to prove. Still, the risk of low-dose radiation is stochastic: there is risk, albeit small, even with the lowest dose, and the risk is time sensitive, so that the youngest exposed (ie, children and young adults) have the greatest risk.[9,10] Keeping the evidence in perspective, the median effective dose observed by Liao et al[5] was 2.49 mSv, which is lower than estimates by others[7,10]; experts classify any exposure below 10 mSv as very low dose, where the incremental risk of cancer is presumably infinitesimal.[8] Because many patients undergoing therapeutic ERCP require 2 or more procedures to address a complex pancreatobiliary obstruction or leak, the cumulative dose may quickly equate to that of 1 or more CT scans. The authors' cohort of 197 patients undergoing 311 ERCPs during an 8-month period illustrates this because a simplified calculation implies that approximately 37% of patients underwent a second ERCP. It is likely that a smaller subgroup underwent more than 2 ERCPs, representing a group particularly at risk for excess and potentially unnecessary radiation exposure.

The authors used a Stanford Fluoroscopy Complexity Score to quantify procedural complexity and adjust their calculations of radiation exposure for the wide variability of indications and maneuvers performed during ERCP. After adjustment with the use of this score, differences in median radiation exposure to patients essentially doubled when a low-volume endoscopist performed the procedure. Although data are sparse, procedures having a higher grade of difficulty and those requiring therapeutic maneuvers such as stent placement and removal of large bile duct or any pancreatic duct stone are associated with longer floroscopy times.[7] Failed cannulation is also associated with a longer floroscopy time but biliary sphincterotomy is associated with a shorter time, probably because sphincterotomy almost invariably occurs after successful cannulation. The authors assigned 1 point for sphincterotomy and for each cannulation tool used. This may be oversimplified because sphincterotomy could be assigned a negative co-efficient but using 2 or more cannulation tools probably increases the use of floroscopy multiplicatively as opposed to linearly, as computed by the Stanford score. Other important considerations include stricture location because pancreatic duct, proximal common hepatic duct, and hepatic bifurcation strictures increase floroscopy requirements exponentially.[11] It would have been interesting to plot the change in radiation exposure as a function of the Stanford Fluoroscopy Complexity Score, to substantiate their weighting system. Much of this is conjecture and should prompt needed research in this area.

Other covariates influence differences in floroscopy use. High-volume ERCP providers are presumably more cautious with pressing their foot on the floroscopy pedal to minimize their own cumulative exposure. Simple maneuvers to minimize patient and provider exposure include use of collimation, lower magnification and frame rates, capturing still images only

when needed, and basic positioning of the equipment: keeping the X-ray tube as far away from but the image receptor as close to the patient as possible. For their own safety, endoscopists should maximize their distance from the patient and use protective shields whenever feasible. Newer floroscopy machines are also more sophisticated in minimizing the use of radiation while acquiring higher-resolution digital images, and alerting providers of floroscopy use in real time. The present retrospective study by Liao et al[5] could not have been completed without these modern enhancements.

Little progress has been made in establishing, measuring, and monitoring quality benchmarks for ERCP despite its higher-risk profile than that of many low-risk surgical procedures.[12] The use of floroscopy is not included in the 2006 American Society for Gastrointestinal Endoscopy guideline, which appropriately emphasizes choosing the right indication, technical success, and adverse events.[12] A failed or complicated procedure, particularly when performed for a controversial indication such as idiopathic recurrent acute pancreatitis or sphincter of Oddi dysfunction, can be catastrophic for the patient and even the physician.[13] Although these metrics will remain at the forefront of ERCP quality, radiation exposure should be added to the list. Assuming that full disclosure were to be mandatory, patients would be interested in a provider's median effective radiation dose per ERCP and how this compares with national averages. As the balance of the health care system in the United States shifts in favor of accountable care organizations that are reimbursed through bundled payments, the quality and efficiency of ERCP services will fall under increasing scrutiny. Gastroenterologists should ask themselves whether they are providing the best ERCP service to their patients. Following the lead of colonoscopy, where reporting adenoma detection rates is increasingly the norm, ERCP providers ought to begin disseminating relevant benchmarks: success rates, adverse events including length of stay when relevant, frequency of early repeated ERCPs or related interventions such as percutaneous transhepatic cholangiograms, and now average radiation exposure—from the patients' perspective—per procedure.

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