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Predictors of Hospital Choice among Rural Patients Seeking Elective Surgery: A Scoping Review

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SUMMARY AND KEY FINDINGS

- We reviewed literature on predictors of hospital choice for rural elective surgery patients.
- Older, publicly insured patients were more likely to undergo surgery at their local hospital (i.e., closest hospital offering the elective surgery).
- Less medically complex patients (i.e., patients with fewer chronic conditions and diagnoses) were more likely to undergo surgery at their local hospital.
- Patients were less likely to bypass accredited, high-volume, and system-affiliated hospitals.
- There is a critical lack of research regarding predictors of hospital choice.

BACKGROUND AND PURPOSE

Individuals living in rural areas represent approximately 20% of the total United States population[1] and, compared to their urban counterparts, generally have worse health outcomes.[2-4] One potentially modifiable determinant of rural public health is the surgical care-seeking behavior of rural patients. The decision of where to receive elective surgical care can have direct effects on surgery-related outcomes[5-14] as well as downstream effects on rural hospitals,[15-21] public health,[22,23] and economies.[24]

Hospital surgical volume often mediates the effect of hospital choice on surgical outcomes for complex procedures, as high-volume hospitals are often associated with better surgical outcomes.[5-14] In contrast, other research suggests that small, local, rural hospitals provide equivalent quality of care (compared to larger, urban hospitals) for less complex, common surgical interventions (e.g., appendectomy, cholecystectomy, colectomy, hernia repair, knee replacement, hip replacement).[25-27] These study findings suggest an optimal health care delivery model regionalizes complex surgeries while keeping common elective surgeries at small, local, rural hospitals.

Retaining surgical volume locally is important for both the rural hospital and the surrounding community.[15-24] The financial viability of rural hospitals depends, in part, on hospitals' abilities to generate sufficient revenue from offered surgical services. Surgical reimbursement provides 10-40% of rural hospital revenue,[15-19] and surgical volume is positively correlated with hospital operating margin.[19] Revenue is also dependent on local patient volume, specifically, rural patients seeking health care locally rather than at a different facility. Bypass behavior, which refers to residents receiving care at a hospital other than their closest hospital,[28,29] is a potential factor contributing to rural hospital closure. Bypass behavior can lead to substantial losses in volume for rural hospitals, both directly[28,29] and indirectly by weakening local perceptions of rural hospital quality.[30] This loss in volume contributes to lower hospital profitability and greater risk of hospital closure.[20,21]

Given that hospital choice for surgery affects both patient outcomes and hospital viability, a greater understanding of rural patients' surgical care-seeking behavior could enhance rural health and rural hospital financial stability. Specifically, insight on modifiable determinants of care-seeking behavior can inform policies to promote behavior that is consistent with evidence-based public health recommendations (e.g., undergoing common, low-risk surgeries at

local hospitals and undergoing complex, high-risk surgeries at high-volume hospitals). Although previous research has examined rural surgical care-seeking behavior, to date, there is no published comprehensive scoping review of the literature. The purpose of this scoping review was to identify literature describing determinants of hospital choice among rural patients seeking elective surgery.

METHODS

We created a study protocol following guidelines set forth by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR).[31] We registered the study protocol with Open Science Foundation, an online research support platform run by the nonprofit Center for Open Science, Inc.[32] Our study protocol can be accessed at the following web address: https://osf.io/fqkn4/. To briefly summarize our methods, we (1) conducted a systematic search of MEDLINE, EMBASE, and Web of Science from inception to December 11, 2020 to identify relevant, peer-reviewed, observational studies on U.S.A.-based surgical care-seeking behavior; (2) independently dual-screened studies in two phases (e.g., title and abstract screening, full-text screening) for eligibility, and; (3) extracted data from eligible studies and narratively summarized findings. Additional methodology details are provided in the Appendix of this findings brief.

RESULTS

We initially identified 6,640 citations through our search of MEDLINE, EMBASE, and Web of Science. We identified nine additional citations through manual searching of relevant article bibliographies. After duplicate citations were removed, we screened 4,165 citations for eligibility based on the title and abstract. We excluded 4,083 citations during the title and abstract screening and retrieved 82 full-text articles for further eligibility assessment. Of the 82 full-text articles, we excluded 79 articles for the following reasons: two were duplicate citations that were not captured by Covidence's duplicate citation screening software, four were the incorrect study type, 38 did not have at least 80% of study years from 2011 or later, 32 did not analyze a rural-only population, one analyzed a population residing outside the United States, and one analyzed outcomes other than hospital-based care-seeking behavior for elective surgeries. We had one "near-miss" article[33] that fulfilled all other inclusion criteria but did not provide a definitive hospital choice set. We considered the remaining three studies eligible for our review.

Each reviewed study was a retrospective observational analysis of secondary data.[34-36] Matthews and colleagues[34] used 2010-2014 data from the Iowa Cancer Registry to analyze hospital choice among 3,167 rural patients that received elective surgery for colon or rectal cancer. Weigel and colleagues[35] and Weigel, Ullrich, and Ward[36] used 2011 data from the Healthcare Cost and Utilization Project State Inpatient Databases and State Ambulatory Surgery and Services Databases to analyze hospital choice among two different samples of rural patients that received elective surgery (65,755 patients from Colorado, North Carolina, Vermont, or Wisconsin[35] and 35,980 patients from Iowa,[36] respectively). The two latter studies did not include any restrictions on the type of elective surgery. Matthews and colleagues[34] analyzed the type of hospital used by each patient (e.g., National Cancer Institute Designated Cancer Center vs. Commission on Cancer-accredited hospital vs. Critical Access Hospital vs. hospitals not classified as any of the above types). In contrast, Weigel and colleagues[35] and Weigel, Ullrich, and Ward[36] each analyzed a binary outcome describing whether or not a patient bypassed their local hospital (i.e., closest hospital offering the elective surgery). Each of the reviewed studies used a combination of descriptive methods and multivariable regression (e.g., Cox proportional hazards regression,[34] logistic regression[35,36]) to analyze their respective study populations.

The reviewed studies found that the average bypass rate was slightly less than 50%. In addition, the reviewed studies found multiple patient and hospital characteristics associated with the probability of bypass. Specifically, patients that were older, were publicly insured, and had fewer chronic conditions and diagnoses were more likely to undergo surgery at their closest hospital.[35,36] In addition, patients were less likely to bypass hospitals that were accredited,[34] had high surgical volume, were not members of a health system, and employed local general surgeons.[35,36] Furthermore, patients with selected comorbidities (e.g., anemia deficiency, arthritis, congestive heart failure, diabetes mellitus, hypertension, hypothyroidism) were less likely to bypass their local hospital, whereas patients with other disease conditions (e.g., obesity, peripheral vascular disease, renal failure) were more likely to bypass.[35,36] Sex, race, estimated household income, and number of procedures[35,36] had inconsistent associations with bypass.

DISCUSSION

Our review found a dearth of recent research that explores care-seeking behavior among rural surgical patients. The limited number of studies that do exist[34-36] suggest that (1) the average rate of local hospital bypass is close to 50%, (2) hospital choice is associated with clinical and nonclinical characteristics like patient age, medical complexity, and insurance status, and (3) hospital choice is associated with hospital characteristics, including hospital accreditation, surgical volume, system affiliation, and surgeon supply. Our findings provide insight on surgical care-seeking behavior and possible determinants of local hospital bypass. However, the limited amount of recent research on rural surgical care-seeking behavior highlights a clear need for additional studies using data that reflect the current health policy environment. Updated investigations can further improve understanding of surgical care-seeking behavior and its effects on patient health outcomes and hospital financial viability.[5-21]

Our findings have important clinical implications. For instance, the high bypass rate could be related to safety concerns, referral patterns by primary care physicians, or patient inquiry about hospitals and physicians informed by published research on hospital choice and surgery-related outcomes.[5-14] Specifically, previous research has consistently found an inverse association between hospital surgical volume and adverse surgical outcomes for complex procedures.[5-14] These research findings have led organizations such as the Leapfrog Group to recommend that patients bypass rural hospitals for large volume hospitals when receiving certain complex surgical operations.[7,10,37] In contrast, other research suggests that small, local, rural hospitals provide equivalent quality of care for less complex, common surgeries.[25-27] Based on the results of our review, these rural hospitals continue to be a common source of surgical care for rural residents. However, the reviewed studies did not examine bypass rates by surgery type. Thus, the current evidence is insufficient to determine whether rural residents are consistently bypassing local, rural hospitals for complex surgeries or receiving less complex, common surgeries at local facilities. Without data on bypass rate by surgery type, we cannot fully assess the concordance between evidence-based hospital recommendations for surgical care and actual patient care-seeking behavior. Future quantitative and qualitative research should continue to explore the clinical implications of rural surgical care-seeking behavior and whether bypass rates differ based on surgery type and complexity.

In addition to the clinical implications, our study findings are relevant in the context of rural hospital financial viability. The high average bypass rate suggests that rural hospitals suffer substantial losses in potential hospital volume. Furthermore, high bypass rates likely weaken local perceptions of rural hospital quality,[30] which could lead to subsequent losses in volume as well. These losses in volume contribute to lower hospital profitability and greater risk of hospital closure.[20,21] In addition, our study findings suggest that hospital financial distress is exacerbated by differences in payer mix between rural patients that bypass and those who remain local. The reviewed studies found that patients insured through Medicare or Medicaid were more likely to undergo surgery locally, and patients insured through private insurance were more likely to undergo surgery elsewhere. Our results are consistent with previous findings from the American Hospital Association, which found that rural hospitals receive approximately 56% of net revenue from Medicare and Medicaid patients.[38] Related findings, published by the Centers for Medicare & Medicaid Services (CMS) Office of Minority Health after the conclusion of our literature search, show that rural Medicare patients who were dual-eligible for Medicaid coverage were less likely to bypass their local hospital for surgical care, in comparison to rural patients that were not dual-eligible.[39] Given variation in insurance reimbursement rates by payer,[40] differences in bypass rates by payer mix almost certainly have direct, important effects on hospital revenue. The findings of our review indicate that hospitals could potentially reduce the rate of bypass through employment of local general surgeons, often capable of providing a wide variety of surgical services,[41] or independence from larger health systems that regionalize care at larger hospitals. However, recruitment and retention of local surgeons at rural hospitals is challenging,[38,42] and health system consolidation is becoming increasingly normalized, thus indicating that independence from larger health systems might not always be a realistic option.[43-45]

Limitations

Our scoping review has several important limitations that should be considered when interpreting the results. First, given the traditional objectives of scoping reviews,[31] we did not conduct a formal critical appraisal of the included sources of evidence. As such, our review does not directly consider how potential methodological limitations of the

included studies affected their results. Second, our review is based on retrospective, observational studies of secondary data. Thus, the identified studies are not sufficient to determine causality but indicate possible associations between patient and hospital characteristics and surgical care-seeking behavior. Importantly, the reviewed studies use the location of surgery (i.e., local hospital versus another hospital located farther away) as a proxy for hospital choice. However, there could be unmeasured factors affecting hospital choice, including insurance restrictions, referral patterns by primary care physicians, transportation availability, surgery setting (e.g., inpatient vs. outpatient), and patient perceptions about hospitals that are informed by public opinion, published hospital data, or published research.[5-14] Given these additional factors, patients might not always have a true "choice" in hospital when receiving elective surgery. Third, our review is based on a limited number of studies that collectively examined rural patients from five states, with the majority of analysis focusing on data from 2011. Thus, the findings from previous studies may not be representative of the larger U.S. rural population. Importantly, we restricted our search to studies that generally examined surgical care-seeking behavior from 2011 to the present. We reasoned that excluding studies examining pre-ACA behavior would eliminate confounding factors and ensure that studied patients were from the current health policy environment (including recent trends in hospital system affiliation[43] and consumer engagement with health information technology[46]).

CONCLUSIONS

Research over the past two decades shows that regionalization of complex surgical care often improves outcomes.[5-14] However, regionalization of all surgical care does not necessarily consider the totality of patient preferences and can be detrimental to rural hospitals,[15-21] which are often integral parts of rural communities.[22-24] Greater understanding of rural patients' surgical care-seeking behavior can inform initiatives to enhance rural patient health without placing undue stress on rural hospitals and the communities they serve. Our review of the literature yielded evidence of patient and hospital characteristics associated with hospital choice.[34-36] Specifically, our review suggests that hospital choice is associated with patient age, insurance status, and medical complexity, as well as hospital accreditation, surgical volume, system affiliation, and surgeon supply. However, the limited amount of recent research on determinants of rural surgical care-seeking behavior underscores a critical lack of knowledge.

The decision of where to receive elective surgical care has direct effects on surgery-related outcomes, as high-volume hospitals are often associated with better outcomes for high-risk, complex surgeries.[5-14] In contrast, other research suggests that small, local, rural hospitals provide equivalent quality of care (compared to large, urban hospitals) for less complex, common surgical interventions.[25-27] These common surgeries also provide important revenue to rural hospitals,[15-19] which has downstream effects on rural public health[22,23] and economies.[24] Thus, without additional knowledge on modifiable determinants of hospital choice, clinicians, policymakers, and patients hoping to optimize care-seeking behavior, improve patient health, and support rural hospitals face a difficult challenge. Future studies can build on existing evidence through (1) analysis of surgical care-seeking behavior in other states, (2) examination of additional possible determinants of hospital choice (e.g., referral patterns, transportation availability, patient perceptions of hospital quality), and (3) calculation of bypass rates by surgery type. With regard to this last recommendation, the current evidence does not demonstrate whether rural residents are consistently bypassing local, rural hospitals for complex surgeries or receiving less complex, common surgeries at local facilities. Additional data on bypass rate by surgery type can highlight the concordance (or discordance) between evidence-based hospital recommendations for surgical care and actual patient care-seeking behavior. Therefore, future research should continue to explore the clinical implications of rural surgical care-seeking behavior and whether bypass rates differ based on surgery type and complexity.

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APPENDIX: DETAILED METHODOLOGY

Eligibility Criteria

We considered studies examining rural individuals living in the United States. In addition, our review focused on studies that analyzed hospital choice among rural patients seeking elective surgery. We did not consider studies that examined hospital choice for non-surgical care, transfer hospital visits, or visits preceded by emergency medical services transportation. Furthermore, given (1) the effects of the Affordable Care Act (ACA) on health care delivery, insurance coverage, and reimbursement, (2) trends in hospital mergers and acquisitions, and (3) increasing consumer engagement with health information technology, we reviewed recent studies that examined surgical care-seeking behavior from 2011 to the present. We reasoned that excluding studies examining pre-2011 behavior would ensure that studied patients were from the current health policy environment, thus improving the present-day applicability of our findings. Lastly, we restricted our scoping review to analytical and descriptive observational studies, including case -control studies, prospective and retrospective cohort studies, cross-sectional studies, and qualitative studies. We excluded editorials, letters, comments, conference abstracts, and case reports from our review. We did not restrict studies based on language.

Search Strategy

The search strategy sought to locate both published and unpublished studies. With the help of an experienced medical librarian, Sarah Cantrell (SC), we searched MEDLINE (via Ovid), EMBASE (via Elsevier), and Web of Science Core Collection (via Clarivate) from database inception to December 11, 2020 using a combination of keywords and database-specific subject headings for three concepts: rural, surgery, and bypass/choice behavior. We synthesized the search terms in each of these categories based on the scoping review objective and developed the terms into comprehensive search strategies for each database. Prior to running the final searches, we reviewed a small subset of articles in order to identify any additional search terms and to refine the eligibility criteria. Once the key search terms were finalized, the search was peer-reviewed by another librarian with expertise in systematic review searching using the Peer Review of Electronic Search Strategies (PRESS) checklist. After review, we executed the search strategies across all databases. The full, reproducible search strategies for each database are available upon request. We also reviewed the bibliographies of the final included studies and contacted experts in the field for possible additional studies.

Evidence Selection

Following the literature search, we uploaded resulting citations into Covidence®, a web-based literature review screening software tool. Next, we used Covidence to identify and remove duplicate citations. After the removal of duplicate citations, we screened the title and abstract of each remaining citation using the aforementioned eligibility criteria. We completed the title and abstract screening using two independent reviewers, Yuqi Zhang (YZ) and Tyler Malone (TM). Following the title and abstract screening, we retrieved the full-text of all potentially relevant citations. We assessed the full-text of selected citations in detail against the eligibility criteria using two independent reviewers (YZ and TM). We designated a third reviewer, John Williams (JW), to resolve disagreements between the two main reviewers during title and abstract screening or full-text screening that could not be resolved through additional discussion.

Based on initial findings from the title and abstract screening, the full-text screening included additional eligibility criteria beyond those reported above. For the full-text screening, we further focused on studies that (1) explicitly framed the research as an analysis of hospital choice; (2) provided a definitive hospital choice set for participants included in the research, and (3) analyzed actual care-seeking behavior (as opposed to hypothetical behavior). We added these criteria in order to provide a clearer assessment of surgical care-seeking behavior among rural patients. In addition to the above criteria, we further required studies to have 80% or more of the included study years to be from 2011 or later (or present results stratified by year, in which case only results from 2011 or later would be reviewed). We decided to apply this rule in order to more strictly focus on care-seeking behavior that occurred after implementation of the ACA (the title and abstract screening only required studies to have at least one study year from 2011 or later). Moreover, we decided to exclude studies that assessed abortions and colposcopies because they are

both predominantly outpatient office procedures. Lastly, we decided to exclude reviews and meta-analyses in order to avoid "double-counting" of studies included across multiple citations.

For each citation that was excluded during the full-text screening, we recorded the reason for exclusion. To improve the reproducibility of our research, we created an ordered list of the full-text exclusion criteria. For each citation that did not pass the full-text screening, each reviewer (YZ and TM) recorded the first listed exclusion criterion that the article satisfied. We resolved disagreements over the first satisfied exclusion criterion through discussion or the assistance of a third independent reviewer (JW). The ordered list of full-text exclusion criteria is available upon request.

Data Extraction and Analysis

We extracted data from studies included in the scoping review using two independent reviewers (YZ and TM). For each study, we extracted data on authors and publication year, study design, data sources, study sample, key outcomes, analytic methods, and key results. We resolved any disagreements related to data extraction through discussion and, if needed, the assistance of an additional reviewer (JW). We then summarized our findings using a narrative approach.

Suggested Citation

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