

Access to Reconstructive Hand Surgery in the United States—Investigating the Obstacles: A Scoping Review

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Abstract

Background: Mechanisms that affect access to surgical hand care appear to be complex and multifaceted. This scoping review aims to investigate the available literature describing such mechanisms and provide direction for future investigation. **Methods:** The methodological framework outlined by the Preferred Reporting Items for Systematic Reviews and Meta-Analysis Extension for Scoping Reviews was used to guide this review. In November 2021, MEDLINE and EMBASE databases were searched. A narrative summary of the characteristics and key findings of each paper is used to present the data to facilitate the integration of diverse evidence. **Results:** Of 471 initial studies, 49 were included in our final analysis. Of these, 33% were cohort studies; 27% reported that underinsured patients are less likely to get an appointment with a hand specialist or to receive treatment. Overburdened emergency departments accounted for the second-most reported reason (16%) for diminished access to surgical hand care. Elective procedure financial incentives, poor emergency surgical hand coverage, distance to treatment, race, and policy were also notably reported across the literature. **Conclusions:** This study describes the vast mechanisms that hinder access to surgical hand care and highlights their complexity. Possible solutions and policy changes that may help improve access have been described.

Keywords: hand, anatomy, fracture/dislocation, diagnosis, trauma, surgery, specialty, epidemiology, research and health outcomes, health policy, outcomes, disability, psychosocial

Introduction

Hand injuries are common, with estimates of more than 2.7 million hand- and wrist-related injuries and infections presenting to US emergency departments annually.¹ Multiple studies have found that complaints related to the hand are among the most prevalent reasons for presentation to an emergency department.¹⁻³ Hand injuries are often lacerations, occur due to occupational hazards, and in a younger population.³ In addition, the prevalence of nontraumatic hand disorders such as carpal tunnel syndrome and trigger finger are on the rise in the United States.^{4,5} With the hand being the most common site of bodily injury, and a large prevalence of nontraumatic hand disorders, these conditions have a noteworthy impact on health care spending.

Challenges that particularly affect the ability for patients to access high-quality surgical hand care, both in an emergency and elective setting, include on-call surgical workforce shortages and geographic maldistribution, overuse of emergency departments, distance to definitive care, uncompensated physician and hospital reimbursement, increasing malpractice costs, and uncertainty of the impact of the Affordable Care Act (ACA).^{3,6-9}

Calfee et al predict that as the health care landscape acclimates to the ACA, growing numbers of patients will

become insured, likely leading to an increased demand for surgical care.⁷ It is apparent from the literature that several barriers to access of surgical hand care exist for patients who are socioeconomically disadvantaged. To address these limitations, a shift in policy is needed to overcome these barriers to maximize outcomes for these patients while minimizing health care costs.¹⁰

The creation of policy is a dynamic process, requiring analysis of quantitative and qualitative evidence from clinical investigations, public health research, and even narrative accounts.² Several reforms in health care make it a challenging environment in which policy makers and leaders must navigate while seeking to improve patient outcomes, satisfaction, and efficient use of limited resources.⁹ Not only is it critical for individual providers to fully understand barriers

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in optimal delivery of care to patients having hand surgery, but it is also imperative for providers to be involved in implementing solutions to these challenges despite limitations present in the current health care environment.⁹

Injuries to the hand and upper extremity can be quite complex often requiring a fellowship-trained hand surgeon to repair complicated neurovascular injuries and restore proper mechanical function to the upper extremity.¹ For example, 1 of 16 lacerations to the hand involves a deep structure (tendon, nerve, and ligament), illustrating the importance of a thorough physical examination by an experienced provider to make the appropriate diagnosis.³ At the same time, leaders in academic centers where hand surgeons, orthopedic surgeons, and plastic surgeons are trained must also contend with work hour limitations, limitations in funding and training positions despite workforce shortages, variability in the quality of resident education, and the recent transition of programs toward competency-based and milestone-based curricula.⁹

If not treated appropriately, hand injuries can lead to devastating functional loss in a young working population.³ Injuries to the hand and wrist, whether occupational or not, often result in significant time missed from work. In more severe cases, these injuries may lead to permanent disability. Considering that traumatic injuries, and musculoskeletal disorders, such as carpal tunnel syndrome, often transpire in the workplace, the downstream effects of loss of productivity are substantial.²

Limitations in access to hand surgical care remains a prominent concern across the United States. Understanding the factors that hinder access to reconstructive hand care will enable the implementation of proper health care reform for improved health outcomes. This study presents a scoping review of the current research investigating access to reconstructive hand surgery and follow-up care in the United States to determine the extent of the research available, how the literature is organized, and identifying gaps within the current available information. It is unclear if current information synthesizes the limiting factors in access to reconstructive hand surgery for patients in the United States. For these reasons, we sought to perform a scoping review to map the research done in this area, identify any existing gaps in knowledge, and provide areas for future investigation. The following research question was formulated: What is the current knowledge base on access to reconstructive hand care throughout the United States?"

Methods

Protocol and Registration

Scoping reviews are used to map the available literature surrounding a research topic of interest. This allows for organization and charting of the literature with respect to a research question(s), as well as identifying gaps in the literature and subsequently determining the need, scope,

and direction of future research investigations. To guide this review, our team employed the Preferred Reporting Items for Systematic Reviews and Meta-Analysis Extension for Scoping Reviews (PRISMA-ScR)¹¹ in association with the methodological framework for scoping studies described by Arksey and O'Malley.¹² This framework includes 5 stages: (1) formulating the research question; (2) screening for relevant studies; (3) study selection; (4) charting of data; and (5) collating, summarizing, reporting, and discussion of the results.

Eligibility Criteria

Peer-reviewed journal papers were included if they were published between 2000 and 2022, written in English, involved human participants in the United States, and discussed patient access to reconstructive hand surgery. Qualitative, quantitative, and mixed-method studies, as well as review articles were included in our review to consider multiple approaches and designs. Papers were excluded if they did not fit our conceptual framework, were not published in peer-reviewed journals in the United States, or written in a language other than English (Table 1).

Information Sources and Search Strategy

To identify potentially relevant articles, our search was conducted on November 9, 2021, using 2 bibliographic electronic databases: MEDLINE and EMBASE. Search terms and keywords were selected using our population, context, and concept themes: hand, reconstructive hand surgery, and access (Table 2). The search strategies were drafted and refined through team discussion. Final search results were imported into Endnote, where duplicates were subsequently removed. The final search strategy for Medline can be found in Table 3.

Source of Evidence Selection

To increase consistency in our study, 2 authors (J.M., J.K.) independently reviewed the title and abstract of each article identified by our searches for potentially relevant publications. Disagreements were resolved by a third author (A.P.). Subsequently, full-text review of each article was accomplished in a similar manner, with independent review by 2 authors (J.M., J.K.) to determine their relevance and resolution of disagreements by a third author (A.P.). The results of our search are reported and presented in a PRISMA-ScR flow diagram (Figure 1).

Data Extraction and Charting

A data charting form was developed with our protocol by 2 reviewers (J.M., J.K.) to determine which variables to extract from the literature. This form was tested and repeatedly updated through team discussion. Data charting of the litera-

Table 1. Inclusion and Exclusion Criteria.

Item	Inclusion criteria	Exclusion criteria	Main justification
Timespan	Articles published from 2000 to 2022	Articles published before 2000	This review focuses on current literature
Language	Articles written in English	Articles not written in English	English is the working language of the reviewers
Paper origin	Articles written in the United States	Articles written outside of the United States	This review focuses on United States Healthcare exclusively
Population	US citizens	Noncitizens of the United States	This review focuses on United States Healthcare exclusively
Paper focus	Articles which provide evidence regarding patient access to reconstructive hand surgery	Articles which do not provide evidence regarding patient access to reconstructive hand surgery	Access to reconstructive hand surgery is the concept of this review
Research type	Articles based on primary research or that are empirically based	Articles that are not based on primary research or not empirically based	This review describes the status of current evidence-based empirical literature
Publication type	Articles published in peer-reviewed journals	Books, book chapters, dissertations, media articles, conference proceedings, other nonempirically based documents	Books, book chapters, dissertations, media articles, conference proceedings, other nonempirically based documents because they were deemed not sufficiently peer-reviewed

Table 2. Population, Concept, Context Chart.

PCC element	Definition
Population	Individuals requiring reconstructive hand surgery within the United States
Concept	Access to reconstructive hand surgery, including exacerbating factors and mechanisms for improvement
Context	Peer-reviewed literature published between 2000 and 2022 within the United States and written in English

ture was accomplished independently by 2 reviewers (J.M., J.K.). Results and discrepancies between reviewers were subsequently discussed by the authors to determine a consensus.

Data extracted from the literature included article characteristics (title, first author, year of publication), aim of the study, study design, study setting, measures, intervention (if applicable), population and sample size, and results of the study. The finalized data charting form can be found in Supplemental Appendix.

Synthesis of Results

Results of the studies were broadly grouped into 3 categories regarding access to reconstructive hand surgery: patient-related obstacles, provider and health care-related obstacles, and mechanisms that facilitate access.

Results

Our search identified 471 articles: EMBASE (n = 235) and MEDLINE (n = 236). In total, 20 duplicate articles were

removed. Of the 451 articles screened for title and abstract review, 381 were excluded because they did not meet our selection criteria. Seventy articles were subsequently screened for full-text review, of which 21 were excluded for the reasons listed in Figure 1. In total, 49 studies were included in this review. Included were 16 cohort studies, 13 cross-sectional studies, 6 reviews, 5 case series, 3 economic evaluations, 2 nonrandomized control studies, 2 case control studies, 1 qualitative study, and 1 text and opinion article.

The key findings of the 49 articles regarding access to reconstructive hand surgery are presented in Supplemental Appendix.

Articles included in our analysis were further stratified into 3 categories: patient-related barriers to surgical hand care, provider-related or health care-related barriers, and mechanisms that facilitate or improve access. Patient-related barriers described in the literature include insurance status, race, distance to treatment, cost of treatment, low socioeconomic status (SES), poor or difficult follow-up, and lack of health literacy. Provider-related and health care-related barriers include emergency department overuse for nonemergent injuries and complaints, discrepancies in reimbursement between emergency and elective procedures, a lack of geographic diversity of surgical hand specialists, and a deficiency of emergency surgical hand coverage. Mechanisms reported in the literature that improve access to reconstructive hand surgery include telehealth, the ACA as well as other policy changes, among others. Table 4 illustrates the frequency of these themes within the articles presented in this review.

Most studies (27%) reported those individuals with noncommercial or no insurance are less likely to get an appointment with a hand specialist or to receive treatment.

Table 3. MEDLINE and EMBASE Search Strategy.

Concept	MEDLINE query	MEDLINE records received	EMBASE query	EMBASE records received
#1 Hand	exp Hand/ OR exp Hand Bones/ OR exp Hand Joints/ OR exp Hand Deformities/ OR exp Hand Injuries/ OR exp Hand Transplantation/ OR exp Hand Strength/	135 552	exp Hand/ OR exp Hand Injury/ OR exp Hand Malformation/ OR exp Hand Transplantation/ OR exp Hand Bone/ OR exp Hand Tumor/ OR exp Hand Burn/ OR exp Hand Strength/	158 387
#2 Reconstructive Surgery	exp Reconstructive Surgical Procedures/ OR exp Surgery, Plastic/ OR exp Physical Therapy Modalities/ OR exp Elective Surgical Procedures/ OR exp Emergency Medical Services/ OR exp Orthopedic Procedures/ OR exp "Wounds and Injuries"/ OR exp Surgical Procedures, Operative/ OR exp treatment outcome/ OR plastic surg*.mp. OR recon*.mp.	5 144 305	exp Orthopedic Surgery/ OR exp Plastic Surgery/ OR exp Reconstructive Surgery/ OR exp Emergency Health Service/ OR exp Surgical Technique/ OR exp Elective Surgery/ OR exp Physiotherapy/ OR Plastic Surg*.mp. OR Recon*.mp.	2 920 369
#3 Access	exp Medical Assistance/ OR exp Insurance, Health/ OR exp Travel/ OR exp Health Services Accessibility/ OR exp Healthcare Disparities/ OR exp Health Status Disparities/ OR exp Insurance Coverage/ OR exp Insurance, Disability/	339 037	exp Health Care Disparity/ OR exp Health Disparity/ OR exp Insurance/ OR exp Travel/ OR exp Health Care Access	507 619
#1 AND #2 AND #3		236		235

^aLimited to studies published between 2000 and the present.

^bLimited to studies published within the United States in English.

^cSearch conducted on November 11, 2021.

Emergency department overuse (16%) accounted for the second-most reported reason for diminished access to reconstructive hand care. Better reimbursement for non-elective hand care (16%), poor emergency department coverage (14%), geographic location (12%), race (10%), and policy (10%) were also notably reported across the literature.

Discussion

This scoping review identified 49 primary articles published from 2007 to 2021 that addressed access to reconstructive hand surgery within the United States. Our findings indicate that access is determined by a multitude of factors; therefore, we propose a schematic of analyzing the provider and health care–related obstacles separate from the patient-related obstacles.

Patient-Related Barriers

Patient-related barriers of accessing hand surgery include interfacility transfers, ability to schedule an initial consult appointment or receive treatment due to insurance status, poor follow-up, low SES, race, distance to treatment, cost of treatment, and lack of health literacy.

Interfacility transfers. Unemployed patients, those with no insurance, or those with noncommercial insurance were more likely to be transferred to another facility.¹³ Although most interfacility transfers occurred during the day, patients with noncommercial insurance were more likely to be transferred at night.¹⁴ In addition, patients with poor or no insurance were twice as likely to be transferred inappropriately, with no medical indication.^{13,15} Drolet et al found that transfers for hand-related issues were more likely to be coded as unnecessary by plastic surgeons when compared with referrals for facial trauma and infection. The expense for these unnecessary transfers over a 4-year period exceeded \$4.6 million.¹⁶

In comparison, Billig et al found that interfacility transfer following traumatic thumb amputation was associated with increased odds of replantation attempt and increased replantation success.¹⁷

Insurance status. We have identified a trend that those with noncommercial or no insurance are less likely to get an appointment with a hand specialist or to receive treatment.

Multiple studies have demonstrated that Medicaid patients are less likely than those with private insurance to receive outpatient hand clinic appointments.^{7,10,18} Baxter proposes that lack of referrals and concerns of

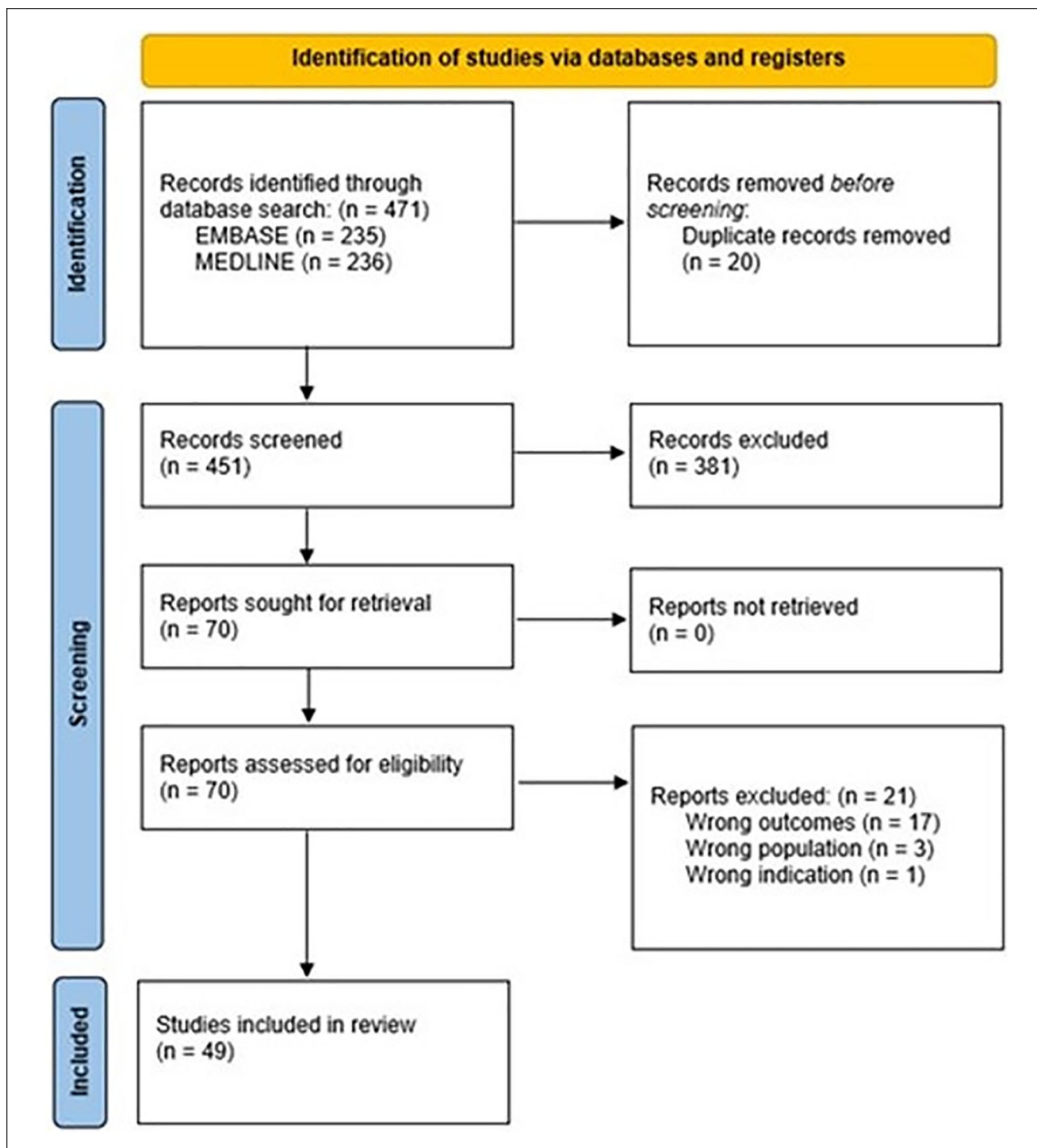


Figure 1. PRISMA flow chart.

Note. Exclusion process reported via PRISMA-ScR flow chart.¹¹ PRISMA-ScR = Preferred Reporting Items for Systematic Reviews and Meta-Analysis Extension for Scoping Reviews.

increased paperwork discourage physicians from caring for Medicaid patients.² This disparity is not limited to hand clinics, as patients enrolled in Medicaid are not guaranteed access to hand therapy due to variation and

sometimes exclusion of occupational therapy coverage in different states and plans.¹⁹

The relationship between insurance status and management of finger amputations in both the pediatric and adult

Table 4. Frequency of Themes Presented in the Articles (n = 49).

Theme	n = 49 (%)
Patient-related barriers	
Insurance status	13 (27)
Race	6 (12)
Distance to treatment	6 (12)
Low socioeconomic status	5 (10)
Cost of treatment	3 (6)
Poor follow-up	2 (4)
Lack of health literacy	1 (2)
Provider- and health care-related barriers	
Emergency department overuse	8 (16)
Elective vs emergency reimbursement	8 (16)
Emergency surgical hand coverage	6 (12)
Geographic diversity of providers	6 (12)
Mechanisms to improve access	
Policy	5 (10)
Other	4 (8)
Telehealth	2 (4)

populations has been heavily studied. All studies included in this review concluded that following finger amputation, the odds of replantation attempt and replantation success are significantly less for uninsured patients compared with those with private insurance.^{17,20-23} In addition, having non-commercial insurance was associated with increased odds of amputation following burn injury.²⁴

Insurance status has been demonstrated to affect the type of skin graft one will receive following hand burns. Nygaard and Endorf²⁵ found that patients with commercial insurance were more likely to get a dermal regenerative graft, while those with noncommercial insurance had a higher rate of autografting.

Underinsured patients and those who lack insurance suffer from logistical obstacles to care as well. For example, having no insurance was associated with longer emergency department wait times.²⁶ In addition, many health insurance plans impose a limit on the number of occupational therapy or physical therapy visits allowed per diagnosis per year and may also limit the duration of an episode of care. Patients in this situation are prone to rationing their therapy visits, which leads to poorer health outcomes.¹⁹

Follow-up. The ability for patients to follow-up with their provider is an essential aspect of high-quality hand care. Disparities in follow-up compliance between patients with different insurance statuses have been well described. Uninsured and Medicaid-insured patients are significantly less likely to initiate recommended hand specialty follow-up, and significantly less likely to complete follow-up even when established with an outpatient clinic.^{7,27} In addition, no-show rates increased with the greater distance required

to reach the tertiary center.⁷ Last, those without a driver's license were less likely to follow-up for their hand care because of the associated challenges with travel.²⁷

Socioeconomic status. Socioeconomic status is often measured as a combination of education, income, and occupation. Those with low SES experience multifactorial mechanisms that hinder access to reconstructive hand surgery and associated care. Rheumatoid arthritis patients of higher SES were more likely to undergo arthroplasty and/or arthrodesis compared with patients of lower SES.²⁸ High income was a positive predictor of escalation of care following traumatic digit amputation.²⁹ Even when insurance pays for hand therapy following surgery, patients may cite inability to take time off from work, child care, or copays as obstacles to attending therapy.¹⁹ Access to a hand surgeon may also be dependent on the economic climate of the state in which a patient lives. Rios-Diaz found that state-level variations in density of surgeons were independent and significantly associated with median per capita income.³⁰

Race. Racial inequities to access of medical care have been well described in the literature. Our review has revealed a similar pattern in which the race of a patient significantly influences their ability to access reconstructive hand surgery and associated care.

African American patients with rheumatoid arthritis were less likely to undergo arthroplasty and/or arthrodesis than whites.²⁸ Following pediatric finger amputation, Black and Hispanic patients were less likely to receive attempted replantation than white patients.²³ In a comparison of the 2016 Census Bureau racial makeup in the United States to total wrist arthroplasty (TWA) statistics, minority groups, particularly Hispanics, disproportionately do not undergo the procedure.³¹ Nygaard and Endorf²⁵ found that following hand burns, white patients were more likely to get a dermal regenerative graft compared with autografting alone, while non-white patients had a higher rate of autografting alone. In addition, Black race and homelessness were associated with amputation during a nonelective primary admission following frostbite injury.²⁴ Last, race can influence logistical access to care for patients, such that being a minority is associated with longer emergency department wait times.²⁶

Distance to treatment. Rural health care has the challenge of injuries occurring at an extended distance and requires that treatment becomes as efficient as possible to maximize the chances of a full recovery.³² Resource limitations may prevent patients from traveling a greater distance to a hand specialist who is willing to provide treatment.^{2,33} In fact, no-show rates increase with the greater distance required to reach a tertiary hand care center.⁷ Consequently, patients who must travel long distances for their treatment often demonstrate poorer outcomes. As the distance from a

patient's residence to their treatment facility increases, so does the clinical complexity and prevalence of complications associated with their hand care.^{7,34}

Cost of treatment. The cost of treatment burden is comprised of high premiums and unexpected hospital bills, both of which negatively affect the accessibility to reconstructive hand surgery. Increasing premiums might result in an increase in the number of uninsured adults, and uninsured individuals are often charged more than what third-party payers pay.¹⁹ Patients who are uninsured are expected to assume uncertain financial responsibility because of inadequate price transparency in outpatient services.¹⁹ In addition, privately insured patients continue to receive surprise Out of network bills at an alarming rate even when they seek in-network physicians and in-network hospitals, and even when they live in states with protective policies.³⁵

Discussing the cost of surgical care is not a universal component of physician-patient interactions, as Alokozai et al found that only 78% of patients discussed the cost of surgical care with their physician.⁴

Health literacy. A lack of health insurance literacy has been identified as a barrier to appropriate insurance coverage selection.¹⁹

Provider- and Health Care–Related Barriers

Provider- and health care–related barriers of accessing hand surgery include a lack of provider geographic diversity, discrepancies in emergency hand coverage and physician reimbursement compared with that of elective procedures, and the overuse of emergency departments for nonemergent injuries.

Geographic diversity of providers. There is a lack of geographic diversity among hand specialists in the United States at both the state and regional levels, as well as the institutional level.

The density of specialist hand surgeons varies significantly between states. Rios-Diaz et al found that state-level variations in density of surgeons were independent and significantly associated with median per capita income and with density of fellowships.³⁰ In addition, Elbuluk determined that despite the Midwest only housing one-fifth of the US population, nearly one-third of TWA procedures are performed in this region.³¹

Access to reconstructive hand surgery is likewise dependent on the type of institution. Following traumatic digit amputation, patients had a higher probability of attempted replantation at teaching hospitals than nonteaching hospitals.^{20,22,29} Furthermore, patients were less likely to undergo replantation at a level II or a level III trauma center.²²

Emergency and elective hand surgery coverage. There is a well-described national deficiency of hand specialists available to provide coverage for emergency hand trauma.^{5,9,36-38} Coupled with the relative ample availability of hand surgeons who provide elective procedures, it is increasingly difficult for patients to adequately receive treatment for traumatic hand injuries.

In a 2017 study of New York State hospitals, 88% of hospitals offered elective hand procedures, but only 27% had consistent coverage for emergency hand trauma.³⁸ The same trend is seen in Tennessee, with 77% of hospitals offering elective hand surgery, 58% offering basic emergency hand services, 18% offering occasional hand specialist call coverage, and only 7% of hospitals having 24/7 hand specialist call coverage.³⁷ A North Florida study found that 23% of hospitals did not have any hand surgeons on call, and 28% of hospitals had hand surgeons on call but not every day of the week or month.⁵

Nationally, from 2010 to 2019, there was a significant decrease in surgeons with obligatory hand call from 70% to 50%.³⁶ When surveyed in both 2010 and 2019, the main barrier for providing hand call was lifestyle considerations.³⁶

Overuse of emergency departments. The national trend of patients using emergency departments for nonemergent care is also prevalent in those that require hand surgery. Many studies have demonstrated that patients presenting with hand injuries to an emergency department often do not require a hospital admission.^{1,3,15,16,39,40} Despite this trend, a large number of patients were still found to undergo imaging studies and specialty consultation.^{15,40} Most patients were treated and discharged from an emergency department, indicating that many can be managed in a clinic setting.³

In addition to the overwhelming volume of nonemergent hand cases presenting to emergency departments, most emergency physicians receive little training in management of acute hand injuries and hand infections.^{3,9} This further exacerbates the difficulties in accessing proper care for those with acute hand injuries.

Reimbursement discrepancies between elective and emergency procedures. Physician and hospital or practice reimbursement for surgical hand procedures widely varies and is primarily driven by insurance status of the patient. Hospitals with hand specialists have significantly more payer charges from commercial insurance than hospitals without hand specialists.³⁷ Baxter found that on average, reimbursement for hand surgery by private insurance companies fulfilled 51% of submitted charges, whereas Medicare and Medicaid compensation only met 25% of charges.² Therefore, providing access to hand trauma patients may be fiscally advantageous in certain settings when the proportion of non-reimbursed care can be controlled.⁶

Medicare physician reimbursements for a major proportion of hand surgical procedures have decreased over time. Average reimbursement for the 20 most common hand procedures and surgeries decreased by 20.9% from 2002 to 2018, with a compound annual growth rate of -3.25% .⁴¹ Following the implementation of the Medicare Access and Children's Health Insurance Program Reauthorization Act in 2015, physicians experienced a decrease of 3.9% in reimbursements between 2014 and 2018.⁴¹

Although Medicaid insurance pays extremely poor compared with private insurance, some surgeons believe that the desire to help people is frequently determined more by the patient's insurance status than by their need.⁴² Low physician reimbursement for replantation compared with less complex hand procedures makes it difficult to recruit and retain hand surgeons for this purpose.⁴³ In addition, these financial disincentives may discourage hand surgeons from working in the emergency room. The diminishing size of the surgical workforce is also a contributor to the shortage of on-call hand surgeons.^{2,5,44}

Mechanisms to Improve Access

Telehealth. The utility of telehealth in clinical medicine is currently an emerging and evolving field. Two studies have evaluated the use of telehealth for rehabilitation and hand therapy following surgery. Palm et al found no statistically significant differences between telerehabilitation and in-person rehabilitation for range-of-motion, pain, and patient-reported functional outcomes.⁴⁵ The Worboys study determined that the level of agreement for all objective and subjective measures were significantly high.⁴⁶ In addition, both studies demonstrated high patient satisfaction in the telerehabilitation cohorts.^{45,46}

ACA and other policy changes. The ACA is a comprehensive reform law, enacted in 2010 with major provisions in 2014, that increases health insurance coverage for the uninsured and implements reforms to the health insurance market. After implementation of the ACA, the proportion of uninsured patients decreased significantly and the proportion of patients on Medicare and Medicaid increased significantly.^{19,47} Expansion of insurance coverage via the ACA may increase access and improve effectiveness of hand surgery.¹⁹ Furthermore, Jackson et al reported a 138% significant increase in the percentage of hospitals reporting 24/7 emergency hand coverage by a hand specialist since their last study in 2010—before the implementation of the ACA.⁴⁸

Other state-specific Medicaid expansion programs have demonstrated similar results. Following New York Medicaid expansion, there was a significant reversal to a positive and growing trend of replantation patients being Medicaid beneficiaries.⁸ When compared with the expected proportion

from a predicted trajectory had there been no Medicaid expansion, the proportion of Medicaid beneficiaries who actually underwent replantation procedures was 1.7% greater within the first 5 years following expansion.⁸ Similarly, after Massachusetts health care reform, the burden of uninsured encounters on an orthopedic hand service was reduced by a statistically significant decrease of approximately one-half.⁴⁹

Additional policy changes have likewise influenced the availability of hand care for patients. On February 9, 2018, the Bipartisan Budget Act of 2018 that repealed the application of the Medicare outpatient therapy expenditure cap was signed into law. This was a monumental step in favor of access to hand therapy for patients who require extended rehabilitation after surgery.¹⁹ On January 12, 2017, the Centers for Medicare and Medicaid Services withdrew a proposed rule that would require a provider to have specified qualifications and accreditation to bill for prostheses and custom fabricated orthoses. Withdrawal of this proposal has preserved hand therapists' ability to provide this service.¹⁹ In addition, changes in health policy and pilot programs that show value in establishing regional hand trauma centers will provide accessible high-quality emergent microsurgical care.⁵⁰

Additional mechanisms. In partnership with the American College of Surgeons and the American College of Emergency Physicians, the American Society of Surgery of the Hand has developed a National Hand Trauma Center Network (NHTCN), a compilation of facilities in the United States whose physicians are able to provide 24/7/365 care for hand trauma emergencies. Azoury et al were the first to report on the effectiveness of the NHTCN. Compared with the available National Inpatient Sample of Healthcare Cost and Utilization Project (NIS-HCUP) data, most of the national upper extremity replantation surgeries occurred through the NHTCN since its implementation, compared with one-third prior to the trial period.⁵¹ The NHTCN provides a dependable referral system through which upper extremity trauma care can be coordinated while allowing for accurate up-to-date tracking of epidemiologic data. This quality improvement project has improved patient care and health care access in the United States.⁵¹

Safety net hospitals are another alternative that would likely increase the health care network for underprivileged and uninsured patient populations.¹⁰

Limitations and Implications for Further Research

This review is not without its limitations. As only 2 databases were used to search for relevant articles, there is a possibility that our team missed published literature pertaining to our research question. In addition, our study

only analyzed peer-reviewed literature, without analysis of abstracts, books, or gray literature. Last, the population and setting of many of the articles we examined may not be representative of the greater national population of interest. Therefore, our analysis of this data is limited. Future research should include analysis of books and gray literature, as well as examining access to other reconstructive surgical procedures such as breast or facial reconstruction.

Conclusion

This scoping review provided an important summary of the current available peer-reviewed literature regarding access to reconstructive surgery within the United States. Given the current evidence presented in this review, significant barriers to access involving both patient and health care system mechanisms exist. Our findings indicate that access to hand care is affected by a multitude of factors; therefore, we propose a schematic dividing provider and health care-related obstacles as distinct from patient-related obstacles. Patient-related obstacles include insurance status, race, SES, geographical location, cost of care, health literacy, and availability of local specialist providers. Provider-related obstacles include limited geographic distribution of hand surgeons, limited emergent hand care coverage, overburdened emergency departments with nonemergent cases, and decreased financial compensation for nonelective care. In addition, our review describes evidence-based mechanisms, resources, and health care policy that have enabled improved access to reconstructive hand care, namely, telehealth, the ACA, and the NHTCN. Objective measures that attempt to describe the difficulties surrounding access seem to be multifaceted and complex. As such, additional research should include analysis of the magnitude of these factors and mechanisms as well as solutions to improve access for all patients.

Ethical Approval

This study was approved by our institutional review board.

Statement of Human and Animal Rights

This article is a scoping review of existing data and does not contain any additional studies with human or animal subjects.

Statement of Informed Consent

No identifying information about patients was included in this article.

Declaration of Conflicting Interests

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