5-2020

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Sarah Stanislav
University of Nebraska Medical Center

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SURGICAL CARE PERSPECTIVES:
Exploring Barriers and Facilitators to Surgery in Rural Nebraska

Sarah Stanislav
University of Nebraska Medical Center
College of Public Health
April 21, 2020

Capstone Committee:
Dr. Jennie Hill, PhD (Committee Chair)
Dr. Paul Estabrooks, PhD
Ms. Melissa Leon, MPH

Table of Contents

Abstract

Background: Minimally invasive surgery (MIS) is associated with less pain, faster recovery, and lower complication rates. Despite being the standard of care, it remains underutilized in rural Nebraska. Surgeon shortages and limited studies describing patient and provider factors influencing treatment gaps contribute to unnecessary complications and healthcare expenditure. Our study aimed to understand rural surgical care barriers and facilitators encountered by patients, providers, and stakeholders in Nebraska. **Methods:** This exploratory mixed methods study involved 17 semi-structured interviews using a snowball sampling of eligible participants affiliated with an MIS Advisory Committee. Two coders analyzed data using NVivo12. A follow-up review of commonly used surgical databases was completed using the data dictionaries and user guides. **Results:** The majority of participants were rural (58% vs. 41%), included providers (n=7), surgical stakeholders (n=6), patients (n=4) and a caregiver (n=1). The analysis identified three interrelated themes related to barriers to surgical care (travel/distance, insurance/reimbursement, limitations to providers), and three interrelated themes related to facilitators of surgical care (referrals, institutional assistance of patients, telehealth). The American College of Surgeons National Surgical Quality Improvement Program, Healthcare Cost and Utilization Program's National Inpatient Sample and Vizient provide differing levels of information regarding surgical provider availability in Nebraska. **Conclusion:** Unique perspectives were captured from various healthcare professionals involved in the management and treatment of surgical care patients. The database review reveals a gap in information related to availability of providers in Nebraska. We offer insight into the complex factors contributing to rural patient barriers and identify key strategies to promote access for all patients requiring surgical treatment.

Abbreviations

American College of Surgeons National Surgical Quality Improvement Program   ACS NSQIP

Center for Advanced Surgical Technology   CAST

Comparative Effectiveness Research   CER

Healthcare Cost and Utilization Program's National Inpatient Sample   HCUP NIS

Minimally Invasive Surgery   MIS

Patient-Centered Outcomes Research Institute   PCORI

Chapter 1 – Introduction & CE/Placement Site

UNMC's Center for Advanced Surgical Technology

The Center for Advanced Surgical Technology (CAST) is a collaborative of multidisciplinary groups of surgeons, engineers, and computer scientists from University of Nebraska campuses working together to advance surgical technology. CAST offers collaborative research opportunities to interested faculty and clinicians, as well as offering the research infrastructure for training the next generations of interdisciplinary scientists (CAST, 2020). CAST's current and former Directors are Physician Scientist with a subspecialty in Gastrointestinal - Minimally Invasive Surgery (MIS). CAST faculty provide medical education training for surgical fellows, residents, and medical students. As well as research opportunities for trainees and students interested in surgical outcomes research through UNMC's Expanding Comparative Effectiveness Research (CER) in Nebraska Program. CAST CER faculty have significant surgical outcomes research expertise utilizing national and regional data sources. The CER purpose is to bring together faculty from all UNMC colleges and disciplines to identify knowledge gaps in the effectiveness of clinical care and then prioritize, promote, and stimulate research that enhance the quality of patient care within Nebraska Medicine.

Project Background

The objectives of this capstone project are part of a larger research effort funded by Patient-Centered Outcomes Research Institute (PCORI) via the Eugene Washington PCORI Engagement Award for Rural Patient and Stakeholder Engagement in Research. Members from CAST,

including Dr. Oleynikov, the CAST Director, and Ms. Leon, CER Program Manager applied for pilot funding from the PCORI grant. The aims of the overall CAST pilot project include:

1. Create a patient and stakeholder minimally invasive surgery advisory committee

2. Conduct a needs assessment of MIS utilization to address challenges and facilitators encountered by patient, stakeholder, and research partners

3. Develop the framework to disseminate research among rural and urban patients and stakeholders, leading to increased patient awareness and improved quality of clinical practice

This Capstone experience is built around the second aim above.

Capstone Experience Objectives

The overall goal of this capstone project is to better understand strengths and weaknesses in rural surgery access to care from the perspective of key stakeholders and explore availability of resources to better support rural surgical patients. The **primary objective** of this project is to identify barriers and facilitators in the use of minimally invasive surgery in rural areas by providers, patients, and stakeholders through the (a) collaborative development of an interview guide, and (b) key informant interviews. The **secondary objective** of this project was to identify surgeon level and hospital level resources that may support either the identification or coordination of patient care across Nebraska through review of (a) CAST's CER most commonly used databases and (b) publicly available websites and data sources. Qualitative data gathered will provide insights into the barriers and facilitators to surgical care experienced in rural areas. Quantitative data offered further support for their patient and provider coordination of care initiatives.

Chapter 2 – Background/Literature Review

Nebraska Demographics

The current population of Nebraska is almost two million people, with nearly 35% of the population living in rural areas (USDA, 2019). Geographic barriers are a significant challenge in accessing health care, and there are different degrees of rural. The USDA defines rural ("noncore") as counties with less than 10,000 people and micropolitan as having a population of 10,000 to 50,000 (USDA, 2019). Of Nebraska's 93 counties, only five are metropolitan or non-rural (<50,000 people) (USDA, 2019).

Rural populations not only experience issues related to distance of healthcare services but also have unique healthcare needs compared to urban counterparts (Rural Health Information Hub, 2019). Health outcomes are consistently worse in rural areas than their urban counterparts for a number of reasons. Individuals living in rural areas are less likely to seek care, get tested for chronic conditions and are more likely to engage in risky behaviors ("Rural and Urban Health", n.d). Lack of access to care in rural areas is often associated with less insurance coverage and a limited healthcare workforce. In 2018, 24% of Nebraska's population living in rural areas did not have health insurance (Hoadley et al., 2018). In Nebraska, there are 64 Critical Access Hospitals, 144 Rural Health Clinics, and seven Federally Qualified Health Centers outside of the urban areas (Rural Health Information Hub, 2019). There is a lack of specialists available in rural areas with only 30 specialists per every 10,000 people in rural areas compared to 263 in urban areas ("About Rural Health Care", 2020). Research completed by Hsia and Shen, showed that a large portion of the United States' population did not have a trauma center within one hour of their home, with greater risk being among the rural population (2011).

Nearly, 80 of Nebraska's 93 counties are considered state-designated shortage areas of general surgery, not including small areas of counties that are part of a metropolitan area (USDA, 2019). The surgical healthcare needs of between metropolitan and non-metropolitan areas vary based on population. Cook et al. examine the differences between needs for surgical practices in large non-metropolitan, small non-metropolitan and rural areas, finding the differences in non-metropolitan areas are more nuanced than previously thought. Surgeons in rural areas limit the procedures that they offer based on the resources available at their local hospital. Meanwhile, surgeons in large non-metropolitan communities are responding to market pressure to provide more elective and specialized procedures as these communities grow in population (Cook et al., 2019). Surgeon availability is consistently more limited in rural areas. While there was an increase in thoracic surgeons between 2010 and 2014, the increase was seen in urban areas and not rural, and there are more orthopedic surgeons per capita in urban areas (Eberth et al., 2018; Fu et al., 2013). The shortage of surgeons in both areas requires special attention to the differing needs and barriers of each population.

There are distinct differences in surgical techniques used by practicing surgeons in rural and urban Nebraska (Gruber et al., 2015). One such disparity, is the use of Minimally Invasive Surgery (MIS) by physicians in the state. Minimally Invasive Surgery is a surgical technique that lessens surgical incisions to reduce trauma on the body. MIS includes both laparoscopic and robotic techniques. Despite having better outcomes and being less invasive, patients are more likely to undergo an open procedure (Robinson et al., 2011). The safe and effective technique is the standard of care for many tumor resection procedures as it is seen to have more positive outcomes and fewer complications than traditional approaches. However, MIS is underutilized in the state of Nebraska (Gruber et al., 2015). Patients with conditions such as colorectal cancer or

diverticulitis are less likely to undergo MIS in rural areas than those living in urban areas with high volume, specialized surgeon availability (Langenfeld et al, 2013; Lemini et al., 2018).

The training needs of practitioners in rural, large, non-metropolitan areas, and metropolitan areas are distinct, as emphasized in research completed by Cook et al. Rural areas showed greater needs of varied skills, while large, non-metropolitan areas favored surgeons with specialty training (Cook et al., 2019). Rural patients were 40% less likely to undergo laparoscopic procedure and had a wider range in demographics (Gruber et al, 2015). Confidence of the practitioner or comfort level to complete these procedures is another factor that may impact whether these procedures are offered. Physician education, training, fellowship opportunities and confidence are important factors in the availability and use of MIS, especially as the number of general surgeons in rural areas continue to fall and/or age (RHI, 2019; Ryan et al., 2016; Fu et al., 2013). The American College of Surgeons (ACS) Curriculum Committee identified gaps in in surgical care and explored the needed educational solutions. Themes emerged such as, communication of surgeons to patients, maintenance of needed skills, ongoing self-development, and modalities for learning (Kim et al., 2014). The training needs of surgeons are different depending on geographic location in which they are practicing, as well as population served. Rural training programs are becoming increasingly common as the need for rural surgeons has being identified. Currently, it is simpler for a medical student to train in an urban setting, than a rural. As of 2018, there was no comprehensive list of surgical residency tracks available to students with interests in rural programs (Rossi et al., 2018). As minimally invasive procedures including laparoscopic and robotic approaches are the standard of care in large, urban hospitals, the natural next step is to expand access of safe, less invasive techniques into rural areas.

The disparities in rural/urban healthcare, the differing needs of rural populations, and the utilization rates of MIS are complex, and this project will help to inform the current understanding of this issue. The population of Nebraska varies greatly depending on county, and this research will help in informing the needs of differing populations through a variety of perspectives. For this reason, it is essential to research how to improve patient outcomes for residents that live outside of Nebraska's metropolitan areas. The first objective identified barriers and facilitators in the use of minimally invasive surgery in rural areas by providers, patients, and stakeholders. Much research is done on access and use of procedures in urban areas, but there is limited knowledge on its use in rural areas. This project explored the reasons that rural patients are less likely to receive MIS, as well as continue to emphasize the need for training and placement of surgeons in rural areas as a priority for professional training institutions. For example, a physician's training level, comfort with MIS techniques, and accessibility to equipment may impact whether or not they offer this option to patients, and whether or not they are able to proceed with an MIS approach. Surgical training and education is ever changing as demand for surgery increases and technology improves. The second objective complemented this work by identifying surgeon level and hospital level resources that may support either the identification or coordination of patient care across Nebraska. While research into provider availability is widespread, there is less related to surgical care in Nebraska. For the health of rural populations, it is essential to make this research a priority.

Chapter 3 - Methods

To meet the stated objectives, this study used an exploratory sequential mixed methods study design (Schoonenboom & Burke Johnson, 2017). The <u>qualitative</u> phase allowed for exploratory evaluation of the complex issue of surgical access in Nebraska, as well as identification of potential solutions to barriers experienced by patients, stakeholders, and providers. The qualitative work led to a complementary quantitative phase, in which databases were reviewed for availability of information surrounding surgical care, particularly provider location and surgical care availability.   The study was deemed exempt by the UNMC Institutional Review Board (#712-19-EX).

Qualitative Phase

Development of the Semi-Structured Interview Guide

As part of the overarching PCORI project, the CAST team participated in a 2-day Rural Patient & Stakeholder Engagement in Research Summit in August 2019. CAST formed an MIS Steering Committee made up of a hospital administrator (n=1), surgeons (n=2), nurse (n=1), patients (n=3) and researchers (n=2) including representation across Nebraska. Key themes that emerged from the discussions during the summit, helped to inform the design of a semi-structured interview guide to better understand issues related to rural minimally invasive surgical care. The MIS Advisory Committee and UNMC/NM Faculty provided additional feedback on the interview guide. Specific to my capstone objectives, questions and probes were drafted based on a review of the literature for typical barriers to surgical care. The resulting interview guide contained three sections, capturing information on demographics of the interviewee and their organization (if applicable), access to care, and delivery of surgical care (Appendix A).

Recruitment for Interviews

A recruitment flyer was created inviting patient, provider, and stakeholder partners willing to share their experience in receiving or managing surgical care services in Nebraska (Appendix B). Potential participants were the original MIS Advisory Committee and a snowball sample of individuals that they recommended. The recruitment flyer was emailed to 20 potential participants- providers, patients and stakeholders. If there was no response via email, we followed up with a phone call. Three individuals declined to participate in this round of interviews. Recruitment efforts targeted UNMC/Nebraska Medicine faculty (providers and researchers), healthcare staff, and MIS Advisory Committee members to participate.

To be eligible to participate in the interviews, potential participants must meet the following inclusion criteria: Nebraska residency, 19 years of age or older and identification of one of the following: 1) Patient, caregiver, or family member with lived experience receiving surgical care, 2) Healthcare provider delivering surgical care treatment to rural or distant patients (E.g. surgeon, clinician, physician assistant, nurse practitioner, nurse, coordinator) 3) Stakeholder leaders at hospital, health system, or training institution representing surgical care patients. A recruitment script was followed for all phone calls in which potential participants were given a description of the study, instructions that stated participation was completely voluntary and an opportunity to ask questions.

Key Informant Interviews

Individuals that met eligibility and agreed to participate in the key informant interview were scheduled for a 1-hour (in-person or Zoom video) appointment at their convenience. All interviews were conducted from October 2019 to January 2020. Interviews were conducted in a private room at CAST or UNMC's College of Public Health to ensure privacy. Oral consent for

participation and permission for audio recording was obtained prior to the start of the interview. Two researchers (S.L. and M.L) conducted the interviews using the interview guide. On average, the interviews lasted between 30 and 70 minutes. Field notes were also taken during the interviews. The initial participant list consisted of 31 individuals who were either part of the original MIS Advisory Committee or referred by the Committee. Data collection for this project stopped when n=17 interviews were reached, and the remainder of the participants will be contacted during the continuation of this research.

The interviews were audio-recorded and transcribed verbatim, first using Otter.ai software, a free transcription service, and then checked for errors by the researchers (Otter.ai). Participants, individuals and organizations mentioned in the interviews were de-identified with unique study IDs to maintain the anonymity the interviewees. Geographic locations mentioned were also de-identified using The United States Office of Management and Budget delineates metropolitan and micropolitan statistical areas. Metropolitan counties are those with greater than 50,000 people. Non-metropolitan counties were subdivided into micropolitan (micro) areas between 10,000-49,999 and non-core with less an 10,0000 people. For the purposes of comparing urban to rural in this research, micropolitan and noncore counties are considered "rural".

Quantitative Phase

Parallel to the qualitative inquiry, it became clear that additional information about surgical services would be helpful. As such, CAST staff requested the review of public and private data sources and databases, to determine whether they could be used to identify surgical providers in Nebraska. Variables of interest include surgeon demographics (name, training level, location) and hospital or health care facility characteristics (type, name, location, surgical

service). Access to databases that are regularly used in CAST CER, such as American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP, 2020), Healthcare Cost and Utilization Program's National Inpatient Sample (HCUP NIS, 2020) and Vizient (Vizient, 2020) a membership healthcare improvement company, was requested, and each was evaluated for general contents based on the data dictionaries and user guides.

The quantitative phase was developed to explore the resources and modes by which information about MIS could be obtained by patient/caregivers or other providers. The databases were reviewed based on information other health care providers could access and then information available to the general public (e.g. patient or caregivers). To determine the utility of these sources a search was completed of each database's data dictionary which could be accessed through each respective site. For data sources that required membership, CAST provided necessary membership information.

Analytic Plan

NVivo 12 Pro software was used to code all 17 transcripts. Two researchers (S.L. and M.L.) individually reviewed transcripts for thematic codes of participant experience, then came together to develop a codebook focused on barriers, facilitators, attempted strategies, and solutions related to accessing surgery in Nebraska. After individual coding, they met to review discrepancies and reconcile differences. Results for the capstone focus on barriers to accessing receiving surgical care in rural Nebraska, facilitators that aid in the process of accessing and receiving surgical care and potential strategies to ensure access to surgical care for the entire state, no matter the patient's location of residence.

The information culled from the database search was compiled into descriptive and summary tables. These tables focus on hospital, providers, and surgical information. This information is descriptive only and no inferential statistics were planned.

Chapter 4 - Results

Participant Characteristics

During this capstone project, semi-structured interviews were completed with n=17 participants. Characteristics of the participants can be found in Table 1. Just over half of the sample was female. The participants were included in two primary groups, Group 1: Provider/stakeholder (76.5%) and Group 2: Patient/Caregiver (23.5%). Of the interviewees, 41.1% were providers (doctor of medicine or doctor of osteopathic medicine), 35.2% were stakeholders, 17.6% were patients and 5.9% were caregivers. Of the total sample, about 59% of participants were located in an urban area and the remaining 41% were located in rural areas. All participants had firsthand experience in receiving surgical care or caring for a family member that received care.

Table 1

Characteristics of interview participants (N=17)

Characteristic	N (%)
Sex	
Male	8 (47.0)
Female	9 (53.0)
Participant Role	
Group 1: Provider/Stakeholder	13 (76.5)
Group 2: Patient/Caregiver	4 (23.5)
Location	
Urban	7 (41.2)
Rural	10 (58.8)

Qualitative Results

Two main categories were analyzed in the interview transcripts: barriers and facilitators to accessing and receiving surgical care in rural Nebraska. Most commonly coded barriers and facilitators are discussed below, as well as primary differences in perspective of the two participant groups. Themes are further illustrated by examples of quotations found in the interviews. Additionally, strategies that have been attempted by participants and other proposed solutions are presented.

Table 2

Top Identified Barriers in the Interviews

Most common themes	Representative examples of the themes	Number of times coded in transcripts
Barriers Related to Travel/Distance Traveled	- Cost for gas and lodging - Childcare - Taking time off work - Adherence to required visits	62
Payment and Reimbursement Issues in Surgical Care	- Elective procedures not being covered - Geographically based or regional health insurance "Surprise billing" because of lack of price transparency	36
Limitations to Providing Surgical Care	- Barriers related to getting proper credentialing to work in hospital settings outside of home institution - Limited by hospital resources (i.e. surgical equipment) - Lack of trained staff	34
Telehealth Barriers	- Lengthy process in setting up telehealth infrastructure - Internet connectivity	32

Physician Training or Comfort Level	- Inability to perform physical diagnostic exam - Low volume of cases impacts comfort level in performing procedures - Education and training needs of physician needs differ depending on location in which a provider practices - Aging workforce comfort with newer surgical techniques	29

Barriers Related to Travel/Distance Traveled

Surgical care typically requires multiple visits with a surgeon including an initial consultation, pre-operative diagnostic procedures, peri-operative care during surgery, and then postoperative visits following their surgery. Specific surgical procedure required, type of case (elective or urgent), and a patient's medical condition impact the length of time involved in pre-operative evaluations and post-operative maintenance. Barriers related to travel for care were discussed by all of participants. Providers recognized the barriers their patients face, including cost of gas, lodging and food. They recognized that these barriers were more commonly faced by patients traveling from rural areas. Providers often reflected on these barriers:

> Well just you know, the cost of travel, you know, we have to the institution and sometimes giving people gas cards, because they can't afford to drive to from certain places here. So you know those type of expenditures are really a burden to the patients. - surgeon

Patients and caregivers, shared similar barriers reiterating the costs associated with travel. In addition, childcare was also associated with the time to travel, as well as taking time off work, potentially resulting in lost wages. On the day of the scheduled surgery, the patient often needs

someone to travel with them. The caregiver then faced similar barriers to the patient, resulting in

additional indirect costs and time off work. One patient shared their experience:

> I had to leave my home at four o'clock in the morning to get to my appointment in MetroCity by seven o'clock and you are NPO nothing to eat or drink. So it's traveling for quite a while, and then I had to have a procedure at seven o'clock at HospitalBuilding1 then go over to the HospitalBuilding2 to see surgeon003 and then go to another appointment and it was late into the afternoon before I finished before I could even find anything to eat. I was hypoglycemic and I had elevated blood pressure. And it's just a little bit of stress. And I guess that would be some of the negative things that I experienced." - patient

Providers were generally aware of the negative impact that distance from care can have

on patients. Notably, providers spoke of research showing that living a greater distance from

one's place of care resulted in worse outcomes. One surgeon shared an example of the impact on

care that distance can have on health outcomes. In this example, the surgeon shares research on

the lap band resulting in greater weight loss in patients living closer to their place of care.

> So like a MetroplitanCity1, where people actually were able to run clinics that were drop in appointments, where you could take a 30 minute lunch, drop into your clinic and get a micro adjustment of your band …people had phenomenal bariatric results with the band... And the band never did well in rural State1… But, you know, when you had to drive two hours to get a band adjustment, it just didn't work….so in MetroCity the average patient got something like nine or 10 band adjustments in the first year. Our patients got something like two to three band adjustments in the first year. – surgeon

Payment and Reimbursement Issues in Surgical Care

Payment and reimbursement issues were the second most commonly reported

barrier. Both providers and patients spoke of issues regarding geographic boundaries of

insurance coverage in managing their healthcare. For example, despite their being specialty care

in a city a relatively short distance for patients, if the hospital was in another state, patients

would have to travel farther for the same level care at a hospital in their state of residence.

… that is …a big barrier for my patients, though, is simply lack of insurance coverage for what they need. Bariatric surgery is not universally covered by their health insurance. And so that just off the top means many patients will not get access to bariatric surgery. But if they do have bariatric surgery, coverage and benefits, then they face the same things [barriers] that were done on your list – surgeon

But there's insurance barriers. So sometimes your insurance isn't necessarily state based. Its region based. So I have an example that we had a patient years ago. And I think his father, he worked solely in State1. His corporate office was like in State2. So he had something like an InsurancePlan, but it was based in State2. So he didn't do what he was told. He should have called before he came for a visit with us to see if we were in network. We weren't in network. His visit with us was $500 and surgery would cost him $4,000 but if he went to MetroHospital where they did have an agreement, it would be $500 for surgery so we gladly referred him. sometimes your relationships are completely based on state area. – nurse

Planning for payment was a topic mainly discussed by patients/caregivers. It was not generally part of provider to patient communication, and payment was coordinated outside of the providers' departments. Patients reported having to speak with multiple parties to plan financially for surgeries. However, both groups reported lack of insurance coverage for a procedure as a determining factor of whether someone would receive the care recommended by their provider.

Providers and stakeholders reported barriers related to not knowing the patient's insurance in emergent cases where fast decisions had to be made. This would often result in "surprise billing" for the patients. In these situations, decisions were made for the patient when they were unable, and the financial cost of these decisions was not known until much later.

Limitations to Providing Surgical Care

Another common set of barriers was the limitations that providers face when delivering surgical care in rural areas. Providers and stakeholders spoke of these topics broadly, while few were recognized by the patients and caregivers. This issue was primarily brought up in relation to providing telehealth to rural areas, and working with providers outside of their home institution.

For example, if a provider from a urban institution wants to assist in providing care for a patient

at an out-of-network institution with limited capacity, they experience barriers involving hospital

privileges, credentialing, and extensive administrative red tape. The development of telehealth as

a primary mode of care and increased needs for patient referral also open up new forms of

liability to providers. Health policies regarding provider liability when utilizing telehealth

services or providing advice to physicians calling for an opinion remain unclear, creating

difficulties in managing a patient's care across geographic locations. There is not clear written

policy on giving care over the phone to a physician in a rural area who is looking for advice.

Providers reflected on these challenges:

> People want to help, but people also don't want to open themselves up for liability that they don't understand. And, you know… But you know, we've been talking about setting up a telehealth clinic, out in MicroCity, right? And I mean, it's taken twice as long as anyone thought ... You know, we want to help but we also don't want to open ourselves to lawsuits. And I think that's part of the challenge. -surgeon

> And when you talk about emergency care or urgent care, I think people have the same issues. So you're like, I'm happy to talk to these ER docs and I'm happy to talk to these general surgeons who think that they've got something in front of them. They don't know how to take care of them but I also don't I want to open myself up to a lawsuit. If they die before they cross my threshold, or, you know, I give advice, and then the local docs don't take my advice. - surgeon

Beyond these limitations, there are limited resources in rural care settings. Providers

stated the lack of needed institution/hospital infrastructure, i.e. surgical equipment in operating

rooms, and trained support staff to help with procedures. One provider listed the needs of rural

facility to offer surgical services:

> … the expertise amongst nurses and ancillary care and that facility. So for instance, nurses know what they're doing, there's a blood bank and in case there's bleeding, that kinds of stuff. ICU bed in case there's a problem. So then, you know, that's personnel, equipment number one person number two and number three is, is physician "know how" so as a surgeon to do complex, minimally invasive surgery requires a lot of training. And

then it requires a lot of practice, meaning that even if you were trained, but you know, don't do the operation more than once, once a year, you're gonna have a hard time doing that operation well. So, so you need volume. - surgeon

Table 3

Top Identified Facilitators in the Interviews

Most common themes	Representative examples of the themes	Number of times coded in transcripts
Familiarity and Helpfulness in Surgical Referrals	- Provider knowing other providers personally - Ease in transferring patient records and information - Openness/receptiveness of receiving provider - Availability of hospital beds	45
Consideration of Patient Needs with Institutional Support	- Financial assistance and payment plans - Coverage of gas and lodging expense - Efforts to align patient appointments in one day	45
Availability and Ease of Use of Telehealth	- Buy in at all levels - Technological infrastructure - Opportunities for pre-surgery consultations visits to determine patient eligibility for procedure without needing to travel	44
Coordination of Care by Provider	- Aligning appointments in one day - Strong communication between providers - Ease of information sharing	44

Familiarity and Helpfulness in Surgical Referrals

The most coded facilitators were those related to the referral process, in which a patient's primary care provider refers them to a specialist or different level of care. Coordination of care across institutions was found to be an integral part of the providers' and stakeholders' abilities to provide proper care. Because providers were located throughout the state, they were asked how they either referred patients or received patients based on the most likely scenario. When asked how referrals were made, providers often noted sending patients to other providers that they knew professionally, such as through an established relationship through academic training. If a provider did not personally know who to contact or directly transfer their patient, they used the hospital's respective call-in system to facilitate the transfer and find an on-call provider. Attitudes on the call systems, a number used to ease the process of transferring a patient to a different level of care, were mixed. Many providers noted areas where they could be improved for more efficient coordination of care for the patient. Transfer processes varied by provider and based on the discretion of the originating provider.

> So before the before the transfer happens, it's variable that does affect whether I will transfer a patient to another facility if I speak to another surgeon, or emergency room physician, and they're collegial. And they express care and they seem to want to be involved in the case. And, you know, we go ahead and proceed. –surgeon

Because coordination of care between institutions was a focus of this research, there were discussions on how to strengthen relationships. Providers and stakeholders noted that existing relationships were essential to improving this type of coordination. Urban medical centers prioritize outreach to build these relationships and increase their reach. One stakeholder noted that greater outreach capabilities were one area that could help in increasing referrals:

> We do have relationships with both primary care physicians. We do some outreach to some of the, like the federally funded low-income type of clinics. But most of our networking and relationships are more with the critical access hospital or private practice clinics. - stakeholder

The referral process varied by provider, and patients were generally unclear on what kind of coordination needed to happen to make referrals and transfers. The discussions not only focused on the referral and transfer of the patient, but also how patient information was sent from one institution to another. This process was made more effective by connected electronic health record systems.

Consideration of Patient Needs with Institutional Support

Facilitators related to institutional assistance were the second most commonly coded facilitator in the interviews. Institutional assistance was defined as ways in which the system supported patients to overcome barriers related to accessing care. Most commonly, providers and stakeholders reported that their respective systems alleviated the stress of payment for care, and more indirect costs of receiving care. For example, there are financial counselors assigned to all patients, financial assistance options, and payment plans available for some. All parties noted assistance in the form of gas vouchers, meal cards, and reduced rate lodging.

> And we have across street from the hospital. It's called that LodgingOption1 and it's basically it's a mini hotel. You know, that's run by the hospital foundation and so patients who are from out of town can stay there very reasonably, I think it's only like $35 a night. So that's for a lot. I mean, that's one way we've tried to accommodate those people from out of town. – surgeon

Providers were generally aware of the barriers faced by patients traveling for care and shared ways in which the system attempted to help patients overcome these barriers. They recognized that more could be done, and that "access" has been a longstanding conversation in the surgical healthcare.

And that's a bigger tragedy, you know, or they get here and they need a gas card because they cannot afford the tank of gas to get them back home. And so of course, we get a gas card. But you know, they're terrified we won't give them the gas card. – surgeon

Patients shared that their experiences related to institutional assistance greatly depended on the provider from which they were receiving care. Most reported that the providers that they worked with were understanding of their barriers, and went out of their way to alleviate problems. Patients and caregivers also noted that this assistance impacted their perceptions of the care they received, and stated that negative experiences they have had with providers affected their comfort with seeking care on an ongoing basis.

Availability and Ease of Use of Telehealth

Availability of telehealth was often reported as a facilitator for increased access to care. Many surgeons addressed the fact that healthcare is moving in the direction of being more virtual-based and shared examples of where it could be used. One provider said:

> So maybe in some community, you know, we have some locations where it makes sense. And we have our specialists that are going out and they might spend four hours or even an entire day running an outpatient clinic, but in some of the more sparsely populated communities, you know, it doesn't make sense of two or three hours, you know, to see patients for an hour and then to drive that two or three hours back. So we will maybe be able to couple that with telemed. - surgeon

Providers recognized the benefit of being able to offer telehealth as an alternative form of care, and saw an opportunity to use the service for initial consultations:

> Because after the discussion they realize that they don't want to pursue surgery or, or that they're not ready yet, so there's no reason for them to make that trip beforehand. So saving them the travel or the uses of their resources and time I think is sometimes can be done through telehealth. - nurse

It was also seen as opportunity for post-operative care:

> Especially for their post op, obviously they're going to come to MetropolitanCity5 for their operation or for the procedure. But if we have the appropriate cameras, where the physician can examine the wound or the closure, the stitches, sutures, staple, whatever they use during that surgery, I believe that it's very advantageous for both the patient and for the physicians. – surgeon

Patients and caregivers reported mixed feelings on the use of telehealth. Some thought there was great potential for the use of virtual care in their communities, especially among populations with limited ability to travel because of aging or job expectations. Others had previous experiences using telehealth and thought that it was less personal and prone to issues related to connectivity.

Quantitative Results

Review of the three primary databases used by CAST are summarized in Tables 4 and 5. American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) does not provide provider information and is not representative based off its sampling practices. Healthcare Cost and Utilization Program's National Inpatient Sample (HCUP NIS) is a largely representative database, but does not provide information on hospital and provider. Vizient offered the most information in regards to hospital and provider characteristics, as well as details on surgical specialties. Vizient also went into further detail on specific surgical specialties.

In addition to the three databases that were reviewed for CAST, some exploratory research yielded additional databases/websites to support future surgical research by individuals/research entities seeking information on provider availability. The Department of Health and Human Services reports providers licensing information in the state, but data is limited to MD and DO (http://dhhs.ne.gov/licensure/Pages/Medicine-and-Surgery.aspx). In the registry, there were 9,695 MDs and 1,370 DOs. The addresses tied to the providers were not necessarily reflective of where they are practicing as only 34% of the providers in the state

registry listed an address within Nebraska. The American College of Surgeons provides a "Find

a Surgeon" tool, which goes in depth as to training and experience of the surgeons

(https://www.facs.org/search/find-a-surgeon). The site provides resources for patients to find

appropriate surgeons and a simple tool for finding a surgeon by name, locations,

specialty/subspecialty, condition/procedure or gender. However, ACS is an opt in service and

does not represent all surgeons practicing in Nebraska. Additional details on the resources that

ACS provides can be found in Appendix C.

Table 4

Data Sources or Websites Descriptions and Potential Use & Limitations

	Strengths & Potential Use	Limitations
ACS NISQIP	Offers some information on surgical specialty	Provider and hospital not identified, opt in service, not representative
HCUP NIS	Sampled from state inpatient databases, and covers 97% of the United States population. Provides provider and hospital information. Data directly from medical records	Only inpatient episodes, not used for hospital or provider analyses
Vizient	Vizient compares clinical outcomes with patient level data obtained from the participating members. The system allows the user to build reports comparing outcomes of one institution to another, or to the data as a whole. Vizient offers the most information in regards to surgical specialty	Membership required, only reflective of systems participating
ACS website	Offer guidance for patients to identify a surgeon, most easily accessible, public information	An opt-in service based on providers registering with the system.

DHHS	Use to identify providers practicing in Nebraska Available to anyone for small fee	Only provided list of Doctors of Medicine and Doctors of Osteopathic Medicine. Address affiliated with each provider is not necessarily where they practice.

Table 5

Database Review for Availability of Information on Hospital, Provider, and Surgical Care

	NISQIP	HCUP	Vizient
Provider and Hospital Information			
Provider Characteristics		x	
Provider ID		x	x
Hospital Identification		x	x
Surgical Specialties			
General Surgery	x		x
Cardiac Surgery			x
Colon and Rectal Surgery			x
Neurological Surgery	x		x
Orthopedic Surgery			x
Otolaryngology –Head/ Neck Surgery			x
Plastic Surgery	x		x
Thoracic and Cardiac Surgery	x		x
Vascular Surgery	x		x
Surgery Subspecialty			
Bariatric Surgery			x
Complex General Surgical Oncology			x
Pediatric Surgery	x		x
Surgery of the Hand			x

ACS NSQIP, HCUP NIS and Vizient all offer some information regarding surgical care, but not enough to identify available providers in Nebraska. The additional research of DHHS provider licensure list and the ACS "Find a Surgeon' tools offer more insight into surgeons throughout Nebraska, but are limited in scope.

Chapter 5 - Discussion

  The goal of this capstone project was to better understand strengths and weaknesses in rural surgery access to care from the perspective of key stakeholders and explore availability of resources to better support rural surgical patients. Through the research, we have recognized the challenge of receiving surgical care in rural areas, as well as identifying appropriate support for care. While all participants shared similar reflections, there were unique perspectives on each topic that can be used to further the work of improving access to surgical care throughout Nebraska.

  Travel and distance traveled were identified as the greatest barriers when receiving surgical care in Nebraska. Due to lack of specialty providers in rural areas, patients often must travel long distances for care, often for multiple appointments. There is little qualitative research completed on the implications of distance traveled for care. The growing barrier of travel distance is also explored in a study looking at the centralization of surgery, and shares the conclusion that this barrier may have significant impacts on patients' ability to receive quality care (Stitzenberg et al., 2009). Kelly et al., completed a systematic review and found that 77% of the articles researching distance and health outcomes showed a negative association between the two (2016). One study looking specifically at surgery reported increased mortality in the hospital of those that had to travel farther distances for surgery (Chou et al., 2014). Poor health outcomes was also brought up by the majority of providers and stakeholders in the interviews. In future studies it will be important to further research, whether the solutions to these barriers lie in increasing services in rural areas, or overcoming barriers faced when patients have to travel for care.

Insurance coverage and reimbursement for services was a barrier that was brought up more than initially expected. Payment and reimbursement issues were mentioned by all participants and it is a common refrain throughout the literature. There are numerous articles citing cost as a significant barrier to care, but few that are specific to surgical care. There also appeared to be a gap in knowledge between the providers and the patients when it came to payment for procedures (Haakenstad et al., 2019; Ziller et al., 2006; Hughes et al., 2015) In fact, one study reported rural patients paid more for colonoscopies than their urban counterparts, and one solution was the elimination of out of pocket costs for those patients do to mandates in the Affordable Care Act (Haakenstad et al., 2019). This is a complex issue in the United States, and will likely require policy change to improve. Another study looked at cost of colorectal screening in Nebraska and found cost to be a significant barrier for rural patients, similar to results found in this project (Hughes et al., 2015). A current solution to this issue is patient financial assistance programs. These programs were viewed as a facilitator for receiving needed surgical care. Similar to the results research done by Zafar and Peppercorn, providers recognized that the assistance was more of a "band aid" on a poorly built healthcare system, than a long-term solution for patients to receive care (2017).

All participants were familiar with telehealth to some degree, and had overall favorable views of its use. Patients were particularly interested in telehealth opportunities. Interestingly, despite their familiarity with telehealth, they were less aware of potential applications in surgical care. While they had seen telehealth progress in other areas of healthcare, they perceived less applications in surgery. Despite not coming up interviews, telehealth is being embraced in many surgical specialties, and conversations continue to expand as demand increases and reimbursement for services continues to improve (Stefano, 2017; Barriero et al., 2020; Lin et al.,

2020). The results of this project show that there are opportunities in pre-surgery consultations and post-operative follow ups, but identified limited options in other parts of the surgical workflow processes. A recent study showed the feasibility in using text messaging as a form of patient follow up after colorectal surgery, and shows potential in identifying postoperative complications (Bragg et al., 2017). This was similar to results of a study that used telephone calls for post-operative visits, where phone calls were offered after low-risk surgical procedures. Most patients that were eligible opted for the phone call, and this new type of appointment was found to be both convenient and timesaving, considering the time they would have spent traveling (Soegaard Ballestar et al., 2018).

There are also barriers to expanding telehealth services, recognized by most participants and in the literature. Barreiro et al. completed a review of current literature on barriers to implementing telehealth in rural communities and found the most common barriers to be fall into six categories: 1. technology, 2. education, 3. health systems, 4. finances, 5. privacy and 6. cultural considerations (2020). All aligned with what was found in this capstone project except cultural considerations. A study surveying family physicians cited lack of training and reimbursement as barriers for telehealth, both of which were emphasized in the interviews by providers in our study (Moore et al., 2016). Another study explored the acceptance of telemedicine in intensive care units (ICU), and found barriers to be confusion around the use, disruptions in workflows and a discomfort with the monitoring involved in telehealth when the patient was participating in an appointment via telehealth at another facility. Facilitators noted in the ICU pilot included past positive experiences and the perception of new benefits from the addition of telemedicine, aligning with the opportunities for telehealth discussed in this capstone project. Similar to this capstone project, results of the ICU pilot show the complexity of adapting

to new technological systems of care, but the results are promising with proper buy in and implementation (Moeckli & Cram, 2013). While the results of this research show most opportunity being in pre- and post- operative care, there is potential for the use if telehealth to be used in robotic surgeries. The market for telesurgery is growing, and more research is beginning to show the feasibility and safety of such practices (Evans et al., 2018). Telehealth is an emerging practice in surgical care, with multiple opportunities beyond just telesurgery, such as telementoring and teleconsultations (Gambadauro & Torrejón, 2013). Telemedicine in surgery has multiple benefits such as overcoming geographic barriers and the sharing of knowledge and expertise (Huang et al., 2019). Overwhelming, participants shared that the potential benefits of telehealth opportunities far outweighed the difficulty in implementation and use.

Another key finding of our study is that that there are large variations in the referral and transfer processes related to surgical care. In this project, there was more discussion around non-urgent referrals, or referrals that were not related to emergency operations, as that was more of the focus of the providers at CAST. It was most common that surgical referrals were made based on who the local doctor knew from previous education or practice. The environment was unique in this research, as the academic medical center at which the project took place educates a large majority of practitioners. Most commonly, providers working in rural areas identified an established relationship when calling or referring to another surgeon. Provider relationships such as these were most often the reason that patients ended up with a particular provider. Notably, patients also referred to finding providers through google searches and social media advertisements when they felt that matters needed to be taken into their own hands. If a provider did not have an existing relationship with a provider with whom they wanted to refer a patient, they would call the healthcare facility's designated phone number for transferring patients.

Providers spoke of the challenges in referring patients if they did not have an existing relationship with another surgeon. One proposed solution in the literature is evidence-based referral, in which patients must be referred to a hospital that meets a certain volume of procedures. Unfortunately, this can be an added barrier to both patients and hospitals. One study found that this type of referral system would increase travel time and result in lost revenue for hospitals (Ward et al., 2004). Another potential solution for referrals is the use of e-referrals and telemedicine, but this does not address the identified barrier of not knowing a surgeon to refer to (Hands et al., 2004; Kim-Hwang et al., 2010). Prada et al., 2019) Little qualitative research has been completed on referral and transfer processes. However, there have been reported issues with wait times to see specialists and lack of follow up by specialists, a barrier that did not emerge in this capstone project (Neimanis et al., 2017). There are immense areas of opportunity for research and improvement in ensuring the providers have the ability to properly refer a patient to the next level of care.

With the knowledge that both providers and patients faced barriers to in referring/being referred, we reviewed commonly used surgical databases and other resources to explore how surgeons could be located and identified. The results of the database review, indicate fragmented and incomplete information on the location and availability of surgical providers throughout the state. Up until this point, it appears that these databases have not been used for this type of research. Additional research showed the availability of public information on surgeon availability, but was limited by opt in status and website design that would not be intuitive for patients. The qualitative data complemented this learned knowledge with individual experience and perspectives. One systematic review explored what factors influence a patient's choice in surgeon. The review reported that it was common for patients to identify surgeons based off of

hospital characteristics, such as reputation and distance, but mainly relied on word of mouth and provider referrals to identify surgeons (Yahanda, 2016). This was like patients who participated in this capstone project's responses that they identified care through local providers and social media.

This capstone provides potential future directions and some actional recommendations. Firstly, create a registry of surgeons to facilitate identification and access to care in which all data is uniformly presented and which can be accessed publicly. Secondly, due to interest of all participants in telehealth options, institutions should explore processes and opportunities for using telehealth to improve aspects of the surgical care experience. For example, pre- and post-operative visits completed remotely for non-complicated patient cases would reduce time, travel and cost burdens for patients. Next, clarify and educate on referral patterns and options for providers to streamline processes and provide needed care to patients more efficiently. Fourth, increase partnerships with public health departments in long term planning and work related to access to care, aligning with priorities in Community Health Needs Assessments and Community Health Improvement Plans. Fifth, explore options for transportation of patients to alleviate burdens of travel. Sixth, engage minority and underrepresented populations to ensure that future work is more representative of the demographics of Nebraska, and as not to worsen health disparities that exist within these populations. Lastly, pursue additional funding to continue research on access to care, surgical outcomes and telehealth options. Additional research is needed to further validate the results presented within this project, as well as build upon identified barriers, facilitators, and solutions.

Limitations

Limitations exist due to the design and sampling for this project. The interview guide that was used was derived from the inputs of the MIS Advisory Committee, which is a relatively small group. In addition, we did not collect sociodemographic information from the participants. In rural Nebraska, the second largest ethnic group are those who identify as Hispanic/Latino. We know that this group disproportionately struggles with access to healthcare services. In future research, additional efforts should be made to engage Hispanic/Latino individuals to gain a better understanding of surgical care for all individuals living in Nebraska. The sampling frame used known providers and extended from there; thus, it is a convenience sample and may not be representative of all providers or caregivers or those in other states. Lastly, in general we found the databases lacking in useful information, particularly for patients. Yet we only sample the databases most used by the CAST team. Other more comprehensive data sources may exist; however, found no robust or comprehensive data sources that would be easy to find and use by the lay public.

Chapter 6 - Conclusion

Surgical care accounts for 40% of healthcare expenditures in the United States (Varghese et al., 2019). With increases in surgical procedures, and a wider range availability of surgical care across the country, this capstone begins to inform the barriers that patients and providers face regarding surgical care. This exploratory mixed methods study begins to inform that gaps in our understanding of these barriers; specifically, in Nebraska. The initial goal was to focus on MIS in Nebraska; however, it became apparent that MIS would be too narrow of a focus due to the limited availability and use of MIS outside of the urban areas. Thus, we reframed it to be

focused on surgery, in general, and the barriers and facilitators to getting surgical care in rural areas. Through this research, we identify clear barriers related to travel, including distance, time and costs associated with travel for surgical care. Use of the mixed methodology allowed for the elicitation of personal experience and possible solutions to the issue to be combined with a review of current data regarding provider availability. Combining the perspectives of multiple types of stakeholders allows for greater movement forward, as well as adds to a gap in current literature.

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Acknowledgments

Appendix A

RURAL SURGICAL CARE PERSPECTIVES IN NEBRASKA

Interview Guide

Date:

Interviewer Name:

Interview Type: _____in-person _____phone _____video/zoom

Participant ID:

<u>Introductory Statement</u>

Hi, my name is [First, Last Name] and I am a [Role] at UNMC. *"Rural Surgical Perspectives in Nebraska"* is a research project that seeks to understand rural surgical care barriers and facilitators. We are inviting patient, provider, and stakeholder partners willing to share their experience in receiving, delivering, or managing surgical care services in Nebraska. Your perspective and responses may assist in developing recommendations to improve access and delivery of surgical care services. This interview will take ~30 minutes to complete. Your participation is strictly voluntary.

<u>Review Written/Oral Informed Consent</u>

Do you consent to participate in this study? _____Yes. _____No.

<u>Audio Recording</u>
With your permission, this interview will be recorded to produce an accurate transcript of our discussion. Notes will also be taken.

<u>Questions</u>
Do you have any questions before we begin?

[Begin Recording]

Start Time:

End Time:

Participant Demographics/Warm Up

1. Which of the following best describe your role and perspective with surgical care?
   a. Patient, caregiver, or family member
      i. Thinking back to the last time you received care, what type of surgery did you/him/she receive?
      ii. Specialty?
      iii. What city were you living in at the time of surgery?
      iv. What city or institution was surgical received? Why did you choose this institution?
      v. How far did you travel?
   b. Healthcare provider including clinician, physician assistant, nurse practitioner, nurse, coordinator, other
      i. What your role?
      ii. Specialty?
      iii. Institution Name or Location
   c. Stakeholder leader including hospital administrator, policymakers, hospitals or health systems, and training institution
      i. What your role?
      ii. Institution Name and Location
      iii. How does your role relate to surgical care?
      iv. In your role, do you work with patients who require care outside of your institution? Where are they typically referred?
      v. From your experience, why do they need to seek care at a different institution?
   d. Surgeon
      i. What is your current job title?
      ii. How long you have been in that role?
      iii. Specialty?
      iv. Subspecialty?
      v. Fellowship/Additional training?
      vi. Institution Name and Location
      vii. What type of procedures do you perform?
      viii. Volume # cases per year
      ix. Are there procedures you routinely ascend to a bigger center or feel comfortable with all procedures?
      x. Do you work with patients that travel long distances for care?

Surgical Procedures:				Other:	
	Skin, Soft Tissue		**Abdominal**		
	Breast		Biliary		
	Head and Neck		Liver		
	Alimentary Tract		Pancreas		
	Esophagus		Gallbladder		
	Stomach		Spleen		
	Small Intestine		**Hernia**	**Endoscopic Procedures:**	
	Large Intestine		Incisional/Ventral		Upper
	Appendix		Inguinal		Lower
	Anti-reflux		**Bariatric**	**Approach:**	
	Endocrine		Gastric Bypass		Open
	Thyroid / Parathyroid		Sleeve Gastrectomy		MIS Laparoscopic
	Trauma		Gastric Band		MIS Robotic

Thank you for helping me better understand your role and how you serve your patients. Now I would like to ask some questions related to surgical care in rural Nebraska.

Access to Surgical Care
Access to surgery has been identified as a significant barrier for patients in rural areas of our state. Access can mean a lot of things, including lack of providers, shortage of specialties, distance traveled, facility recourses etc.

[Surgeon /Physician Shortage]

2. [PROVIDER/STAKEHOLDER] What are some ways you have tried to overcome or deal with lack of providers in your area?
   a. Probes: Are there specific types of practitioners you need?
   b. Probes: Are there programs and initiatives you have tried?
      i. Probe: Which have been successful? Which have failed or not had the results you intended?
      ii. Probe: Some ideas of strategies we have heard about are: loan repayment programs, scholarship programs, clinical education rotation programs, J-1 visa waiver, career education programs)

3. [ALL] As a [Partner Role], can you describe how the lack of surgical specialty care has impacted [your/patient/community] healthcare?
    a. Eg Delay in care
    b. Provider Probe: can you give me some specific examples of how this impacts your patients.

[Distance Traveled]
For a large state like Nebraska, distance is a common barrier and many patients travel long distances for routine and/or specialty care and surgery.

4. [ALL] How does distance or travel time impact [your/ your patient/ their] access to surgical care?

5. Describe ways [you/ your provider/ institution] help manage these challenges?
    a. Patient Probe: What are ways that providers or institutions have helped with these barriers in the past? What could they do to be more accommodating to you/?
    b. Provider/Administrator Probe: Some barriers associated with travel, is the travel time and costs to travel. Do you have any practices that you or your organization use to reduce these barriers? Can you describe those to me?

[Additional Barriers]
6. [ALL] What other barriers exist when it comes to access to surgical care for you and your community?

7. [PROVIDER/STAKEHOLDER] Lastly on barriers, have you or your organization tried to overcome barriers associated with providing care by using payment/reimbursement approaches?
    a. Probe: This could be the way your system codes or tries to coordinator across various payers-insurance, Medicaid, etc.

Delivery of Surgical Care

Advanced Surgical Procedures
Minimally Invasive Surgery is a surgical technique that lessens surgical incisions to reduce trauma on the body. MIS includes both laparoscopic and robotic techniques. Despite having better outcomes and being less invasive, patients are more likely to undergo an open procedure and MIS remains underutilized in the state of Nebraska. In this next section, I'm going to focus more specifically on Minimally Invasive Surgery, including preoperative, operative, and postoperative care, including complications and the patient's referral process.

8. [ALL PROVIDER/STAKEHOLDER] Can you describe barriers to providing MIS in rural areas of the state?
   a. Probe: Which of these can be overcome? What sorts of solutions are needed (e.g. better marketing, better facilities, etc?)

Referrals:
[RURAL PROVIDER/STAKEHOLDER]
9. Can you describe what happens during the referral or transfer of a patient to an urban hospital?
   a. Probe: What is the referral process?
   b. Probe: How do you communicate this process with your patient?
   c. Probe: How do you communicate a patient transfer to the other institution?
   d. Probe: Do you hand-off your patients to the urban provider or manage care together?
   e. Probe: What about follow-up?

[URBAN PROVIDER/STAKEHOLDER]
10. Can you describe what it is like to care for rural or distant patients?
    a. Probe: How are patients referred to you?
    b. Probe: How does a rural provider communicate a patient referral to you?
    c. Probe: What type of preoperative consultations are required for surgery?
    d. Probe: What are the postoperative processes you have in place?
    a. Have you tried to lower barriers for rural patients?
    b. Are there ways you would still like to improve? OR specific barriers you can share that need to be overcome to make better for the patient?

11. In general, does the referral/transfer process work well for your organization? Are there ways you would like to improve that process?
    a. Probe: Could you reduce any of the barriers we discussed before for patients if you had an improved process?

12. What type challenges have you experienced with payment or reimbursement models when transferring or referring patients on?
    a. Probe: are the challenges to adapting new strategies? (e.g., PPO, HMOs, discount cards) and/or e.g., HealthCare Group, safety net programs, employer sponsored programs

Telemedicine

Now, I want to talk to you about something else. *(Make the transition known)
Hospital organizations across the state are moving towards the use of telemedicine/telehealth to support and promote long-distance clinical health care, patient and professional health-related education, public health and health administration. Telehealth uses electronic information and telecommunications technologies including videoconferencing, the internet, streaming media, and terrestrial and wireless communications.

13. [ALL] How might this be impactful to MIS? (Pre-operative, post-operative, follow-up)

14. [ALL] Have you ever used telemedicine services in your care/practice?
    a. Probe: How long? What has gone well? What has been the challenges?
    b. What type of specialty/service was used?
    c. What type of application was used?
        i. Live (synchronous) videoconferencing: a two-way audiovisual link between a patient and a care provider
        ii.   Store-and-forward (asynchronous) videoconferencing: transmission of a recorded health history to a health practitioner, usually a specialist.
        iii.   Remote patient monitoring (RPM)
        iv.   Mobile health (mHealth): health care and public health information provided through mobile devices.

15. [PROVIDER/STAKEHOLDER] What are your thoughts on the potential of telemedicine in MIS or surgery in general?
    a. Probe: What would be the needs for you to adopt a telemedicine approach?
    b. Probe: Which point in the referral or treatment process makes more sense? Less sense?
    c. Probe: How willing patients might be to use telemedicine services?

That is the end of my questions. Is there anything you would like to share that I didn't directly ask you about?

Thank you!

Appendix B

Rural Surgical Care Perspectives in Nebraska

IRB # 712-19-EX

"Rural Surgical Care Perspectives in Nebraska" is a research project developed by the Center for Advanced Surgical Technology at the College of Medicine of the University of Nebraska Medical Center.

The project seeks to understand rural surgical care barriers and facilitators. We are inviting patient, provider, and stakeholder partners willing to share their experience in receiving or managing surgical care services in Nebraska. We want to hear your perspectives.

You are invited to participate if:

- You are at least 19 years of age or older
- You live in Nebraska
- You are a patient, caregiver, or family member with lived experience receiving surgical care
- You are a healthcare provider delivering surgical care to rural or distant patients

    E.g. surgeon, clinician, physician assistant, nurse practitioner, nurse, coordinator

- You are a stakeholder leader at a hospital, health system, or training institution representing the delivery or management of patient surgical care

This survey will take approximately 30 minutes to complete.

Risks from this study are minimal, but responses may assist in developing recommendations for communities to improve access and delivery of surgical care in Nebraska.

Participation is strictly voluntary, and you may refuse to participate at any time. Deciding not to participate in this research study or deciding to withdraw will not affect your relationship with any of the study personnel or with the University of Nebraska Medical Center or Nebraska Medicine.

If you have questions at any point, please feel free to contact any of the study personnel listed:

Melissa Leon, MPH Principal Investigator melissa.leon@unmc.edu 402-559-2162	Dmitry Oleynikov, MD Co-Investigator dmitry.oleynikov@unmc.edu 402-559-4581	Sarah Liewer, BS Participating Personnel sarah.liewer@unmc.edu 712-490-3631

Appendix C

Find a Surgeon https://www.facs.org/search/find-a-surgeon

Resource:
A. How to Look for a Qualified Surgeon https://www.facs.org/education/patient-education/patient-resources/qualifications
   a. board certification
   b. fellowship at ACS
   c. practice in an accredited health facility https://www.qualitycheck.org/
   d. Surgeon by surgeon. "The letters F.A.C.S. (Fellow of the American College of Surgeons) after a surgeon's name are a further indication of a physician's qualifications."
B. A Guide to Surgical Specialists https://www.facs.org/education/patient-education/patient-resources/specialists
   a. Describes each specialty
C. Check for a Surgeon's Board Certification https://www.facs.org/education/patient-education/find/board-certification
D. Check for Facility Accreditation https://www.facs.org/education/patient-education/find/facility-accreditation
   a. Hospital "You can check to see if a hospital has been accredited by visiting www.qualitycheck.org and entering your search information." https://www.qualitycheck.org/
   b. Surgical Center "Visit AAAHC to see if your surgical center is accredited. Once you enter the AAAHC website, click the heading "Search for Accredited Organizations" to access find a list of facilities in your area." https://www.aaahc.org/
E. Information for Surgeons on Patient Resources
F. Patient Resources
   a. https://www.facs.org/education/patient-education
   b. Surgical Wounds https://www.facs.org/-/media/files/education/patient-ed/wound_surgical.ashx
   c. Surgery Brochures https://www.facs.org/education/patient-education/patient-resources/operations
G. Should You Seek Consultation?
H. Giving Your Informed Consent

Biography

Sarah Stanislav, BS, received her Bachelor of Science from Iowa State University in 2015, with a major in Dietetics and a minor in Sustainability. After graduating, she worked as a health coach and in community nutrition. She has worked for and contracted with numerous nonprofits as a program coordinator. In the Spring of 2018, she was accepted into the University of Nebraska Medical Center's College of Public Health to pursue her MPH in Health Promotion, where she is currently completing her final semester. While enrolled at the COPH, she worked as a student researcher at UNMC's Center for Reducing Health Disparities and as Vice President of the student coalition, EMPOWER. Sarah currently works as a Healthy Communities Coordinator at CHI Health where she works in communities throughout Nebraska to complete Community Health Needs Assessments and address prioritized health needs.

Sarah C. Stanislav

9247 Fowler Circle
Omaha, Nebraska 68134

712.490.3631
sarahcliewer@gmail.com

Education

University of Nebraska Medical Center, Omaha, Nebraska   **Expected May 2020**
Master of Public Health
Concentration: Health Promotion

Iowa State University, Ames, Iowa   **May 2015**
Bachelor of Science in Dietetics
Minor: Sustainability

Capstone Experience, Omaha, Nebraska
"SURGICAL CARE PERSPECTIVES: Exploring Barriers and Facilitators to Surgery in Rural Nebraska"

Professional Experience

Healthy Communities Coordinator   **December 2019 - Present**
CHI Health, Omaha, Nebraska
- Complete Community Health Needs Assessments, work collaboratively to see through unique Implementation Strategic Plans, and document associated tax reporting for Community Benefit
- Work collaboratively with both internal and external stakeholders in CHI Health communities to ensure progress of prioritized health needs

Research Assistant   **November 2018 – April 2020**
Center for Reducing Health Disparities, Omaha, Nebraska
- Aid in the design and implementation of quantitative and qualitative research tools
- Assist in a variety of grant-related activities, including literature reviews, data collection, data analysis, and project evaluation

Program Consultant   **May 2018 – November 2018**
Nebraska Appleseed, Lincoln, Nebraska
- Managed Preventing Childhood Obesity grant provided by Children's Hospital and Medical Center to meet specific project deliverables
- Created a social media marketing strategy, implemented research and evaluation on summer meals use, and provided program support for summer meals in the Omaha metro area

Omaha Double Up Food Bucks Extension Coordinator   **May 2018 – October 2018**
Nebraska Extension, Omaha, Nebraska
- Worked with the Omaha Farmers Market and community partners to double the buying power of individuals using SNAP at two Omaha markets
- Recruited, trained, and coordinated volunteers to provide nutrition education at the markets
- Taught nutrition and STEM related curriculum in schools and throughout the community

Campaign Lead   **August 2016 – July 2018**
No Kid Hungry Nebraska, Omaha, Nebraska

- Directed and coordinated the No Kid Hungry Nebraska campaign through marketing, reporting, and achieving set goals
- Maintained the relationship with Share our Strength and management of the Youth Ambassador program

Program Coordinator   **August 2016 – May 2018**
Hunger Free Heartland, Omaha, Nebraska
- Worked as a subject matter expert on federal child nutrition programs and other strategies to address childhood food insecurity throughout Nebraska
- Managed HFH's School Breakfast and Summer Meals programs by maintaining relationships with all key stakeholders, providing technical assistance, and managing project content
- Aided in development through grant writing and marketing design and implementation

Certified Profile Coach   **December 2015 – August 2016**
Profile by Sanford, Des Moines, Iowa
- Used motivational interviewing techniques to encourage clients to maintain a healthy lifestyle
- Worked as part of an interdisciplinary team to assist with business development, evaluate program protocols and effectiveness, and develop solutions for improvement

Student Researcher   **June 2015**
Multidisciplinary Experiential Study of International Nutrition, Peru
- Conducted nutrition research and implemented community interventions
- Developed an understanding of the complexity of nutrition issues and barriers to behavior change through working with professionals and completing field work in various communities

Service Learning/Independent Study   **August 2014 – May 2015**
Clinical Health Coaching Practical Experience, Ames, Iowa
- Applied theories of behavior change and aspects of motivational interviewing in weekly sessions with research participants to promote healthy lifestyles
- Entered diet logs into the ESHA Food Processor Nutrition Analysis Software and utilized data to analyze participants' diets via the Healthy Eating Index

Volunteer and Leadership Experience

Capstone Experience   **August 2019 - Present**
Center for Advanced Surgical Technologies (CAST), UNMC, Omaha
- Work with CAST and a community advisory committee to develop and implement a needs assessment to determine the strengths and challenges of surgery in rural Nebraska

Work Group Lead/Leadership Council   **June 2019 – December 2019**
Share Our Table, Omaha, Nebraska
- Participate as a work group leader to facilitate conversations with multiple stakeholders to alleviate food insecurity in the Omaha area

Volunteer and Event Coordinator   **June 2018 – December 2019**
Our Gathering Place, Omaha, Nebraska
- Plan and see through mobile meals events for families with children with special needs
- Recruit and maintain relationships with volunteers, event participants, and funders

Vice President   **April 2018 – December 2019**

EMPOWER, UNMC, Omaha, Nebraska
- Work with community partners to raise awareness of domestic and sexual violence
- Advocate for the health and wellbeing of women through the partnership with the Women's Center for Advancement and Girls Inc.

Intern   **May – June 2014**

Dean's Global Agriculture and Food Leadership Program, Italy
- Worked as part of a team to gather and review data and collaborate with the Food and Agriculture Organization (FAO) of the United Nations to add to and raise awareness of the FAO/INFOODS Food Composition Database for Biodiversity
- Developed professional communication and public speaking skills through weekly meetings with FAO professionals and a final presentation

Student Representative   **October 2013 - May 2015**

Food Science and Human Nutrition (FSHN) Outcomes Assessment Committee, Ames, Iowa
- Analyzed data from student and alumni surveys to determine strengths and weaknesses of the FSHN curriculum

Certifications and Skills

Certifications: ServSafe*,* National Institutes of Health Human Subjects Training, Certified Profile Coach

Skills: SPSS, Microsoft Office, Grant Writing, Respirator Fit Testing, Incident Command System

Selected Posters and Presentations

Liewer, S. C., Quintero, S. A., Ramos, A.K. (2019, June). *Community Leaders' Perspectives on Welcoming Communities.* Presented at Cambio de Colores in Columbia, Missouri.

Ramos, A., Carvajal, M., **Liewer, S.,** Quintero, S. (2019, March). *Rural Narratives on Welcoming Communities: A Report to the Columbus Chamber of Commerce.* Columbus, Nebraska.