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Identifying Perceived Barriers to Communication and Coordination of Care of the Liver

Transplant Recipient

Meghan C. O'Meara

Submitted as Partial Fulfillment for the Doctor of Nursing Practice Degree

Regis University

May 3, 2018

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Executive Summary

Identifying Perceived Barriers to Communication and Coordination of Care of the Liver Transplant Recipient

Problem

Communication is essential between and among all members of the health care team to provide coordinated care that is effective, efficient, cost sensitive, safe and maximizes health care goals and outcomes for post liver transplant patients. Although essential, it remains unclear why effective communication and coordination of care it is not always available between and among members caring for the liver transplant recipient.

Purpose

Perceived barriers to communication and coordination of care need to be identified and better understood between the University of Colorado Health (UCH) liver transplant team members (LTTMs) and primary care providers (PCPs) in order to begin to breakdown these barriers and drive necessary change.

Goals

The goal of the project was to identify perceived barriers to communication and coordination of care of the liver transplant recipient among and between members of the transplant team and PCPs caring for liver transplant recipients.

Objectives

The first objective was to identify perceived barriers to communication and coordination of care through a self-report survey completed by the IPHCT including the transplant team members and PCPs. The second was to analyze perceptions between and among participants for common and uncommon themes.

Plan

A self-report instrument was generated from current literature on barriers to communication and coordination of care between outpatient clinics and face-validity was established. The 20-question survey was sent electronically via Survey Monkey to members of the liver transplant team and providers listed as PCPs of liver transplant recipients in the electronic health record. Self-report survey responses were summarized and reviewed for frequency of similar answers and differences between primary care providers and members of the liver transplant team.

Outcomes and Results

Both LTTMs and PCPs reported using the EPIC electronic medical record was the most preferred method of communication between care providers suggesting the method of communication between the two teams was not a major issue. LTTMs felt lack of written communication to be the greatest barrier to ongoing communication and were more routine in sending treatment plans than PCPs were. Neither group reported a lack confidence of when to contact other providers. The major barriers to communication and coordination of care between LTTMs and PCPs was based on role confusion, lack of clear expectations, lack of education on how to care for the liver transplant recipient, and the lack of a relationship between PCPs and LTTMs. PCPs and LTTMs did not agree on which team should manage renal insufficiency.

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There are not enough words to describe how grateful I am for all those who supported me throughout this project.

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To Heidi Monroe, my clinical mentor, thank you for motivating me to improve the care of liver transplant patients.

To Joe, my husband, thank you for just being you.

To my family, thank you for all your support throughout my many years of education.

This project is dedicated to the most amazing nurse I have ever known, my mother, Carol O'Meara.

Table of Contents

I.	Preliminary Pages	i
	A. Copyright Page	i
	B. Executive Summary	ii
	C. Acknowledgements	iii
	D. Table of Contents	iv
	E. List of Tables	vi
	F. List of Figures	vi
	G. List of Appendices	vi
II.	Problem Recognition and Definition	1
	A. Problem	1
	B. Project Purpose	2
	C. Project Question	2
	D. PICO Statements	3
	E. Project Significance	3
	F. Foundational Theory	3
	i. Tuckman’s Model of Small Group Development.	3
	ii. Mishel’s Uncertainty in Illness	4
	G. Literature Search	5
	H. Review of Evidence	6
III.	Market Risk Analysis	9
	A. Strengths, Weakness, Opportunities and Threats	9
	B. Driving and Restraining Forces	11

C. Stakeholders	11
D. Project Team	11
E. Cost Benefit Analysis	11
IV. Project Objectives	13
A. Mission	13
B. Vision	13
C. Goals	13
D. Objectives	13
E. Conceptual Model	13
V. Methodology	14
A. Research Design	14
B. Sample Population	15
C. Setting	16
D. Methods	16
E. Instrument	16
F. Protection of Human Subjects/Risk Evaluation	17
VI. Project Findings and Results	18
A. Sample	18
B. Perceived Barriers to Communication and Coordination of Care	19
C. Summary of Major Findings	24
VII. Conclusion	25
VIII. Limitations, Recommendations and Implications for Change	26
A. Limitations	26

B. Recommendations	26
C. Implications for Change	27
IX. References	28
X. Appendices	33

List of Tables

I. Literature Review Search Term Summary	6
II. Project Cost: Team Members	12
III. Project Cost: Software and Hardware	12

List of Figures

I. SWOT Analysis	10
II. Number of UCH Post-Liver Transplant Patients Cared For	19
III. Methods Utilized to Obtain Records	20
IV. Greatest Perceived Barrier to Communication	20
V. Most and Least Effective Method of Communication	21
VI. Perception of What the LTTM Should Manage	22
VII. Perception of What the PCP Should Manage	22

List of Appendices

A. Systematic Review of the Literature	32
B. Concept Model	33
C. Letter Accompanying Survey and Survey Tool	34
D. Survey Tool	35
E. Timeframe.	38
F. CITI Training Certificate	39

G. IRB and Agency Approval for Project.	42
H. Greatest Barriers to Communication (SPSS Data)	46
I. Perceived Greatest and Least Effective Forms of Communication (SPSS Data).	47
J. Perception of what the LTTM and PCP Should Manage (SPSS Data)	49
K. Perception of Timely Access to Care (SPSS Data)	56

Identifying Perceived Barriers to Communication and Coordination of Care of the Liver

Transplant Recipient

Problem Recognition and Definition**Problem**

The liver transplant process is long and tedious for patients as they shuffle between various healthcare providers while suffering physically and emotionally with end stage liver disease. After liver transplant surgery, patients continue to require medical management from multiple providers including their transplant providers, primary care providers (PCPs), and many times from other specialists as well. The complexity of these patients and the multiple care providers can create a barrier to care particularly when patient care coordination, plan of care and expected patient outcomes are unclear to all team members.

While Interprofessional Health Care Teams (IPHCT) can deliver effective, high-quality, cost effective care for complex patients with multiple comorbidities (Reeves, Pelone, Harrison, Goldman & Zwarenstein, 2017) and for best outcomes, team members must collaborate and establish clear lines of communication (Weiss, Tilin, & Morgan, 2018). If this does not happen, team members can become cautious in providing care that may interfere or negate other care provider's interventions, thus decreasing rather than increasing optimal outcomes for the patients. For example, PCPs may be uncertain if their plans of care for acute minor or stable chronic conditions such as hypertension, sinus infections, contraception, bacterial infections and so on might interfere with the post liver transplant care required for comorbidities associated with liver disease, use of immunosuppressant medications or other treatments designed to maximize the function of the transplant graft and minimize the risk of rejection. In turn, the transplant team may not be aware that the client is being treated for a viral infection or other

pathology that could interfere with the graft or negate best overall outcomes for the client.

There was little question that when communication and coordination of care between specialty clinics and primary care fails, delays in diagnosis and treatment of complications can occur (Heller, Prochazka, Everson & Forman, 2009; Weiss, Tilin, & Morgan, 2018; Younossi et al., 2014). In fact, primary care that the liver transplant recipient population received from providers outside the transplant team can have an impacted both morbidity and mortality (Heller, Prochazka, Everson & Forman, 2009; Wong and Pagalilauan, 2015). While there was significant support for the concept that coordinated care demanded clear communication between and among all levels of care for best patient outcomes, the barriers to communication have not been extensively explored in the literature with this population (Banares and Salcedo, 2014; Heller, Prochazka, Everson & Forman, 2009).

Project Purpose

The purpose of this project was to identify barriers to communication and coordination of care between PCPs caring for liver transplant recipients and the health care providers from the liver transplant team.

Project Question

What are the perceived barriers to communication and coordination of care between the PCPs caring for clients post liver transplant and health care providers from the liver transplant team?

PICO Statements

Population. The PCP population consisted of physicians, nurse practitioners and physician assistants caring for liver transplant recipients who receive their transplant care from a major hospital system in Denver, Colorado. The liver transplant team consisted of transplant

hepatology physicians and registered nurse (RN) liver transplant coordinators from the same major hospital system.

Intervention. A self-report survey was developed, distributed and analyzed to explore perceptions of barriers to communication and coordination of care among the providers of liver transplant recipients.

Comparison. Compared perceptions of barriers to communication and coordination of care among the providers of liver transplant recipients.

Outcome. Identified perceived barriers to communication and coordination of care within the study population.

Project Significance

Communication is essential between and among all members of the health care team to provide coordinated care that is effective, efficient, cost sensitive, safe and maximizes health care goals and outcomes for post liver transplant patients. Although essential, it remains unclear why effective communication and coordination of care it is not always available and perceived barriers need to be identified and better understood to drive change to improve communication between care providers.

Foundational Theory

Tuckman's Model of Small Group Development. Tuckman's Model of Small Group Development's (1965) purpose was to identify the stages small groups progress through as they move from a group with no common purpose to a team with an identified common goal. The major stages identified by Tuckman included forming, storming, norming, and performing. The forming stage focused on establishing dependent relationships prior to the storming stage where conflict can arise as tasks and roles are first identified (Tuckman). Norming occurs when roles

and standards are adopted setting a foundation for the performing stage in which a cohesive functional and flexible team works together on the task (Tuckman).

Utilizing Tuckman's (1965) model in the post-transplant setting could be beneficial for better understanding communication and coordination of care of liver transplant recipients in a small group comprised of health care providers from various clinics. This DNP project required a model that helped guide two groups, primary care providers and liver transplant team members, to come together as a functional team to manage complex post liver transplant patients and maximize patient outcomes. PCPs and transplant teams initiated the forming stage as both parties were brought together by the liver transplant patient to co-manage care; however, it was possible the group did not move through storming and norming to performing related to perceived barriers in communication and coordination of care.

Mishel's Uncertainty in Illness. Mishel's Uncertainty in Illness is a middle range nursing theory that looked at how patients created meaning from events surrounding their illness (Mishel, 1988). When the meaning of an event was unable to be found, a person felt uncertainty. Mishel's concepts included stimuli frames, structure providers, cognitive capacities, appraisal, and coping. Mishel proposed that illness provided the patient with uncertainty that could be seen as a danger or an opportunity. If a patient was coping effectively then the patient was capable of redirecting uncertainty to become a beneficial aspect in his/her health. Therefore, the context for use in this project was in how not only the patient but also health care providers could intervene throughout illness to promote adaptation from uncertainty instead of creating angst. Uncertainty in Illness was especially impactful in patients with chronic illness such as patients who lived through end stage liver disease and survived liver transplant (Bailey et al., 2010).

Mishel's emphasized that uncertainty can be transformed into a positive or negative experience. The liver transplant recipient population is particularly vulnerable to this uncertainty as Mishel's three stimuli of symptom pattern, event familiarity and event congruence are often lacking, therefore, increasing uncertainty. Mishel stated that credible authority figures, such as healthcare providers, reduced uncertainty when they provided information to the patient. When communication and collaboration between PCPs and transplant clinics is hindered, health care management may fail, and patient uncertainty increases. Poor management could increase risk of graft failure and decrease overall health, which then furthers patient uncertainty.

Literature Search

A literature review was completed using the Cumulative Index of Nursing and Allied Health Literature (CINAHL), EBSCO, MEDLINE, PubMed databases in addition to the University of Colorado Health library search engine. Keywords included primary care, post liver transplant, liver transplant recipients, post-transplantation care, communication, co-management and specialty clinic. The search concluded when the same articles were listed despite changes in keywords; however, four additional articles outside the last five-year exclusion criteria, but cited in current articles, were added. Table 1 below summarizes search terms and the number of articles yielded from the search terms and then the number filtered to eliminate articles published prior to 2012.

Table 1.

Literature Review Search Term Summary

Search Term	All Dates	2012-2017
CINAHL & MEDLINE		
Primary care + Post liver transplant	142 articles	78 articles
Primary care + Liver transplant	688 articles	338 articles
Primary care and specialty care and communication	600 articles	304 articles
UCH Database		
Post-transplantation care and liver and primary care	1,651 articles	492 articles

Further narrowing included eliminating articles there were duplicative of key points, not available in English and systematic reviews that did not focus on communication or coordination of care but centered on the complexity of the post-transplant patient population and common comorbidities providers face caring for these patients. After three systematic reviews were chosen, other comparable articles were eliminated, as they did not provide new information applicable to the project. Finally, all articles related to pediatric patients or the transition from pediatric to adult transplant programs were excluded. This resulted in twenty-six articles to support the project and study methodology (see Appendix A).

Review of Evidence

Post-transplant care was viewed as complex (Wong & Pagalilauan, 2015) but with the expanding knowledge base of surgical technique, organ rejection, and immunosuppression management, transplant recipient survival rates continue to improve (Cimino & Snyder, 2016;

Parekh, Corley & Feng, 2012; Wong & Pagaliluan, 2015). While this is the goal, long-term survival meant medical management of this population by PCPs for commonly associated co-morbidities such as diabetes, hypertension, hyperlipidemia and malignancies was critical (Albeldawi et al., 2012; Galindo, Fried, Breen & Tamler, 2015; Hughes 2014; Kahn et al., 2016; Lucey, Terrault, Hay, Neuberger, Blumberg and Teperman, 2013; Parekh, Corley and Feng, 2012; Younossi et al. 2014). Poor management increased risk for other pathologies such as cardiac disease, metabolic syndrome and malignancy.

PCPs have reported that they prefer specialists manage patients with other complex medical conditions such as cirrhosis and non-alcoholic fatty liver disease (Beste, Harp, Blais, Evans & Zickmund, 2015; Said, Gagovic, Malecki, Givens & Nieto, 2013). The complexity of the post-liver transplant patient could also leave PCPs preferring that transplant teams manage co-morbidities in addition to transplant specific needs. Yu et al. (2014) concluded a barrier to care in complex patients' care arose when there were competing priorities in disease management and Banares & Salcedo (2014) concluded barriers occurred due to unclear role definition between PCPs and transplant teams (Banares & Salcedo, 2014). Loeb, Binswanger, Candrian and Bayliss (2015) discussed that outcomes could improve for complex patients when improved models of care are refined such as providing algorithms for providers when caring for liver transplant recipients.

Improving PCP involvement in care of transplant recipients was viewed as a need in the transplant community in the past (Aqel 2009; Heller, Prochazka, Everson & Forman, 2009; Hughes, 2014; McCashland, 2001), but there was a lack of recent similar research. However, Easley et al. (2017) reported a need to maximize medical management from multiple providers for cancer survivors and, like the longer surviving liver transplant patients, found the complexity

of these patients being cared for by multiple care providers could result in less than optimal care. Her team studied the undefined role of family physicians (FPs) in cancer care and concluded that improved communication, collaboration and education were necessary components for FPs to provide best care for cancer survivors. Their research also examined FPs and oncologists perceived barriers in caring for cancer survivors with complex health care issues and found that FP identified poor communication, lack of role clarity and lack of educational opportunities as barriers. Oncologists perceived challenges to FPs role in caring for cancer patients included trust of the FP, patient's trust of the FP, shortage of FPs, patient difficulty in accessing their FP, and poor communication between oncologists and the FPs as barriers to optimal patient outcomes strongly suggesting teamwork is critical.

Like the post care of cancer patients, it was crucial for the post care of the transplant patient that specialists, FPs and other PCPs maintained relationships and used teamwork to properly medically manage these complex patients (Mandl, Olson, Mines, Liu & Tian, 2014; Wong & Pagalilauan, 2015). Teamwork required relationships built on trust as the team moves from forming to performing and that required open, efficient and effective communication between and among all team members (Therasse, Wallia & Molitch, 2013; Banares & Salcedo, 2014), role clarity and agreed on goals.

It was clear all members must know the patient's health care goals and what other team members are doing and why (Kim et al., 2015; O'Malley & Reschovsky, 2011; Zuchowski et al., 2015). Teams must establish an interdisciplinary collaborative culture through communication valuing individual contributions and the expertise of all members while sharing clear role expectations and accountability (Weiss, Tilin, and Morgan, 2018). The how to accomplish this was not as clear. It has been suggested integrated electronic health record (EHR) systems could

make communication between providers easier but not without some challenges (McCashland, 2001; O'Malley & Reschovsky, 2011). Inconsistency in communication structure, expectation of instant communication that can increase daily workload and difficulty relaying special and urgent requests remained issues even with EHR utilization. So, although helpful, EHRs were not the sole answer (Kim et al., 2015; Zuchowski et al., 2015). It was also unclear if the same barriers existed for IPHCT working within an integrated system as for those working outside of the system or if the cancer research generalized to the transplant setting.

Market Risk Analysis

Strengths, Weaknesses, Opportunities and Threats (SWOT) Analysis

A SWOT analysis identified driving and restraining forces for this project, see below for a summary of the analysis (Figure 1).

Strengths. Major strengths included an overhead cost under six thousand dollars and support for the project by transplant hepatology faculty and employer, access to an EHR and a list of PCPs caring for liver transplant recipients with their contact information.

Weaknesses. A weakness of this project was the lack of a standardized self-reporting tool that could be used to survey PCPs and transplant team members. Those surveyed may have also feared reporting communication or coordination of care barriers. The self-report surveys were also a weakness as perceptions of barriers might not have been actual barriers thus decreasing validity of results. Percentage of survey return was a weakness as there was no incentive for returned surveys. Additionally, the cost associated with having to possibly send surveys by postal mail was considered in the initial project design.

Opportunities. A potential opportunity of this project was to build better relationships through identifying and removing or minimizing barriers to communication and coordination of

care. Improved relationships could result in future referrals to the transplant center.

Threats. A potential threat to the project was PCPs not reporting what they perceive as barriers to communication and coordination of care in fear the liver transplant team would no longer recommend them to transplant recipients, the liver transplant team would be resentful of reported barriers, or their relationship would change with the liver transplant team.

Figure 1.

SWOT Analysis



Driving and Restraining Forces

Driving Forces. Driving forces included support by the transplant team for the study and access to a sample population of PCPs. The need to identify barriers to communication and coordination are critical in order to design ways to eliminate the barriers for best patient outcomes and that need was also a driving force for this project.

Restraining Forces. Two major restraining forces were the limited time to complete the study and the self-report survey design. Fear of reporting barriers or lack of communication of care may limit not only completion of the surveys but also honest recognition of barriers.

Stakeholders

Stakeholders for this project were the liver transplant team, PCPs of liver transplant recipients, and the project team. Liver transplant recipients were also stakeholders as the results of this study will help to better understand how to improve their post-transplant care. Although this project did not generalize, the findings may lead to additional study that could benefit future patients, regulatory agencies and insurance companies.

Project Team

The project team was multidisciplinary and included the project leader, clinical mentor, and Regis faculty mentor, transplant hepatology physicians, statistician, and a member of the informatics team. A patient affairs coordinator (medical secretary) was part of the original project team but was not utilized as postal mailed surveys were not sent.

Cost-Benefit Analysis

The overall cost for this project was \$5645 (see Table 2 and 3) as all surveys were sent electronically thus eliminating the need for the patient affairs coordinator and any additional cost for postal mailed surveys.

Table 2.

Project Cost: Team Members

Project Team Member	Hourly Wage *	Estimated Time Commitment	Estimated Total Cost
Project Leader	\$47.00	80 hours	\$3760
Informatics Team Member	\$35.00	2 hours	\$70
Statistician	\$50.00	10 hours	\$500
			Total Cost \$4330

*Hourly wages were estimated based on trends in Aurora, Colorado

Table 3.

Project Cost: Software and Hardware

Project Item	Project Cost
Survey Monkey Annual Advantage Plan	\$408
Laptop Computer (internet capable)	\$750
IBM SPSS Statistics 23 (12 months)	\$87
Microsoft Office	\$70 for annual subscription
	Total Cost \$ 1315

Potential financial benefits of the project, such as increased patient and care provider satisfaction, were to not only identify barriers but start to eliminate them and form a more effective and efficient health care team were difficult at best to measure or estimate. However, the potential of more effective and efficient teams could improve quality of life, increase patient longevity and decrease complications or exacerbation of chronic disease.

Project Objectives

Mission

To identify the perceived barriers in communication and coordination of care between PCPs caring for liver transplant recipients and the health care providers from the liver transplant team.

Vision

Remove or minimize barriers in communication and coordination of care between PCPs and the transplant team to develop an efficient interprofessional team that delivers highly effective, cost sensitive and safe patient care coordinated by all team members thus maximizing health care goals and outcomes for liver transplant recipients.

Goals

The goal of this project was to identify perceived barriers to communication and coordination of care between PCPs caring for liver transplant recipients and the liver transplant team and to compare perceptions among and between team members for common themes and disagreements.

Objectives

- Identify perceived barriers to communication and coordination of care through a self-report survey completed by the IPHCT including the liver transplant team members and PCPs
- Analyze perceptions between and among participants for common and uncommon themes

Conceptual Model

A conceptual model was designed to visually represent the project (see Appendix B). The

initial problem considered was that liver transplant recipients require health care management from both the liver transplant team and PCPs, combined with recognition that patient care coordination and outcomes can be compromised when providers are unable to communicate effectively. This led to two assumptions. The first was that providers want and need communication from the other members of the IPHCT to appropriately managed liver transplant recipients and the second was that providers would benefit and use recommendations from other providers if communication was improved.

Inputs such as encouragement from transplant center faculty and access to a sample population supported the project. Potential constraints were recognized as limited time to complete the project, survey return rate, fear of reporting for those surveyed and lack of a validated self-report instrument. The project's activity centered around creation and distribution of a validated self-report survey focusing on perceived barriers to communication and care of the liver transplant recipient population. Outputs of the project were analysis of methodology effectiveness, analysis of perceptions of possible barriers and identification of additional needed research with future potential to reduce, if not eliminate, these barriers. If reduced, further outcomes could include promoting efficient, safe and cost-effective health care to liver transplant recipients while improving their long-term management.

Methodology

Research Design

This project was a descriptive survey design with convenience purposive sample. Purposive sampling relied on distinguishing the characteristics of the population from the general population. Inclusion criteria for this study was that all subjects were healthcare providers who cared for liver transplant recipients. IBM SPSS software was used to analyze the survey results.

The self-report survey responses were summarized and reviewed for frequency of similar answers and differences between primary care providers and liver transplant team members. Since the data collected was nominal, frequency tables were generated. The SPSS split data function was utilized to separate survey answers between liver transplant team members and primary care providers.

Sample Population

Primary Care Providers (PCPs). PCPs consisted of family and/or internal medicine physicians, nurse practitioners and physician assistants that were providing primary care for liver transplant recipients who receive their transplant care from University of Colorado Health (UCH) at the time of the survey.

PCPs inside UCH system. Primary care providers providing primary health care for UCH post-transplant patients working in a UCH facility in Colorado with access to the UCH EPIC electronic health record (EHR) which includes recent transplant clinic notes, labs and medication lists as well as communication options for data exchange between and among providers.

PCPs outside UCH system. PCPs outside the UCH system were primary care providers providing primary health care for UCH post-transplant patients but working in other major private healthcare systems, academic health centers, and independent clinics outside the Colorado UCH without access to the UCH EPIC EHR.

Liver transplant team members (LTTMs). The liver transplant team members consisted of transplant hepatology physicians and RN liver transplant coordinators working within the Colorado UCH system.

Setting

The project design and implementation were completed at the UCH Outpatient Transplant Clinic in Aurora, Colorado. The project was approved by the UCH and Regis University Institutional Review Board (see Appendix G).

Methods

An initial list of potential subjects was generated by a member of the UCH informatics team that included the names of PCPs providing primary medical care for UCH's post-liver transplant patients with the clinic address, phone and fax numbers. E-mail addresses for the providers were not complete in this list and were obtained individually. Providers were asked in the survey if they currently work in a UCH clinic in Colorado, non-UCH clinic in Colorado or in a clinic outside of Colorado.

An e-mail described the purpose of the project, the risks and benefits of participation and a Survey Monkey URL was sent to all eligible potential subjects (see Appendix C). The Survey Monkey software provided an anonymous report of data. Anonymous settings were used so that the collector was unable to see e-mail addresses or names of which participants who had or had not completed the survey. A reminder notification was sent to participants who had not completed the survey one and two weeks after the initial survey was sent. At the end of the survey, all subjects were thanked for their time and were offered contact information to receive a copy of the project results. Given the limited amount of time for survey administration, surveys were not sent by postal mail or fax.

Instrument

A self-report instrument was generated from current literature on barriers to communication and coordination of care between outpatient clinics (see Appendix D). The

survey instrument consisted of twenty questions. To establish face validity, six uninterested subject matter experts reviewed the survey questions validity to measure perceptions of barriers and answer the research question. These subject matter experts included two transplant hepatology physicians who previously worked on the liver transplant team at UCH, a former UCH RN liver transplant coordinator, two NPs working in primary care and a UCH Research Nurse Scientist.

SPSS was unable to calculate a Cronbach's alpha for the survey instrument. This was related to the lack to correlation between questions on the survey which was supported by the results of Spearman correlation. Spearman's correlation demonstrated most of the questions with significant correlation involved demographic questions. Minimal question combinations that did not involve demographics demonstrated significant correlation. These results do not suggest the survey tool was not effective and without any reliability, however.

Protection of Human Subjects/Risk Evaluation

The study population itself was not considered vulnerable; however, if confidentiality was compromised the participant could have felt vulnerable which in turn would have reduced reliability (Terry, 2015). Although the sample population was not considered to be vulnerable, informed consent to participate in the survey for the project was required. A letter accompanying the survey briefly explained the project and how survey completion ultimately aimed to improve communication and care coordination of liver transplant recipients by recognizing barriers to communication and coordination of care (see Appendix C). The letter included a statement that completion and return of the survey indicated informed consent to participate in the project. Signed and return consent forms would have compromised confidentiality of the person being surveyed which was not desired. The participants were not asked to provide their names or any

demographic information in the survey which could have compromised their confidentiality. Survey Monkey was used to ensure participants remained anonymous by not requiring a login step to protect anonymity of those who took the survey. Participants who completed the survey were at minimal risk; however, surveys can elicit emotional harm. Careful survey question design reduced this risk.

Project Findings and Results

Sample

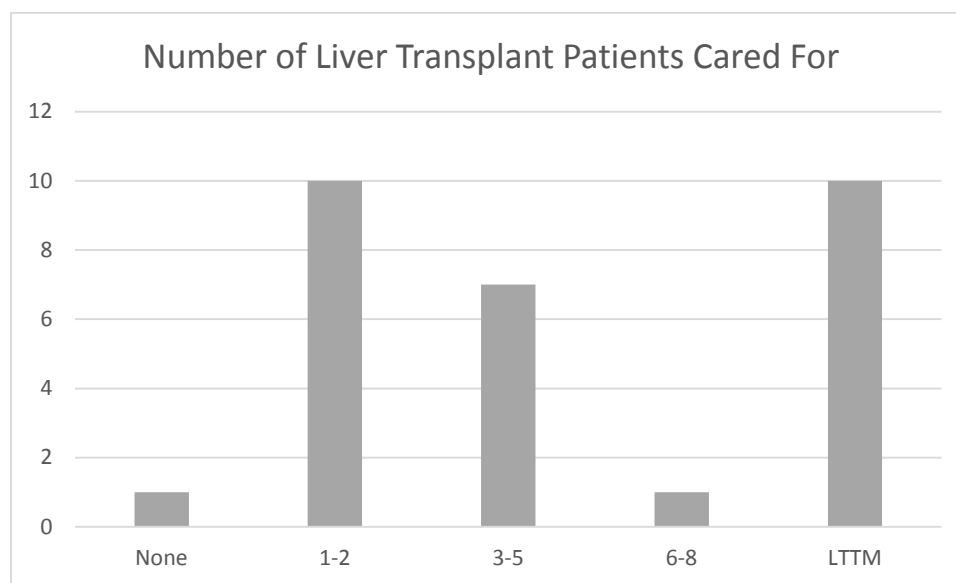
A total of 189 care providers met the inclusion criteria for the study and were invited to participate in the study via an e-mail. Fifteen were liver transplant team members (LTTMs) and 174 were primary care providers (PCPs). One week after the initial request for participation seven members of the transplant team and ten PCPs agreed to participate by completing the survey. At that time, the remaining 172 potential participants were sent a follow-up email asking for their participation as it was unclear if they had opened the original request. Two participants were sent a request to complete the survey they had started. This resulted in an additional 11 completed surveys. A final request for participation was e-mailed two weeks after the initial request to the remaining 161 potential participants and three requests were e-mailed to participants to complete surveys that were started. After three weeks a total of 29 surveys were received. Ten were from liver transplant team members (LTTMs) (24.5%) and 19 were from PCPs (65.5%) with a total response rate of 15.3% and the survey was then closed. One of the PCPs reported not caring for any post liver transplant patients and was excluded from the study. Another PCP did not complete the survey so that data was also excluded leaving a total of 17 PCP participants. In the total sample, 79.3% (n=23) were physicians and 20.7% (n= 6) were RNs. It is unclear how many nurse practitioners or physician assistants received an invitation to

participate; however, no nurse practitioners or physician assistants replied to the survey.

Of the providers caring for post liver transplant patients that also received transplant care from UCH, ten (34.5%) cared for one to two post liver transplant patients, seven (24.1%) cared for three to five, and one (3.4%) cared for six to eight. Ten (34.5%) reported all their patients received transplant care from UCH indicating they were a LTTM (Figure 2). Since 92.6% or 25 of the participants reported working in a UCH clinic in Colorado, comparing data between providers inside and outside of the UCH system was not explored as initially intended.

Figure 2.

Number of UCH Post-Liver Transplant Patients Participants Cared For



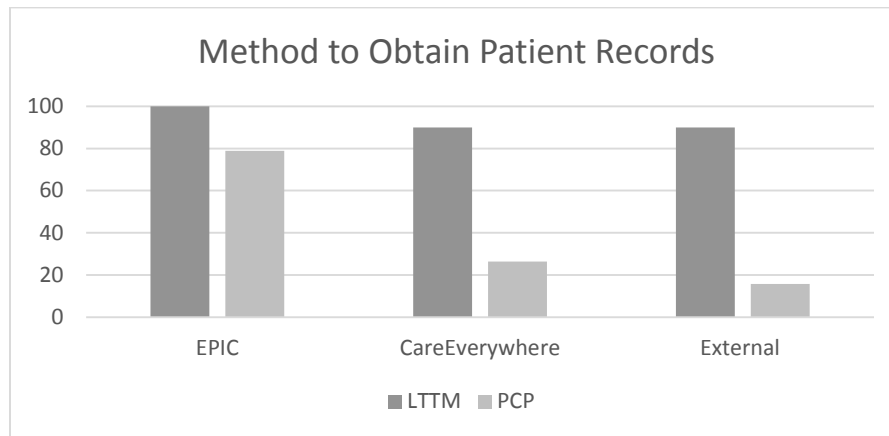
Perceived Barriers to Communication and Coordination of Care

Patient record obtainment. The survey asked providers that were caring for liver transplant patients to select, from a forced choice list, the methods they used to obtain the previous medical records of the patient. Fifteen PCPs (78.9%) and all LTTMs reported using the EPIC EHR to obtain records of UCH liver transplant recipients, while five PCPs (26.3%) and nine LTTMs (90%) used Care Everywhere and three PCPs (15.8%) and nine LTTMs (90%) of

LTTMs used external records being sent to their clinic (see Figure 3). These results suggested LTTMs utilize all three methods to obtain patient records, whereas PCPs primarily use records obtainable in EPIC.

Figure 3.

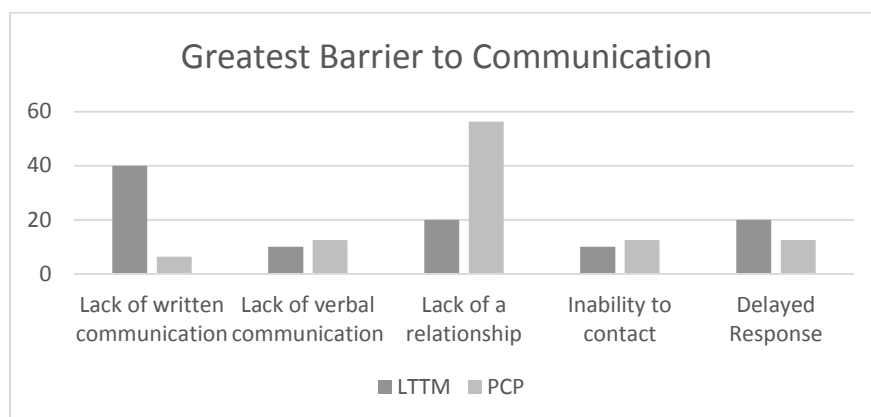
Methods Utilized to Obtain Records



Communication methods. The greatest barrier to ongoing communication and patient updates among and between providers perceived by LTTMs was the lack of written communication (40%, n=4). The lack of relationship with the team members was the greatest barrier for PCPs (56.3%, n=9) (see Appendix H).

Figure 4.

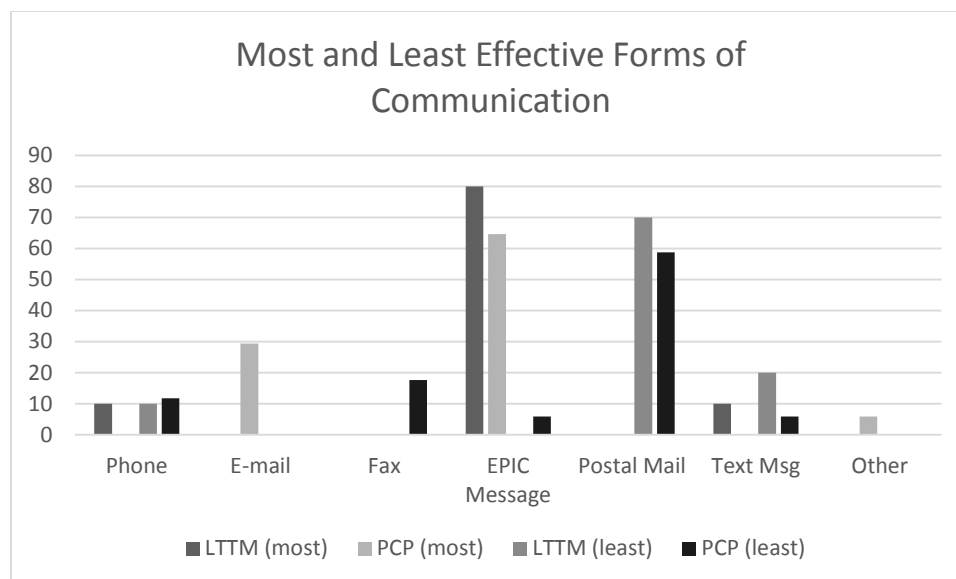
Greatest Perceived Barrier to Communication



LTTMs and PCPs agreed on the most and least effective forms of communication (see Appendix I). The most effective form of communication reported was messaging through the EPIC EHR (80% LTTMs, n=8; 64.7% PCPs, n= 11) and the least effective form was postal mail (70% LTTMs, n=7; 58.8% PCPs, n=10) (Figure 5) (see Appendix I).

Figure 5.

Most and Least Effective Method of Communication



Transplant and comorbidity management. LTTMs and PCPs were further asked their perception of what the LTTMs and the PCPs should manage in the post liver transplant recipient in regards to diabetes, hyperlipidemia (HL), anti-rejection/immunosuppression regimen (IS), renal insufficiency (renal), hypertension (HTN), procedures related to liver disease management (i.e. liver biopsy, endoscopic retrograde cholangio-pancreatography, biliary drain placement), osteopenia/osteoporosis (bone), malignancy screening (i.e. colonoscopy, pap smear, mammogram), and imaging of the transplant graft (see Appendix J). There was agreement on who should be managing all of the above with the exception of who should be managing renal insufficiency. Neither LTTMs nor PCPs consistently reported they should be

responsible for managing renal insufficiency. It is possible this uncertainty was related to PCPs and LTTMs knowing that some immunosuppression agents are the root cause of renal insufficiency in liver transplant recipients; therefore, both groups were hesitant to answer not knowing who should manage it. However, this was impossible to tell from this study.

Figure 6.

Perception of What the LTTM Should Manage

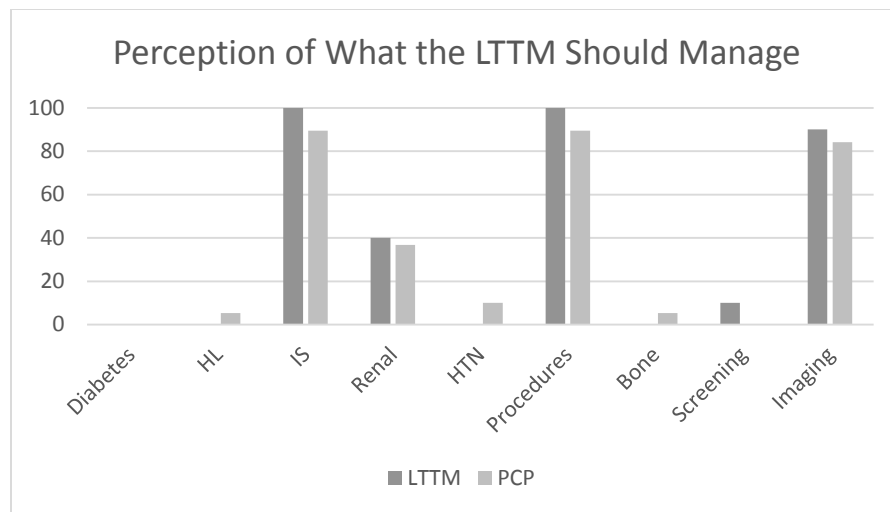
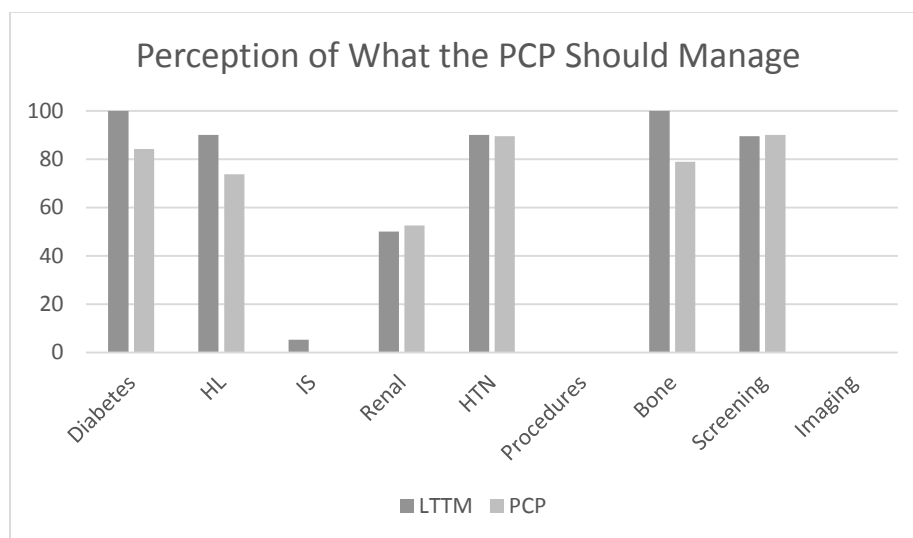


Figure 7.

Perception of What the PCP Should Manage



Role clarity and education. All LTTMs and 16 PCPs (94.1%) agreed that PCPs are not given clear expectations of their role and responsibilities in the management of liver transplant recipients from the transplant team and all LTTMs and 15 PCPs (88.2%) also felt PCPs are not provided with appropriate education regarding the impact of common comorbidities in post-transplant patients and drug interactions with immunosuppressive drug regimens.

Treatment plans. Six PCPs (35.3%) and eight LTTMs (80%) reported that they do not receive treatment plans from other providers caring for post liver transplant patients. Only one PCP (5.9%) but nine LTTMs (90%) reported sending their treatment plans to other providers caring for post liver transplant recipients. It was unclear from this study, if LTTMs would have sent treatment plans to PCPs if this was not an automatic feature of the EPIC EHR at UCH. When care plan recommendations were sent from other providers, seven PCPs (41.2%) and seven LTTMs (70%) were willing to complete recommended diagnostics and treatments and discuss any concerns about the recommendations with the provider who sent the request. Ten PCPs (58.8%) and three LTTMs (30%) preferred that the provider making the recommendations also order the diagnostics and treatments. None of the providers reported that they ensured all recommended diagnostics and treatments were completed even if they might not agree with them.

Perception of patient preference. Another perceived barrier was evident when providers were asked how they felt liver transplant recipients prefer their health care be managed. Three PCPs (17.6%) and seven LTTMs (70%) felt transplant recipients preferred all their health care managed by the liver transplant team. Thirteen PCPs (76.5%) and three LTTMs (30%) felt recipients preferred their health care to be managed by their PCP and the liver transplant team. One PCP (5.9%) and no LTTMs felt recipients preferred all their health care

managed by their PCP.

Relationship with LTTMs. When asked to describe their current relationship with the UCH liver transplant team, only one PCP (5.9%) reported he/she had a strong and trusting relationship with the UCH liver transplant team; while five PCPs (29.4%) felt they did not have a working relationship with the team. Six PCPs (35.3%) felt they worked well with the team and would like to continue to build on this relationship. Five PCPs (29.4%) said they would like to get to know the team better and to further work on how best to manage patients following liver transplant.

Access to care. Timely access to available appointments did not appear to be a significant barrier to communication and coordination of care as only three LTTMs (30%) and five PCPs (29.4%) reported experiencing this as a barrier. When timely access to care was noted as a barrier, both groups noted this occurred most frequently in specialty clinics other than with the LTTMs (see Appendix K).

Recognition of when to communicate. Confidence in recognizing when to contact other providers caring for the same post liver transplant patient did not appear to be a barrier to communication and coordination of care either. Seven PCPs (41.2%) and three LTTMs (30%) were very confident, six PCPs (35.3%) and five LTTMs (50%) were confident and four PCPs (23.5%) and two LTTMs (20%) were somewhat confident. No LTTMs or PCPs reported not being confident at all in recognizing when to contact other providers caring for a mutual post liver transplant patient.

Summary of Major Findings

Both LTTMs and PCPs reported that using the EPIC EHR was the most preferred method of communication between care providers, suggesting that the method of communication

between the two teams was not a major issue. Also, both groups did not report a lack confidence of when to contact other providers caring for the same post liver transplant patient. The major barriers to communication and coordination of care between LTTMs and PCPs was based on role confusion, education, and the relationship between the two groups. These included:

- LTTMs and PCPs agreed that PCPs are not being given clear expectations of their role and responsibilities and are not being provided with appropriate education regarding care of the liver transplant recipient.
- LTTMs and PCPs did not agree on which team should manage renal insufficiency.
- PCPs reported the lack of a relationship with LTTMs to be the greatest barrier to ongoing communication.
- LTTMs reported lack of written communication to be the greatest barrier to ongoing communication.
- LTTMs send treatment plans to other providers more routinely than PCPs.

Conclusion

Although the volume and diversity of providers who completed the survey in this project was limited, the results provided insight into the perceived barriers to communication and coordination of care of the liver transplant recipient between and among liver transplant team members (LTTMs) and primary care providers (PCPs). The primary perceived barriers to communication and coordination of care of the liver transplant recipient identified from this self-report survey were role clarity, lack of education from LTTMs to PCPs, disagreement on which team should manage renal insufficiency, PCPs noting a lack of relationship between teams as a large barrier, LTTMs reporting lack of written communication as a large barrier and LTTMs being more routine in sending care updates. Preferred method of communication was the same

for LTTMs and PCPs. Therefore, role clarity, LTTMs providing education to PCPs and the relationship between teams were the most important barriers to communication and coordination of care of the liver transplant recipient. The results of this study highlighted areas where communication and coordination of care between LTTMs and PCPs can improve. LTTMs need to inform PCPs of the expectations of both teams in the mutual care of the liver transplant recipient and provide education on the common comorbidities post liver transplant and drug interactions with common immunosuppressive agents.

Limitations, Recommendations and Implications for Change

Limitations

The major limitation of the study was the lack of providers responding that were not within the UCH system which prevented analysis of identified barriers between providers inside and outside of the UCH system. Another limitation was limiting requests for participation in the study to PCPs whose e-mail address were known to the PI. This eliminated providers who may have responded if invited to participate through a postal mailed survey. This may have skewed the results, particularly for the preferred communication methods. Other limitations included a small sample size, a low 15.3% response rate, and use of a self-report, forced choice instrument that captured a moment in time. This may have caused subjects to select a response they believed the researcher wanted or caused a possible distortion to a perception due to a recent event or a desire to present a favorable impression or because their first choice was not listed on the tool.

Recommendations

Additional similar research with a broader audience is highly recommended. To reach a broader audience, it is suggested that multiple methods be used to invite participation including, e-mail, postal mail and direct contact with known PCPs and liver transplant teams providing care

for post-liver transplant patients. It is also recommended to study whether providing clear expectations of the roles and responsibilities for various members of the team along with education regarding care of the liver transplant patient on immunosuppression drugs and co-morbidities would improve patient outcomes for survival and quality of life. There should also be consideration of redesigning the survey tool to include questions using the Likert scale in order to obtain ordinal or interval level data

Implications for Change

Based on the results of this study, education regarding the common comorbidities in the liver transplant population and immunosuppressive agents could be included in the go-home packet sent to PCPs when the liver transplant recipient is around three months post-transplant and is encouraged to make an appointment with their local PCP. A phone call from a LTTM to the PCP around this time would offer an opportunity for any questions the PCP might have for the LTTM prior to seeing the patient. In fact, LTTMs should consider multiple calls to the PCP as the liver transplant recipient completes various milestones in their surgical recovery and long-term medical management. These interventions would not only provide pertinent information for the care of the liver transplant recipient but also provide a foundation for improved communication and relationship between providers.

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Appendix A

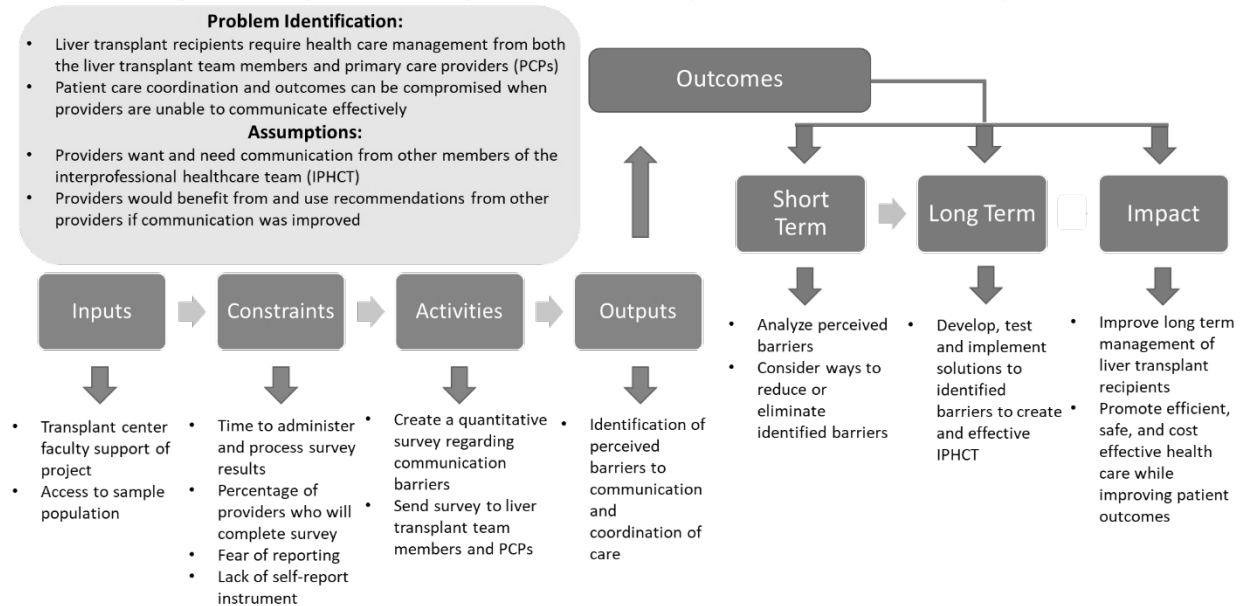
Systematic Review of the Literature

Levels of Evidence	Number of Articles	Article Citations
1 Systematic Review or Meta-analysis of Randomized Controlled Trials (RCTs)	3 articles	Galindo, Fried, Breen and Tamler (2015); Lucey, Terrault, Hay, Neuberger, Blumberg and Teperman (2013); Wong and Pagalilauan (2015)
2 Well-designed RCT	1 article	Yu et al. (2014)
3 Well-designed controlled trial without randomization	0 articles	
4 Well-designed case-control and cohort studies	6 articles	Albeldawi et al. (2014); Kahn et al. (2016); Kim et al. (2015); Parekh, Corely and Feng (2012); Younossi et al. (2014); Zuchowski et al. (2015)
5 Systematic reviews of descriptive or qualitative study	0 articles	
6 Single descriptive or qualitative study	8 articles	Beste, Harp, Blais, Evans and Zickmund (2015); Easley et al., 2017; Heller, Prochazka, Everson and Forman (2009); Loeb, Binswanger, Candrian, and Bayliss (2015); Mandl, Olson, Mines, Liu & Tian (2014); McCashland (2001); O'Malley and Reschovsky (2011); Said, Gagovic, Malecki, Givens and Nieto (2013)
7 Opinion of authorities and/or reports of expert committees	8 articles	Aqel (2009); Banares and Salcedo (2014); Cimino and Snyder (2016); Hughes (2014); Jenssen and Hartmann (2015); McGuire et al. (2009); Sharif et al. (2014); Therasse, Wallia and Molitch (2013)

Appendix B

Conceptual Model

What are the perceived barriers to communication and coordination of between the primary care providers caring for clients post liver transplant and healthcare providers from the liver transplant team?



Appendix C

Letter Accompanying Survey

Dear Provider,

My name is Meg O'Meara, a Doctor of Nursing Practice (DNP) student at Regis University in Denver and Family Nurse Practitioner in the Liver Transplant Clinic at University of Colorado Hospital (UCH). You have been selected to participate in a survey to better understand the perceived barriers of communication and coordination of care between primary care providers and team members of the UCH Liver Transplant Clinic. This survey is part of a quality improvement project that will fulfill my DNP project for graduation and has been approved by the Institutional Review Board at UCH and Regis University.

The answers you provide in this brief multiple choice 20-question survey, will allow me to better understand the perceived barriers between healthcare team members caring for liver transplant recipients. Future projects will focus on interventions to reduce the barriers discovered in this survey, foster improved collaborative relationships between healthcare teams managing, and will not only improve patient outcomes but also increase provider satisfaction.

I greatly appreciate your time and willingness to complete the survey. The link below does not require a login or creation of an account as your anonymity is of foremost importance in the project design. If you do not wish to participate, disregard this e-mail and survey link. Please note by completing this survey you are indicating your informed consent to participate in this quality improvement project.

Thank you for your time and consideration,

Meg O'Meara MSN, RN, FNP-C
Regis University

Feel free to email me at momeara001@regis.edu or my project supervisor, Dr. Lynn Wimett, at lwimett@regis.edu with any questions regarding the project.

Appendix D

Survey Tool

1. Indicate your current position within your clinic:
 - Physician (MD or DO)
 - Nurse Practitioner
 - Physician Assistant
 - Registered Nurse
2. Are you a primary care provider or a liver transplant team member?
 - Primary care provider
 - Transplant team
 - Other
3. Which of the following best describes your clinic?
 - UCH clinic in Colorado
 - Non-UCH clinic in Colorado
 - Clinic outside of Colorado
4. Which methods do you utilize to obtain records of UCH liver transplant recipients? Select all that apply.
 - UCH EPIC electronic health record
 - Care Everywhere EPIC electronic health record
 - External records if they are sent directly to my clinic
5. In working with a team (such as the transplant center and primary care providers) caring for the same patient what is the greatest barrier to ongoing communication and patient updates among and between providers?
 - Lack of written communication
 - Lack of verbal communication to me directly
 - Lack of a relationship with the team members
 - Inability to contact the team members
 - Delayed response from team members
6. Which method of communication between providers do you find **most** effective?
 - Phone
 - E-mail
 - Fax
 - Messaging through the EPIC electronic health record
 - Postal mail
 - Text message
 - Other
7. Which method of communication between providers do you find **least** effective?
 - Phone
 - E-mail
 - Fax
 - Messaging through the EPIC electronic health record
 - Postal mail
 - Text message
 - Other

8. Approximately how many post-liver transplant patients you care for receive transplant care from UCH?
 - None, I do not provide primary care to any liver transplant recipients
 - 1-2
 - 3-5
 - 6-8
 - 9 or more
 - All of my patients receive transplant care from UCH (I am a member of the liver transplant team)
9. Which of the following should the liver transplant team manage for the post liver transplant patient? Select all that apply.
 - Diabetes
 - Hyperlipidemia
 - Anti-rejection/immunosuppression regimen
 - Renal insufficiency
 - Hypertension
 - Procedures related to liver disease management (such as liver biopsy, ERCP, biliary drain placement)
 - Osteopenia/osteoporosis
 - Malignancy screening (colonoscopy, pap smear, mammogram)
 - Imaging of the transplanted graft
10. Which of the following should the PCP manage for the post liver transplant patient? Select all that apply.
 - Diabetes
 - Hyperlipidemia
 - Anti-rejection/immunosuppression regimen
 - Renal insufficiency
 - Hypertension
 - Procedures related to liver disease management (such as liver biopsy, ERCP, biliary drain placement)
 - Osteopenia/osteoporosis
 - Malignancy screening (colonoscopy, pap smear, mammogram)
 - Imaging of the transplanted graft
11. Do you feel PCP's are given clear expectations of their role and responsibilities in the management of liver transplant recipients from the transplant team?
 - Yes
 - No
12. In your experience, has timely access to available appointments been a noted barrier to care for liver transplant recipients?
 - Yes
 - No
13. Which of the following have been mentioned most frequently as not having timely access to care?
 - Primary care clinic
 - Transplant clinic
 - Specialty clinic other than transplant
 - None of the above

14. Do you feel liver transplant recipients prefer to have
 - All of their health care managed by their PCP
 - All of their health care managed by the liver transplant team
 - Their health care co-managed by their PCP and the liver transplant team
15. Do you receive treatment plans from other providers caring for you post liver transplant patients?
 - Yes
 - No
16. Do you send your treatment plans to other providers also caring for your post liver transplant patients?
 - Yes
 - No
17. When you receive care plan (diagnostics and treatment) recommendations from other providers also caring for your post liver transplant patient(s), what is your understanding of these requests?
 - I ensure all recommended diagnostics and treatments are completed even if I might not agree with them
 - I am willing to complete recommended diagnostics and treatments but discuss any concerns about the recommendations with the provider who sent the request first
 - I prefer the provider making the recommendations order the diagnostics and treatments themselves
18. How confident are you in recognizing when to contact other providers also caring for the same post liver transplant patient(s)?
 - Very confident
 - Confident
 - Somewhat confident
 - Not confident at all
19. Do you feel primary care providers are provided with appropriate education regarding common comorbidities in post-transplant patients and drug interactions with immunosuppressive drug regimens?
 - Yes
 - No
20. How would you describe your current relationship with the UCH liver transplant team?
 - I have a strong and trusting working relationship with the team
 - I work well with the team; however, would like to continue to build on this relationship
 - I would like to get to know the team better and further work on how best to manage patients following liver transplant
 - I do not feel I have a working relationship with the team

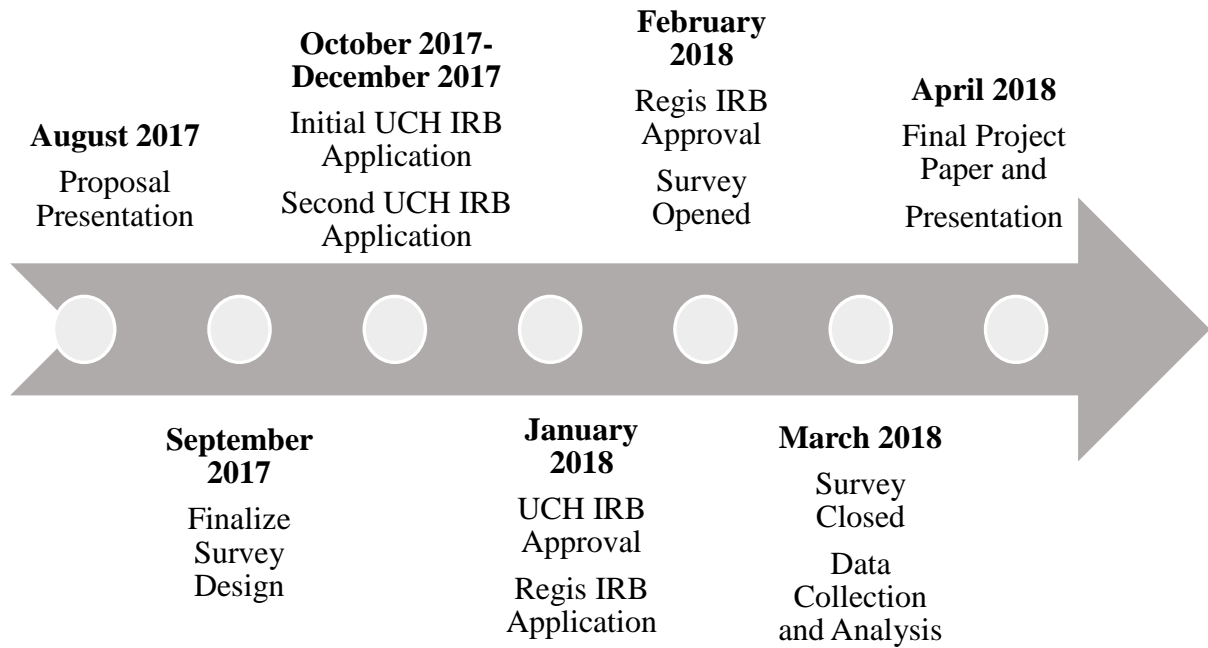
Thank you for completing this survey, your time and perspective are very much needed and appreciated. In the space below, please feel free to leave any additional recommendations, comments or concerns related to bettering the communication and coordination of care of the liver transplant recipient.

If you would like a copy of the completed study please send a request to me at momeara001@regis.edu to assure your name is not associated with the survey. Again, thank you for your participation.

Meg O'Meara, MSN, RN, FNP-c

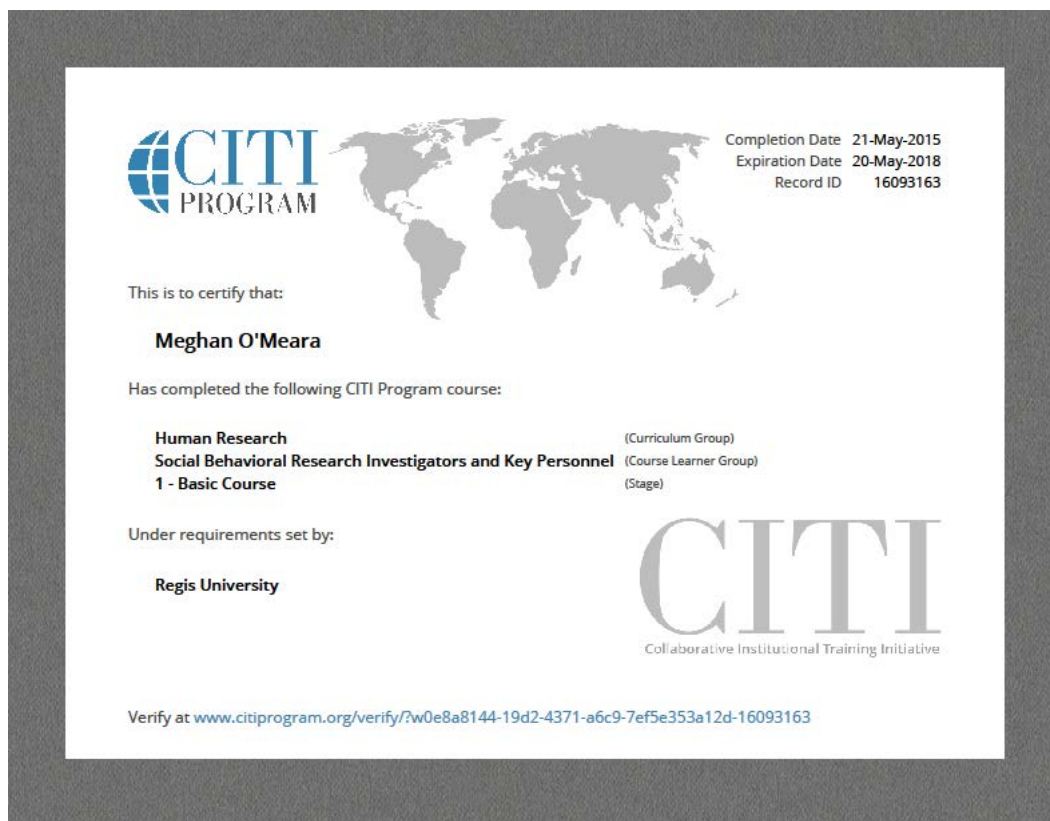
Appendix E

Timeframe



Appendix F

CITI Training Certificates: Meghan O'Meara and Lynn Wimett





Completion Date 25-Aug-2017
Expiration Date 24-Aug-2020
Record ID 21744986

This is to certify that:

Meghan O'Meara

Has completed the following CITI Program course:

Human Research (Curriculum Group)
Group 1 Biomedical Investigators (Course Learner Group)
1 - Basic Course (Stage)

Under requirements set by:

University of Colorado Denver

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?wa0f9bdcd-c0c4-41c5-8202-509870815424-21744986



Completion Date 25-Aug-2017
Expiration Date 24-Aug-2020
Record ID 21744987

This is to certify that:

Meghan O'Meara

Has completed the following CITI Program course:

CITI Health Information Privacy and Security (HIPS) (Curriculum Group)
CITI Health Information Privacy and Security (HIPS) for Clinical Investigators (Course Learner Group)
1 - Basic Course (Stage)

Under requirements set by:

University of Colorado Denver

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?wfac2b494-1376-4ca6-8770-b8e7f1c2df9e-21744987



Completion Date 27-Aug-2017
Expiration Date 26-Aug-2020
Record ID 21744988

This is to certify that:

Meghan O'Meara

Has completed the following CITI Program course:

Good Clinical Practice Course for Clinical Trials Involving Drugs (ICH focus) (Curriculum Group)
Group 4: ICH/GCP - meets NIH requirements (Course Learner Group)
1 - Basic Course (Stage)

Under requirements set by:

University of Colorado Denver

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?w1f9c0b8e-008d-401f-8d47-14bcc27556b-21744988



Completion Date 26-Dec-2016
Expiration Date 26-Dec-2019
Record ID 20916288

This is to certify that:

Lynn Wimett

Has completed the following CITI Program course:

Human Research (Curriculum Group)
Biomedical Research Investigators and Key Personnel (Course Learner Group)
3 - Refresher Course (Stage)

Under requirements set by:

Regis University

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?w3cb468aa-b557-42dc-94e9-bbf2356ffba1-20916288

Appendix G

IRB and Agency Approval For Project



University of Colorado Hospital
Transplant Services

1635 Aurora Ct.
Aurora, CO 80045

D 720-848-1005
F 720-848-0006

uchealth.org

Letter of Agreement

December 11, 2017

To Regis University Institutional Review Board (IRB):

I am familiar with Meg O'Meara's research project entitled "Identifying Perceived Barriers to Communication and Coordination of Care of the Liver Transplant Recipient". I understand University of Colorado Health's involvement to be providing a sample population for the project. This population includes liver transplant team members (transplant hepatologists and liver transplant registered nurse coordinators) and the primary care providers caring for liver transplant recipients. The sample population will be sent a letter briefly describing the project and a link to access an electronic survey. Survey Monkey will be used to create and administer the survey to ensure anonymity of those who complete the survey.

The Liver Transplant Team at UCHealth is committed to improving communication with those who care for our patients, which closely ties to the outcomes of this project. Our role as an organization in supporting this project will be to provide workplace contact information for the identified population, as identified in the protocol, and ensure that survey responses remain confidential. We will also support the student in sharing her project outcomes and recommendations with the liver transplant team.

I understand that this project will be carried out following sound ethical principles and that participant involvement in this research project is strictly voluntary and provides confidentiality of data, as described in the proposal.

Therefore, as a representative of University of Colorado Health, I agree that Meg O'Meara's research project may be conducted at our agency/institution.

Sincerely,

Heidi Monroe MS, RN, CNS, CCTN
Manager Transplant Quality Services
Heidi.monroe@uchealth.org
720-848-2222



University Research
UNIVERSITY OF COLORADO DENVER | ANSCHUTZ MEDICAL CAMPUS

Colorado Multiple Institutional Review Board, CB
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Veteran's Administration Medical Center
Children's Hospital Colorado
University of Colorado Denver
Colorado Prevention Center

Certificate of Exemption

11-Jan-2018

Investigator: Meghan O'Meara
Subject: COMIRB Protocol 17-1922 Initial Application
Review Date: 11-Jan-2018
Effective Date: 11-Jan-2018
Anticipated Completion Date: 10-Jan-2021
Sponsor(s):
Title: Identifying perceived barriers to communication and coordination of care of the liver transplant recipient.
Exempt Category: 2

Submission ID: APP001-2

SUBMISSION DESCRIPTION:

APP001-2 Response to minor modifications

APP001-1 Initial exempt application

Your COMIRB Initial submission APP001-2 has been APPROVED FOR EXEMPTION. Periodic continuing review is not required. For the duration of your protocol, any change in the experimental design/content/personnel of this study must be approved by COMIRB before implementation of the changes.

The anticipated completion date of this protocol is 10-Jan-2021. COMIRB will administratively close this project on this date unless otherwise instructed by e-mail to COMIRB@ucdenver.edu. If the project is completed prior to this date, please notify the COMIRB office in writing or by e-mail once the project has been closed.

Study personnel are approved to conduct the research as described in the documents approved by COMIRB, which are listed below the REVIEW DETAILS section. Please carefully review the REVIEW DETAILS section because COMIRB may have made red-line changes (i.e. revisions) to the submitted documents prior to approving them. The investigator can

submit an amendment to revise the documents if the investigator does not agree with the red-line changes. The REVIEW DETAILS section may also include important information from the reviewer(s) and COMIRB staff.

[Click here for instructions on how to retrieve stamped documents.](#)

Information on how to submit changes (amendments) to your study and reports of unanticipated problems to COMIRB can be found on the COMIRB website <http://www.ucdenver.edu/COMIRB>.

Contact COMIRB with questions at 303-724-1055 or COMIRB@ucdenver.edu.

REVIEW DETAILS:

This protocol meets the criteria for exempt Category 2, as it involves administration of an anonymous survey. The survey does not involve any sensitive topic.

Sincerely,

UCD Panel S

Please provide Feedback on [Your Experience with the COMIRB Process](#)



REGIS.EDU

Institutional Review Board

DATE: February 16, 2018

TO: Meghan O'Meara, MSN, RN, FNP-c
FROM: Regis University Human Subjects IRB

PROJECT TITLE: [1137791-1] Identifying Perceived Barriers to Communication and
Coordination of Care of the Liver Transplant Recipient

SUBMISSION TYPE: New Project

ACTION: DETERMINATION OF EXEMPT STATUS

DECISION DATE: February 16, 2018

REVIEW CATEGORY: Exemption category # (2)

Thank you for your submission of New Project materials for this project. The Regis University Human Subjects IRB has determined this project is EXEMPT FROM IRB REVIEW according to federal regulations 45.CFR46.101(b).

We will retain a copy of this correspondence within our records.

If you have any questions, please contact the Institutional Review Board at irb@regis.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within Regis University Human Subjects IRB's records.

Appendix H

Greatest Barriers to Communication (SPSS Data)

In working with a team (such as the transplant center and PCPs) caring for the same patient what is the greatest barrier to ongoing communication and patient updates among and between providers?

Are you a primary care provider (PCP) or a liver transplant team member?			Frequency	Percent	Valid Percent	Cumulative Percent
Primary care provider	Valid	Lack of written communication	1	5.3	6.3	6.3
		Lack of verbal communication to me directly	2	10.5	12.5	18.8
		Lack of a relationship with the team members	9	47.4	56.3	75.0
		Inability to contact the team members	2	10.5	12.5	87.5
		Delayed response from team members	2	10.5	12.5	100.0
		Total	16	84.2	100.0	
	Missing	System	3	15.8		
Total			19	100.0		
Liver transplant team member	Valid	Lack of written communication	4	40.0	40.0	40.0
		Lack of verbal communication to me directly	1	10.0	10.0	50.0
		Lack of a relationship with the team members	2	20.0	20.0	70.0
		Inability to contact the team members	1	10.0	10.0	80.0
		Delayed response from team members	2	20.0	20.0	100.0
		Total	10	100.0	100.0	

Appendix I

Perceived Greatest and Least Effective Forms of Communication (SPSS Data)

Which method of communication between providers do you find most effective?

Are you a primary care provider (PCP) or a liver transplant team member?			Frequency	Percent	Valid Percent	Cumulative Percent
Primary care provider	Valid	E-mail	5	26.3	29.4	29.4
		Messaging through the EPIC electronic health record	11	57.9	64.7	94.1
		Other	1	5.3	5.9	100.0
		Total	17	89.5	100.0	
	Missing	System	2	10.5		
Total			19	100.0		
Liver transplant team member	Valid	Phone	1	10.0	10.0	10.0
		Messaging through the EPIC electronic health record	8	80.0	80.0	90.0
		Text message	1	10.0	10.0	100.0
		Total	10	100.0	100.0	

Which method of communication between providers do you find least effective?

Are you a primary care provider (PCP) or a liver transplant team member?			Frequency	Percent	Valid Percent	Cumulative Percent
Primary care provider	Valid	Phone	2	10.5	11.8	11.8
		Fax	3	15.8	17.6	29.4
		Messaging through the EPIC electronic health record	1	5.3	5.9	35.3
		Postal Mail	10	52.6	58.8	94.1
		Text message	1	5.3	5.9	100.0
		Total	17	89.5	100.0	
	Missing	System	2	10.5		
Total			19	100.0		
Liver transplant team member	Valid	Phone	1	10.0	10.0	10.0
		Postal Mail	7	70.0	70.0	80.0
		Text message	2	20.0	20.0	100.0
		Total	10	100.0	100.0	

Appendix J

Perception of What the LTTM and PCP Should Manage

Participants were asked if the LTTM should be responsible for the various aspects of post liver transplant care. None of the PCPs and LTTMs thought diabetes should be managed by the LTTM. One PCP (5.3%) and no LTTMs thought hyperlipidemia should be managed by the LTTM. 17 PCPs (89.5%) and 100% of LTTMs thought anti-rejection/immunosuppression regimens should be managed by the LTTM. Seven PCPs (36.8%) and four LTTMs (40%) thought renal insufficiency should be managed by the LTTM. No PCPs and one LTTM (10%) thought hypertension should be managed by the LTTM. 17 PCPs (89.5%) and all LTTMs thought procedures related to disease management (i.e. liver biopsy, ERCP, biliary drain placement) should be managed by the LTTM. One PCP (5.3%) and no LTTMs thought osteopenia/osteoporosis should be managed by the LTTM. No PCPs and one LTTM (10%) thought malignancy screening (i.e. colonoscopy, pap smear, mammogram) should be managed by the LTTM. 16 PCPs (84.2%) and 9 LTTMs (90%) thought imaging of the transplanted graft should be managed by the LTTM.

Participants were then asked if PCPs should be responsible for same aspects of post liver transplant care. 16 PCPs (84.2%) and all LTTMs thought diabetes should be managed by PCP. 14 PCPs (73.7%) and nine LTTMs (90%) thought hyperlipidemia should be managed by the PCP. One PCP (5.3%) and no LTTMs thought anti-rejection/immunosuppression regimens should be managed by the PCP. Ten PCPs (52.6%) and five LTTMs (50%) thought renal insufficiency should be managed by the PCP. 17 PCPs (89.5%) and nine LTTMs (90%) thought hypertension should be managed by the PCP. No PCPs nor LTTMs thought procedures related to disease management (i.e. liver biopsy, ERCP, biliary drain placement) should be managed by the

PCP. 15 PCPs (78.9%) and all LTTMs thought osteopenia/osteoporosis should be managed by the PCP. 17 PCPs (89.5%) and nine LTTMs (90%) thought malignancy screening (i.e. colonoscopy, pap smear, mammogram) should be managed by the PCP. No PCPs nor LTTMs thought imaging of the transplanted graft should be managed by the PCP.

Which of the following should the liver transplant team manage for the post liver transplant patient? Select all that apply.

Are you a primary care provider (PCP) or a liver transplant team member?			Frequency	Percent	Valid Percent	Cumulative Percent
Primary care provider	Valid	Hyperlipidemia	1	5.3	100.0	100.0
	Missing	System	18	94.7		
	Total		19	100.0		
Liver transplant team member	Missing	System	10	100.0		

Which of the following should the liver transplant team manage for the post liver transplant patient? Select all that apply.

Are you a primary care provider (PCP) or a liver transplant team member?			Frequency	Percent	Valid Percent	Cumulative Percent
Primary care provider	Valid	Anti-rejection/immunosuppression regimen	17	89.5	100.0	100.0
	Missing	System	2	10.5		
	Total		19	100.0		
Liver transplant team member	Valid	Anti-rejection/immunosuppression regimen	10	100.0	100.0	100.0

Which of the following should the liver transplant team manage for the post liver transplant patient? Select all that apply.

Are you a primary care provider (PCP) or a liver transplant team member?			Frequency	Percent	Valid Percent	Cumulative Percent
Primary care provider	Valid	Renal insufficiency	7	36.8	100.0	100.0
	Missing	System	12	63.2		
	Total		19	100.0		
Liver transplant team member	Valid	Renal insufficiency	4	40.0	100.0	100.0
	Missing	System	6	60.0		
	Total		10	100.0		

Which of the following should the liver transplant team manage for the post liver transplant patient? Select all that apply.

Are you a primary care provider (PCP) or a liver transplant team member?			Frequency	Percent	Valid Percent	Cumulative Percent
Primary care provider	Missing	System	19	100.0		
Liver transplant team member	Valid	Hypertension	1	10.0	100.0	100.0
	Missing	System	9	90.0		
	Total		10	100.0		

Which of the following should the liver transplant team manage for the post liver transplant patient? Select all that apply.

Are you a primary care provider (PCP) or a liver transplant team member?			Frequency	Percent	Valid Percent	Cumulative Percent
Primary care provider	Valid	Procedures related to liver disease management (such as liver biopsy, ERCP, biliary drain placement)	17	89.5	100.0	100.0
	Missing	System	2	10.5		
	Total		19	100.0		
Liver transplant team member	Valid	Procedures related to liver disease management (such as liver biopsy, ERCP, biliary drain placement)	10	100.0	100.0	100.0

Which of the following should the liver transplant team manage for the post liver transplant patient? Select all that apply.

Are you a primary care provider (PCP) or a liver transplant team member?			Frequency	Percent	Valid Percent	Cumulative Percent
Primary care provider	Valid	Osteopenia/osteoporosis	1	5.3	100.0	100.0
	Missing	System	18	94.7		
	Total		19	100.0		
Liver transplant team member	Missing	System	10	100.0		

Which of the following should the liver transplant team manage for the post liver transplant patient? Select all that apply.

Are you a primary care provider (PCP) or a liver transplant team member?			Frequency	Percent	Valid Percent	Cumulative Percent
Primary care provider	Missing	System	19	100.0		
Liver transplant team member	Valid	Malignancy screening (colonoscopy, pap smear, mammogram)	1	10.0	100.0	100.0
	Missing	System	9	90.0		
	Total		10	100.0		

Which of the following should the liver transplant team manage for the post liver transplant patient? Select all that apply.

Are you a primary care provider (PCP) or a liver transplant team member?			Frequency	Percent	Valid Percent	Cumulative Percent
Primary care provider	Valid	Imaging of the transplanted graft	16	84.2	100.0	100.0
	Missing	System	3	15.8		
	Total		19	100.0		
Liver transplant team member	Valid	Imaging of the transplanted graft	9	90.0	100.0	100.0
	Missing	System	1	10.0		
	Total		10	100.0		

Which of the following should the PCP manage for the post liver transplant patient? Select all that apply.

Are you a primary care provider (PCP) or a liver transplant team member?			Frequency	Percent	Valid Percent	Cumulative Percent
Primary care provider	Valid	Diabetes	16	84.2	100.0	100.0
	Missing	System	3	15.8		
	Total		19	100.0		
Liver transplant team member	Valid	Diabetes	10	100.0	100.0	100.0
	Missing	System				
	Total					

Which of the following should the PCP manage for the post liver transplant patient? Select all that apply.

Are you a primary care provider (PCP) or a liver transplant team member?			Frequency	Percent	Valid Percent	Cumulative Percent
Primary care provider	Valid	Hyperlipidemia	14	73.7	100.0	100.0
	Missing	System	5	26.3		
	Total		19	100.0		
Liver transplant team member	Valid	Hyperlipidemia	9	90.0	100.0	100.0
	Missing	System	1	10.0		
	Total		10	100.0		

Which of the following should the PCP manage for the post liver transplant patient? Select all that apply.

Are you a primary care provider (PCP) or a liver transplant team member?			Frequency	Percent	Valid Percent	Cumulative Percent
Primary care provider	Valid	Anti-rejection/immunosuppression regimen	1	5.3	100.0	100.0
	Missing	System	18	94.7		
	Total		19	100.0		
Liver transplant team member	Missing	System	10	100.0		
	Valid	Anti-rejection/immunosuppression regimen				
	Total					

Which of the following should the PCP manage for the post liver transplant patient? Select all that apply.

Are you a primary care provider (PCP) or a liver transplant team member?			Frequency	Percent	Valid Percent	Cumulative Percent
Primary care provider	Valid	Renal insufficiency	10	52.6	100.0	100.0
	Missing	System	9	47.4		
	Total		19	100.0		
Liver transplant team member	Valid	Renal insufficiency	5	50.0	100.0	100.0
	Missing	System	5	50.0		
	Total		10	100.0		

Which of the following should the PCP manage for the post liver transplant patient? Select all that apply.

Are you a primary care provider (PCP) or a liver transplant team member?			Frequency	Percent	Valid Percent	Cumulative Percent
Primary care provider	Valid	Hypertension	17	89.5	100.0	100.0
	Missing	System	2	10.5		
	Total		19	100.0		
Liver transplant team member	Valid	Hypertension	9	90.0	100.0	100.0
	Missing	System	1	10.0		
	Total		10	100.0		

Which of the following should the PCP manage for the post liver transplant patient? Select all that apply.

Are you a primary care provider (PCP) or a liver transplant team member?			Frequency	Percent
Primary care provider	Missing	System	19	100.0
Liver transplant team member	Missing	System	10	100.0

Which of the following should the PCP manage for the post liver transplant patient? Select all that apply.

Are you a primary care provider (PCP) or a liver transplant team member?			Frequency	Percent	Valid Percent	Cumulative Percent
Primary care provider	Valid	Osteopenia/osteoporosis	15	78.9	100.0	100.0
	Missing	System	4	21.1		
	Total		19	100.0		
Liver transplant team member	Valid	Osteopenia/osteoporosis	10	100.0	100.0	100.0

Which of the following should the PCP manage for the post liver transplant patient? Select all that apply.

Are you a primary care provider (PCP) or a liver transplant team member?			Frequency	Percent	Valid Percent	Cumulative Percent
Primary care provider	Valid	Malignancy screening (colonoscopy, pap smear, mammogram)	17	89.5	100.0	100.0
	Missing	System	2	10.5		
	Total		19	100.0		
Liver transplant team member	Valid	Malignancy screening (colonoscopy, pap smear, mammogram)	9	90.0	100.0	100.0
	Missing	System	1	10.0		
	Total		10	100.0		

Appendix K

Perception of Timely Access to Care (SPSS Data)

In your experience, has timely access to available appointments been a noted barrier to care for liver transplant recipients?

Are you a primary care provider (PCP) or a liver transplant team member?			Frequency	Percent	Valid Percent	Cumulative Percent
Primary care provider	Valid	Yes	5	26.3	29.4	29.4
		No	12	63.2	70.6	100.0
		Total	17	89.5	100.0	
	Missing	System	2	10.5		
	Total		19	100.0		
Liver transplant team member	Valid	Yes	3	30.0	30.0	30.0
		No	7	70.0	70.0	100.0
		Total	10	100.0	100.0	

Which of the following have been mentioned most frequently as not having timely access to care?

Are you a primary care provider (PCP) or a liver transplant team member?			Frequency	Percent	Valid Percent	Cumulative Percent
Primary care provider	Valid	Primary care clinic	1	5.3	5.9	5.9
		Transplant clinic	3	15.8	17.6	23.5
		Specialty clinic other than transplant	9	47.4	52.9	76.5
		None of the above	4	21.1	23.5	100.0
		Total	17	89.5	100.0	
	Missing	System	2	10.5		
Total			19	100.0		
Liver transplant team member	Valid	Primary care clinic	3	30.0	30.0	30.0
		Specialty clinic other than transplant	6	60.0	60.0	90.0
		None of the above	1	10.0	10.0	100.0
		Total	10	100.0	100.0	

