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TITLE: Psychosocial Predictors in VCA

PRINCIPAL INVESTIGATOR: Simon Talbot, MD

CONTRACTING ORGANIZATION: Brigham and Women's Hospital, INC
BOSTON, MA 02115

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Fort Detrick, Maryland 21702-5012

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SEPTEMBER 2019	Annual	15 AUG 2018 – 14 AUG 2019

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Psychosocial Predictors in VCA

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5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)
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5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

Brigham and Women's Hospital
Boston, Massachusetts 02115

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

U.S. Army Medical Research and Materiel Command
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13. SUPPLEMENTARY NOTES

14. ABSTRACT

During year one, compilation of the International Registry of Hand and Composite Tissue Transplantation (IRHCTT) and psychosocial surveys was performed. Focus group interviews of transplant recipients, social support and experts in the field were completed an transcribed. During year two, data analysis from the IRHCTT and psychosocial surveys determined 5 factors were associated with transplant outcomes and perceived success. The factors were tested in a vignette survey distributed to 100 participants. Preliminary analysis determines that increased number of factors leads to worse perceived success. Two papers are underway demonstrating these findings. Qualitative thematic analysis was performed for the focus group interviews with several themes being associated with perceived success. A paper has been submitted demonstrating these findings.
Additionally, a mirroring qualitative focus group study at UCLA is underway and a subaward has been approved for similar work in Innsbruck, Austria.

15. SUBJECT TERMS
Psychosocial factors. Vascularized Composite Allotransplantation.

16. SECURITY CLASSIFICATION OF:	17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
			USAMRMC

a. REPORT	b. ABSTRACT	c. THIS PAGE			19b. TELEPHONE NUMBER *(include area code)*
Unclassified	Unclassified	Unclassified	Unclassified	24	

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Prescribed by ANSI Std. Z39.18

TABLE OF CONTENTS

1. **INTRODUCTION:** Narrative that briefly (one paragraph) describes the subject, purpose and scope of the research.

Over the past ten years, hand transplantation has moved from a purely experimental option for a few amputees to, at some institutions, the standard of care. This transition has occurred without a detailed, comprehensive, and objective analysis of the psychosocial factors that contribute to the success or failure of these unique transplants. Additionally, the selection of transplant recipients and donors is currently an inherently subjective process. By aggregating the quantitative data available, obtaining qualitative data from patients and physicians, and combining the opinions of experts, we expect to determine the factors associated with perceived success in upper extremity transplants. These associated factors are expected to be predictive of outcomes in patients who have been transplanted and can be modified in those who will be transplanted going forward.

2. KEYWORDS: Provide a brief list of keywords (limit to 20 words).

Vascularized Composite Allotransplantation (VCA)
Psychosocial factors
Qualitative data
Focus group

3. ACCOMPLISHMENTS: The PI is reminded that the recipient organization is required to obtain prior written approval from the awarding agency Grants Officer whenever there are significant changes in the project or its direction.

What were the major goals of the project?
List the major goals of the project as stated in the approved SOW. If the application listed milestones/target dates for important activities or phases of the project, identify these dates and show actual completion dates or the percentage of completion.

The major goals of this project as stated in the Statement of Work include:

Specific Aim 1 – To collate the comprehensive array of demographic, anatomic, medical, immunologic, social, psychiatric, donor and surgical/logistic variables held in the International Registry of Hand and Composite Tissue Transplantation (includes almost all cases performed to date internationally) and undertake statistical analysis.	Timeline in months per SOW	Completion
1. Hire staff including coordinator	1-3	
2. Contact and coordinate with all sites	1-3	
3. Finalize IRB documents	3	
Milestone: All necessary staff hired	3	8/2017
Milestone: IRB approval at BWH	6	8/2017
4. Submit HRPO documents	1-3	
Milestone: HRPO approval	6	8/2017
5. Develop online databases	3-6	
6. Test data collection and storage systems	3-6	
Milestone: Databases online and functional	6	1/2018
7. Review of ptients in IRHCTT database and collation of data	6-9	
8. Detailed review with collection of additional data from individual centers	6-12	
Milestone: Data available online	12	1/2018
9. Descriptive statistical analysis	12-24	
Milestone: Detailed descriptive statistics complete and available	24	3/2019

Specific Aim 2 – To elucidate the core factors involved in transplant success and failure utilizing qualitative research methods to guide selection of patients.	Timeline in months per SOW	Completion
1. Review of available data regarding key variables	6-12	
2. Focus groups and in-depth interviews with patients, social support, and expert clinicians to gather qualitative data	6-12	
3. Collection of data and preliminary analysis	12-18	
4. Review with statistician	18	
Milestone: Compilation of comprehensive set of potential transplant outcome predictors	18	6/2019

Specific Aim 3 – To develop a model, utilization expert opinion of hypothetical patients with a variety of psychosocial variable sand the RAND/UCLA appropriateness method, to help objectify the evaluations of hand transplant patients and validate the model developed in Aims 1 and 2 in actual patients from the several large volume centers where complete data is available.	Timeline in months per SOW	Completion
1. Collection of clinical experts through transplant meetings	6-12	
Milestone: Commitment from clinical experts	6-12	11/2018
2. Development and review of survey	12-18	
3. Review with statistician	12-18	
Milestone: Survey useable	12-24	10/2018
4. Mailing and contact list developed	6-12	
5. Survey deployed	12-18	
6. Follow up with survey recipients	18-24	
Milestone: Survey completed	24	12/2018
7. Tabulation of data	24-27	
Milestone: Data available for analysis	27	12/2018
8. Statistical model developed	27-33	
Milestone: Model complete	33	3/2019
9. Database population with all available data to date	33-36	
Milestone: Data available	36	0%
10. Each patient score determined	36	0%
11. Each outcome measure determined	33-36	0%
12. Correlation of variables with outcome	33-36	0%
Milestone: Study validation	36	0% Complete

What was accomplished under these goals?

For this reporting period describe: 1) major activities; 2) specific objectives; 3) significant results or key outcomes, including major findings, developments, or conclusions (both positive and negative); and/or 4) other achievements. Include a discussion of stated goals not met. Description shall include pertinent data and graphs in sufficient detail to explain any significant results achieved. A succinct description of the methodology used shall be provided. As the project progresses to completion, the emphasis in reporting in this section should shift from reporting activities to reporting accomplishments.

During the first year of study, accomplishments included obtaining IRB and HRPO approvals for each of the three specific aims of this study. Through collaboration with the International Registry of Composite Tissue Transplantation (IRHCTT), anonymous data has been shared and analysis was completed in year two. This data was found to be lacking psychosocial data and a survey was created and distributed through the IRHCTT to worldwide transplant centers. This data has been analyzed and 5 factors were determined to be most important to perceived patient success. These factors included: depression, social support, participation, timeliness and patient expectations.

In year two, these five factors were used to create patient scenario vignettes which were compiled into a 10-question survey and distributed to 100 transplant expert participants. Multilinear regression analysis has been completed with preliminary results clearly demonstrating that increased risk factors correlates to decreased perceived outcomes. Two manuscripts are being written discussing these quantitative accomplishments.

During the first year, focus group interviews were conducted on 20 participants by our psychiatrist and psychologist. The participants include transplant recipients, their primary caregiver and experts in the field of transplantation. These interviews were transcribed and thematic analysis has been performed for the transplant recipient and primary caregiver interviews. Several themes emerged as contributors to perceived success which included: patient expectations, social support and community, attitudes and values, and the value of hands. A journal manuscript has been submitted discussing this work.

A subaward contract is been approved to perform mirror our focus group interviews with the Medical University of Innsbruck, Austria. This will strengthen our data analysis. Additionally, University of California, Los Angeles, is performing focus group interviews with their transplant recipients within their own institution and will share the data upon completion.

What opportunities for training and professional development has the project provided?
If the project was not intended to provide training and professional development opportunities or there is nothing significant to report during this reporting period, state "Nothing to Report."

Describe opportunities for training and professional development provided to anyone who worked on the project or anyone who was involved in the activities supported by the project. "Training" activities are those in which individuals with advanced professional skills and experience assist others in attaining greater proficiency. Training activities may include, for example, courses or one-on-one work with a mentor. "Professional development" activities result in increased knowledge or skill in one's area of expertise and may include workshops, conferences, seminars, study groups, and individual study. Include participation in conferences, workshops, and seminars not listed under major activities.

Nothing to report.

How were the results disseminated to communities of interest?
If there is nothing significant to report during this reporting period, state "Nothing to Report."

Describe how the results were disseminated to communities of interest. Include any outreach activities that were undertaken to reach members of communities who are not usually aware of these project activities, for the purpose of enhancing public understanding and increasing interest in learning and careers in science, technology, and the humanities.

Nothing to report.

What do you plan to do during the next reporting period to accomplish the goals?
If this is the final report, state "Nothing to Report."

Describe briefly what you plan to do during the next reporting period to accomplish the goals and objectives.

During the next year, we will complete the thematic analysis on the expert focus group interviews and complete a manuscript on these findings. Two additional manuscripts will be completed discussing our quantitative results. We plan to develop a scoring model to help objectify the evaluations of hand transplant patients which can be used for potential transplant candidates. We will also prospectively validate the data collected through the IRHCTT in hand transplant within our site and the international database.

4. **IMPACT:** Describe distinctive contributions, major accomplishments, innovations, successes, or any change in practice or behavior that has come about as a result of the project relative to:

What was the impact on the development of the principal discipline(s) of the project?
If there is nothing significant to report during this reporting period, state "Nothing to Report."

Describe how findings, results, techniques that were developed or extended, or other products from the project made an impact or are likely to make an impact on the base of knowledge, theory, and research in the principal disciplinary field(s) of the project. Summarize using language that an intelligent lay audience can understand (Scientific American style).

Development of an algorithmic, data-based protocol of psychosocial factors for optimal patient selection will directly improve chances of success in transplant recipients. This work will represent the first study to look globally at this problem and it stands to improve care for all future potential transplant patients.

What was the impact on other disciplines?
If there is nothing significant to report during this reporting period, state "Nothing to Report."

Describe how the findings, results, or techniques that were developed or improved, or other products from the project made an impact or are likely to make an impact on other disciplines.

Nothing to report.

What was the impact on technology transfer?
If there is nothing significant to report during this reporting period, state "Nothing to Report."

Describe ways in which the project made an impact, or is likely to make an impact, on commercial technology or public use, including:

- *transfer of results to entities in government or industry;*
- *instances where the research has led to the initiation of a start-up company; or*
- *adoption of new practices.*

Nothing to report.

What was the impact on society beyond science and technology?
If there is nothing significant to report during this reporting period, state "Nothing to Report."

Describe how results from the project made an impact, or are likely to make an impact, beyond the bounds of science, engineering, and the academic world on areas such as:

- *improving public knowledge, attitudes, skills, and abilities;*
- *changing behavior, practices, decision making, policies (including regulatory policies), or social actions; or*
- *improving social, economic, civic, or environmental conditions.*

Nothing to report.

5. **CHANGES/PROBLEMS:** The Project Director/Principal Investigator (PD/PI) is reminded that the recipient organization is required to obtain prior written approval from the awarding agency Grants Officer whenever there are significant changes in the project or its direction. If not previously reported in writing, provide the following additional information or state, "Nothing to Report," if applicable:

Changes in approach and reasons for change
Describe any changes in approach during the reporting period and reasons for these changes. Remember that significant changes in objectives and scope require prior approval of the agency.

Nothing to report.

Actual or anticipated problems or delays and actions or plans to resolve them
Describe problems or delays encountered during the reporting period and actions or plans to resolve them.

Nothing to report.

Changes that had a significant impact on expenditures
Describe changes during the reporting period that may have had a significant impact on expenditures, for example, delays in hiring staff or favorable developments that enable meeting objectives at less cost than anticipated.

Nothing to report.

Significant changes in use or care of human subjects, vertebrate animals, biohazards, and/or select agents
Describe significant deviations, unexpected outcomes, or changes in approved protocols for the use or care of human subjects, vertebrate animals, biohazards, and/or select agents during the reporting period. If required, were these changes approved by the applicable institution committee (or equivalent) and reported to the agency? Also specify the applicable Institutional Review Board/Institutional Animal Care and Use Committee approval dates.

Significant changes in use or care of human subjects

Nothing to report.

Significant changes in use or care of vertebrate animals.

Nothing to report.

Significant changes in use of biohazards and/or select agents

Nothing to report.

6. **PRODUCTS:** List any products resulting from the project during the reporting period. If there is nothing to report under a particular item, state "Nothing to Report."

- **Publications, conference papers, and presentations**
  Report only the major publication(s) resulting from the work under this award.

  Journal publications. *List peer-reviewed articles or papers appearing in scientific, technical, or professional journals. Identify for each publication: Author(s); title; journal; volume: year; page numbers; status of publication (published; accepted, awaiting publication; submitted, under review; other); acknowledgement of federal support (yes/no).*

Submission to the Journal of Hand Surgery: *Perceived Success in Upper Extremity Vascularized Composite Allotransplantation: A Qualitative Study*

  Books or other non-periodical, one-time publications. *Report any book, monograph, dissertation, abstract, or the like published as or in a separate publication, rather than a periodical or series. Include any significant publication in the proceedings of a one-time conference or in the report of a one-time study, commission, or the like. Identify for each one-time publication: Author(s); title; editor; title of collection, if applicable; bibliographic information; year; type of publication (e.g., book, thesis or dissertation); status of publication (published; accepted, awaiting publication; submitted, under review; other); acknowledgement of federal support (yes/no).*

Nothing to report.

  Other publications, conference papers, and presentations. *Identify any other publications, conference papers and/or presentations not reported above. Specify the status of the publication as noted above. List presentations made during the last year (international, national, local societies, military meetings, etc.). Use an asterisk (*) if presentation produced a manuscript.*

Two post presentations at the Military Health System Research Symposium, Orlando, FL, August, 2019 o Qualitative evaluation of psychosocial predictors of outcomes in upper extremity vascularized composite allotransplantation o Psychosocial predictors of outcomes in upper extremity vascularized composite allotransplantation with mock patient vignettes

- **Website(s) or other Internet site(s)**

List the URL for any Internet site(s) that disseminates the results of the research activities. A short description of each site should be provided. It is not necessary to include the publications already specified above in this section.

Nothing to report.

- **Technologies or techniques**
  Identify technologies or techniques that resulted from the research activities. In addition to a description of the technologies or techniques, describe how they will be shared.

Nothing to report.

- **Inventions, patent applications, and/or licenses**
  Identify inventions, patent applications with date, and/or licenses that have resulted from the research. State whether an application is provisional or non-provisional and indicate the application number. Submission of this information as part of an interim research performance progress report is not a substitute for any other invention reporting required under the terms and conditions of an award.

Nothing to report.

- **Other Products**
  Identify any other reportable outcomes that were developed under this project. Reportable outcomes are defined as a research result that is or relates to a product, scientific advance, or research tool that makes a meaningful contribution toward the understanding, prevention, diagnosis, prognosis, treatment, and/or rehabilitation of a disease, injury or condition, or to improve the quality of life. Examples include:
  - *data or databases;*
  - *biospecimen collections;*
  - *audio or video products;*
  - *software;*
  - *models;*
  - *educational aids or curricula;*
  - *instruments or equipment;*
  - *research material (e.g., Germplasm; cell lines, DNA probes, animal models);*
  - *clinical interventions;*
  - *new business creation; and*
  - *other.*

Nothing to report.

7. PARTICIPANTS & OTHER COLLABORATING ORGANIZATIONS

What individuals have worked on the project?
Provide the following information for: (1) PDs/PIs; and (2) each person who has worked at least one person month per year on the project during the reporting period, regardless of the source of compensation (a person month equals approximately 160 hours of effort). If information is unchanged from a previous submission, provide the name only and indicate "no change."

Example:

Name: *Mary Smith*
Project Role: *Graduate Student*
Researcher Identifier (e.g. ORCID ID): 1234567
Nearest person month worked: *5*

Contribution to Project: *Ms. Smith has performed work in the area of combined error-control and constrained coding.*
Funding Support: *The Ford Foundation (Complete only if the funding support is provided from other than this award).*

Name: Simon Talbot
Project Role: Principal Investigator
Researcher Identifier (e.g. ORCID ID):
Nearest person month worked: 3
Contribution to Project: Directs and oversees all phases of the study.

Name: Robert Edwards, PhD
Project Role: Co-Investigator
Researcher Identifier (e.g. ORCID ID):
Nearest person month worked: 0.96
Contribution to Project: Directs qualitative portion of study and assists in all phases of study.

Name: Jeffrey Katz, MD, MSc
Project Role: Co-Investigator
Researcher Identifier (e.g. ORCID ID):
Nearest person month worked: 0.96
Contribution to Project: Assists in all phases of the study, particularly qualitative research and case vignette development.

Name: Elena Losina, PhD
Project Role: Co-Investigator
Researcher Identifier (e.g. ORCID ID):
Nearest person month worked: 0.96
Contribution to Project: Assists in all aspects of study and ensures methodologic and statistical needs are met. Involved in statistical analysis, development and testing of vignettes and will oversee finalizing of all data collection forms.

Name: Sejal Shah, MD
Project Role: Co-Investigator
Research Identifier (e.g. ORCID ID):
Nearest person month worked: 0.96
Contribution to Project: Assist in all phases of study and development of focus group interviews and analysis of data.

Name: Matthew Carty, MD
Project Role: Co-Investigator
Research Identifier (e.g. ORCID ID):
Nearest person month worked: 0.48
Contribution to Project: Assists in study planning and focus group expert interviews.

Name: George Dyer, MD
Project Role: Co- Investigator
Research Identifier (e.g. ORCID ID):
Nearest person month worked: 0.48
Contribution to Project: Assists in study planning and focus group expert interviews.

Name: Sarah Kinsley
Project Role: Research Study Coordinator
Research Identifier:
Nearest person month worked: 0.96
Contribution to Project: Assists with data collection, basic analysis and to ensure that each phase of the project remains on schedule.

Name: Nora Lenhard
Project Role: Research Assistant
Research Identifier (e.g. ORCID ID):
Nearest person month worked: 2.4
Contribution to Project: Responsible for performing literature reviews and development of study materials.

Name: Emma Lape
Project Role: Research Assistant
Research Identifier (e.g. ORCID ID):
Nearest person month worked: 2.4
Contribution to Project: Responsible for performing qualitative literature reviews and analysis.

Name: Christine Gude
Project Role: Administrator
Research Identifier (e.g. ORCID ID):
Nearest person month worked: 1.2
Contribution to Project: Coordination of travel arrangements and conference meetings.

Name: Faith Selzer, PhD OrACORe
Project Role: Project Manager
Research Identifier (e.g. ORCID ID):
Nearest person month worked: 0.96
Contribution to Project: Oversees secondary data analysis and data collection projects.

Name: Shuan (Zoey) Song
Project Role: Data Analyst
Research Identifier (e.g. ORCID ID):
Nearest person month worked: 6
Contribution to Project: Statistical analysis, development and implantation of data for vignettes.

If the active support has changed for the PD/PI(s) or senior/key personnel, then describe what the change has been. Changes may occur, for example, if a previously active grant has closed and/or if a previously pending grant is now active. Annotate this information so it is clear what has changed from the previous submission. Submission of other support information is not necessary for pending changes or for changes in the level of effort for active support reported previously. The awarding agency may require prior written approval if a change in active other support significantly impacts the effort on the project that is the subject of the project report.

Nothing to report.

What other organizations were involved as partners?
If there is nothing significant to report during this reporting period, state "Nothing to Report."

Describe partner organizations – academic institutions, other nonprofits, industrial or commercial firms, state or local governments, schools or school systems, or other organizations (foreign or domestic) – that were involved with the project. Partner organizations may have provided financial or in-kind support, supplied facilities or equipment, collaborated in the research, exchanged personnel, or otherwise contributed.
Provide the following information for each partnership:
Organization Name:
Location of Organization: (if foreign location list country)
Partner's contribution to the project (identify one or more)

- *Financial support;*
- *In-kind support (e.g., partner makes software, computers, equipment, etc., available to project staff);*
- *Facilities (e.g., project staff use the partner's facilities for project activities);*
- *Collaboration (e.g., partner's staff work with project staff on the project);*
- *Personnel exchanges (e.g., project staff and/or partner's staff use each other's facilities, work at each other's site); and*
- *Other.*

Nothing to report. Collaboration and subcontract award with Medical University of Innsbruck, Austria is pending.

8. SPECIAL REPORTING REQUIREMENTS

COLLABORATIVE AWARDS: N/A

QUAD CHARTS: N/A

Psychosocial Predictors in VCA

Log Number: RT160066
Award Number: W81XWH-17-1-0400

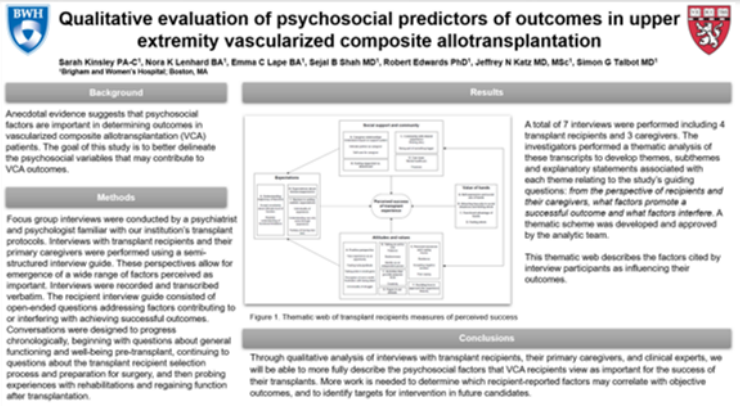
PI: Simon Talbot, MD **Org:** Brigham and Women' s Hospital **Award Amount:** $1M

Study/Product Aim(s)

- Hand transplantation has moved from an experimental option for a few amputees to, at some institutions, the standard of care. This transition has occurred without a comprehensive analysis of the factors that contribute to the success or failure of these unique transplants. We believe that demographics, anatomic factors, medical comorbidities, social situations, psychiatric/psychological factors, therapy involvement, and logistical factors have a complex interplay to contribute to a good outcome. The objective of this study is to better delineate psychosocial factors associated with outcomes in this group of upper extremity transplant patients.

Approach

- Specific Aim 1: To evaluate prospectively collected data on the International Registry of Hand and Composite Tissue Transplantation to determine variables associated with transplant "success"
- Specific Aim 2: To elucidate core factors involved in transplant success and failure utilizing qualitative research methods.
- Specific Aim 3: To develop a model, based on expert opinion, to help objectify the evaluations of hand transplant patients.



Qualitative evaluation of psychosocial predictors of outcomes in upper extremity vascularized composite allotransplantation

Sarah Kinsley PA-C[1], Nora K Lenhard BA[1], Emma C Lape BA[1], Sejal B Shah MD[1], Robert Edwards PhD[1], Jeffrey N Katz MD, MSc[1], Simon G Talbot MD[1]
[1]Brigham and Women's Hospital, Boston, MA

Background

Anecdotal evidence suggests that psychosocial factors are important in determining outcomes in vascularized composite allotransplantation (VCA) patients. The goal of this study is to better delineate the psychosocial variables that may contribute to VCA outcomes.

Methods

Focus group interviews were conducted by a psychiatrist and psychologist familiar with our institution's transplant protocols. Interviews with transplant recipients and their primary caregivers were performed using a semi-structured interview guide. These perspectives allow for emergence of a wide range of factors perceived as important. Interviews were recorded and transcribed verbatim. The recipient interview guide consisted of open-ended questions addressing factors contributing to or interfering with achieving successful outcomes. Conversations were designed to progress chronologically, beginning with questions about general functioning and well-being pre-transplant, continuing to questions about the transplant recipient selection process and preparation for surgery, and then probing experiences with rehabilitations and regaining function after transplantation.

Results

A total of 7 interviews were performed including 4 transplant recipients and 3 caregivers. The investigators performed a thematic analysis of these transcripts to develop themes, subthemes and explanatory statements associated with each theme relating to the study's guiding questions: *from the perspective of recipients and their caregivers, what factors promote a successful outcome and what factors interfere.* A thematic scheme was developed and approved by the analytic team.

This thematic web describes the factors cited by interview participants as influencing their outcomes.

Figure 1. Thematic web of transplant recipients measures of perceived success

Conclusions

Through qualitative analysis of interviews with transplant recipients, their primary caregivers, and clinical experts, we will be able to more fully describe the psychosocial factors that VCA recipients view as important for the success of their transplants. More work is needed to determine which recipient-reported factors may correlate with objective outcomes, and to identify targets for intervention in future candidates.

Poster presentations at MHSRS Conference, August, 2019.

Timeline and Cost

Activities	2017	2018	2019	2020
Evaluate prospectively collected data				
Qualitative assessment of core factors in transplant success and failure				
Develop model to objectify evaluations of transplant candidates				
Estimated Budget ($K)	337	335	321	

Updated: 09/01/2019

Goals/Milestones

CY17-18 Goal – Evaluate data collected from IRHCTT to determine factors of transplant success

☑ IRB and HRPO Approval
☑ Obtain and analyze IRHCTT data

CY18-19 Goal – Qualitative assessment of core factor

☑ Focus group interviews
☑ Analyze qualitative data from interviews

CY19-20 Goal – Develop model to objective evaluation of hand transplant candidacy

☑ Develop survey for clinical experts
☑ Obtain survey results and analyze data from clinical experts
☑ Begin manuscript journal submission
❑ Determine statistical model and score to correlate with existing patients

Comments/Challenges/Issues/Concerns: None

Budget Expenditure to Date:
Actual Expenditure: $462,707.52 (indirect costs $204,187.99)

9. APPENDICES: Attach all appendices that contain information that supplements, clarifies or supports the text. Examples include original copies of journal articles, reprints of manuscripts and abstracts, a curriculum vitae, patent applications, study questionnaires, and surveys, etc.

None.