Section I

Project Leader: John Berry-Candelario
Credentials: MD, DO, MPH

- Male [ ] Female [ ]
- Date of birth: 02/19/1977
- NC medical license no.: N/A

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Fax

Current Residency program
Neurosurgery, Duke University Health System
Est. completion date
2018

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Program Coordinator
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Coordinator’s email
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Additional Project Team Members

<table>
<thead>
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<th>Name</th>
<th>Credentials</th>
<th>Email address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oren Gottfried</td>
<td>MD, DO, FAANS</td>
<td><a href="mailto:Oren.gottfried@duke.edu">Oren.gottfried@duke.edu</a></td>
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<td>MD, DO, BA</td>
<td><a href="mailto:Rtz3@duke.edu">Rtz3@duke.edu</a></td>
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<tr>
<td>Mary Clement</td>
<td>MD, DO, BSN, RN</td>
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Section II

Personal Statement: Please indicate how this grant, if funded, will help toward your career goals and intended area of specialization. Outline your expected career path and how this aligns with the Residency Research Grant program objectives and criteria. (500 words max.)

I am currently a Chief Resident at Duke and I became interested in this project because of the growing need for neurosurgeons to be not only great surgeons but also to build strong positive relationships with their patients. This is important for spine, which I am interested in pursuing, but also for neurosurgery and medicine as a whole. I am also interested in how modern technology can transform our relationship with our patients – shared decision making is very important to me and will be a major communication goal when I begin my own practice. Spine represents one of the best subspecialties for this type of research due to the large and diverse patient population and the large national surgical databases available to work with.
Section III – Details of the proposal

Short title
Improving Spine Clinic Communication Through Mobile Technology

Abstract summary
Mobile technology can be used in outpatient spine clinic to efficiently collect patient data, reduce form fatigue, improve communication, aid patient decision making, and increase satisfaction for all stakeholders. Hospital specific data in conjunction with national data can be used to aid in decision making.

Outline of the problem
Timely assessment of patient experiences and quality of care is essential in today’s practice environment, not only because such assessment is now federally mandated but because it allows providers to assess problems, improve upon their practice and deliver better care to their patients. The current assessment tool – the Press Ganey survey/CG CAHPS – collects potentially useful information but aggregates, anonymizes, and delays the transfer of information, making nearly impossible for providers and practices to associate particular patients or encounters with the feedback.
Additionally, neurosurgery – including spine – suffers in particular areas from a specific lack of high level data about surgical outcomes that is easily understood by both patients and providers; this is in contrast to fields like cardiology, where risks for thrombosis can be calculated with CHA2DS2-VASC, or transplant surgery, where mortality can be predicted with a MELD score. New data is emerging that will fill this gap, but it is also important that each institution and its patients knows where it lies in comparison to national outcomes.

State of the art in this field
N2QOD is a national spine surgery database which has recently been used to create national prediction models for patient centered outcomes such as return to work (Asher et al 2017), disability, quality of life, & pain (McGirt et al 2017), and reoperation and readmission (Wadhwa et al 2017). Mobile technology has demonstrated effectiveness in augmenting shared decision making, with women after cesarean delivery choosing significantly less opioid pain management after being shown the standard trajectories for postoperative pain using tablet computers (Prabhu et al 2017).

Past research of the applicant in this field
n/a

Open questions
- Does mobile technology improve patient-provider communication?
- Does mobile technology improve patient understanding of disease?
- How do Duke spine surgery outcomes compare to the national average?

Hypothesis
We propose that bringing tablet technology into the outpatient setting to collect data – from chief complaints to patient-centered outcomes – and provide easy access to data that will inform decision making, we can improve communication between patients and physicians make clinic visits for satisfying for all stakeholders.

What are the aims you want to reach with this study?
(1) Improved communication from patient to provider through
a. Mobile version of Clinic Satisfaction Tool  
b. Mobile version of standard scales (e.g., ODI, VAS)

(2) Improved communication from provider to patient through  
a. Shared decision making during the visit using Duke-specific and national outcomes data for common spine diseases and procedures  
b. Tailored AVSs and emails based on CST responses, scales, and decisions

(3) Reduction of patient “form fatigue”\(^1\) by streamlining intake paperwork

(4) Eco-friendly reduction in paper resources

Anticipated results

- Duke specific (general and geriatric) prediction models for outcomes of common spine interventions
- iPad app for collecting patient chief complaints, accessing information critical for shared decision making, and assessing patient satisfaction

Study subjects, specimen or materials

Subjects: Duke Spine Center patients and providers  
Materials:
- Hardware:  
  - iPad tablets (x8) with safety cases (already acquired)
- Software:
  - RedCap survey & database software
  - Designed app for integrating surveys and decision making tools
  - RStudio for statistical analysis
- Databases:
  - N2QOD
  - Internal Duke QOD
  - Clinic Satisfaction Tool internal database

Effect and outcome variables

- CG CAHPS: Global & Physician Communication subscores – current metrics for satisfaction
- Clinic Satisfaction Tool – internal metrics for satisfaction  
  - Satisfaction score
  - Patient comments – qualitative results, total quantity, & percent of positive comments
- Patient & Provider Intervention Surveys

Methods for taking measurements

Clinic Satisfaction Tool is currently administered as a paper intervention at check in to our Spine Center. During the study we will transition from paper to electronic format through the iPad.

\(^1\) [https://oia.unm.edu/surveys/survey-fatigue.pdf](https://oia.unm.edu/surveys/survey-fatigue.pdf)
Additional patient surveys will be securely administered through the RedCap data management system, and provider surveys will be administered through Qualtrics.

Methods for data management and analysis (including biostatistical check)
All researchers involved have completed the necessary training as required by Duke Office of Clinical Research and biostatisticians within the Duke Department of Neurosurgery will be responsible for analyzing the data.

Primary analysis will be descriptive to identify baseline characteristics of patient cohorts, pre- and intraoperative characteristics associated with surgery, and postoperative complications. Categorical variables will be described using frequencies and percentages. Means/medians, standard deviations, and ranges for continuous variables will be used for the aforementioned primary outcomes. Chi-squared tests will be used to compare patient cohorts. If continuous variables are normally distributed, ANOVA/t-tests will be employed, otherwise non-parametric Wilcoxon rank sum tests will be used. Significance of tests will be assessed at \( \alpha = 0.05 \). Univariate and logistic/multinominal logistic regression analyses will be used to test multiple variables for significance, which should reduce the impact of confounding factors. All statistical analysis will be performed using RStudio.

Qualitative information collected from questionnaires will be coded by thematic analysis using NVivo software.

For providers, quantitative analysis will be similar to that described above for patient data. For physician scores on Clinic Satisfaction Tool, CG CAHPS self-assessment, and actual CG CAHPS scores, categorical variables will be described using frequencies and percentages. Means/medians, standard deviations, and ranges for continuous variables will be used for the aforementioned primary outcomes. Chi-squared tests will be used to compare patient cohorts as necessary. If continuous variables are normally distributed, ANOVA/t-tests will be employed, otherwise non-parametric Wilcoxon rank sum tests will be used. Significance of tests will be assessed at \( \alpha = 0.05 \). Univariate and logistic/multinominal logistic regression analyses will be used to test multiple variables for significance, which should reduce the impact of confounding factors. All statistical analysis will be performed using R Studio.

Estimation of sample size and power
Duke Spine Center sees 1400 patients per month and performs over 1500 surgeries a year. Clinic Satisfaction Tool is administered to every patient in the clinic. Any patient survey administered over a week will reach approximately 350 patients, which is capable of detecting a 5% difference in satisfaction scores with 81% power.

Internal outcomes database contains over 1000 patients.

Animal model
If an in vivo animal model is used in the planned research work, please describe the model in detail. The description should include: anesthesia protocols, treatment protocols, pain management, surgical techniques, post-operative care, criteria for removal from the study if necessary, and euthanasia protocols.
AAALAC accreditation (Association for assessment and accreditation of Laboratory Animal Care International) www.aaalac.org

Please indicate whether the institution (main applicant and co-applicants) is AAALAC accredited and specify in which institution the animal research will be carried out. If the institution is not AAALAC accredited, please detail what agency and standards are used to oversee animal use and care.

N/A

Relevance of the project

Since the passing of MACRA within the ACA in 2010, now more than ever it has become essential for practices to track their own quality measures and patient-centered outcomes as well as to make every effort to improve them. When we create our app it will potentially be a low-cost, high-impact solution for other practices with REDCap/Epic based EMRs as well as a model for those using other software.

Time schedule

- Duke spine surgery outcomes model – 1 month
- Software design and testing – 2 months
- Implementation in Spine Center – 1 month roll out and 6 months study
- Assessment of patient and provider perspectives – concurrent
- Statistical analysis – 1 month

Relevant literature by the investigators


Relevant literature by other authors


### Section IV – Budget for proposed project period

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<tr>
<td>Clement, Mary</td>
<td>Nurse Manager, Implementation Leader</td>
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<td>TBD (Duke Health IT)</td>
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Section V

If selected for participation in the program, the grantee agrees to conduct herself/himself professionally according to the principles of medical ethics and to be governed by the Bylaws of the North Carolina Spine Society.

Applicant’s signature: _______________________________ Date: 7/3/2017

Program Director’s signature: _______________________________ Date: 7/3/2017

To be considered for the 2017-2018 grant year, submit the following by July 3, 2017:
1. Completed application form
2. Applicant’s CV
3. Completed W-9 form of the recipient organization (IRS W-9)

Please sign your completed form and return it along with your CV by email, mail or fax to:
NCSS, PO Box 27167, Raleigh, NC 27611 | Fax: 919-833-2023 | ncspine@ncmedsoc.org