**Abstract**

**Title:** “Fractures and co-morbid indicators of elder abuse”

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**Brief description of research plan:**

The objective of this exploratory pilot study is to evaluate the prevalence, location, point of entry, and comorbidities of fractures for adults age 65 years and older receiving care at UCI Medical Center. The translational nature of the findings will inform future studies to develop guidelines for recognizing clinical signs of abuse in older adult fracture patients. Using quantitative analytic methods, we will create a descriptive profile of older adult fracture patients. In order to obtain patient data for analysis, we will use the Cohort Discovery Tool to run an initial query which will inform our request to the Honest Broker Services at UCI for specified de-identified patient records. This descriptive profile will allow us to look at the distribution of fractures by comorbidities, patient demographics, and fracture context. We will also analyze the prevalence of elder abuse coding among this population. Using a combination of evidence gleaned from this project, evidence-based literature, and consultation with elder abuse medical experts we can then generate hypotheses linking fracture comorbidities and characteristics to elder abuse. These hypotheses will form the basis for future studies to develop warning signs of abuse for older adult fracture patients seeking treatment in hospital settings.

1. **Specific Aims**

We propose to conduct research that utilizes the **Cohort Discovery Tool** and **Honest Broker Services** at UCI to gather preliminary data on patient demographics of older adults treated for fractures and their comorbid diagnoses. These data will be used to inform a full application for extramural funds to develop clinical guidelines for clinicians treating fractures that, combined with other comorbid diagnoses, may be indicative of possible elder abuse and/or neglect. The overall goal of this study is to evaluate the prevalence, patterns, and comorbidities of fractures for adults 65 years of age and older receiving care at UCI Medical Center. Qualitative data from this pilot project will increase understanding of the type and frequency of comorbid diagnosis associated with fractures among an aging population of adults. Findings will provide preliminary information to inform the development of an elder abuse risk profile and clinical guidelines for identification of elder abuse among older adults seeking treatment for bone fractures.

The specific aims of this one-year exploratory study are to:

1. Identify demographic information of patients over the age of 65 treated for a fracture at UCI health centers.
2. Determine the prevalence of elder abuse codes and comorbid diagnoses associated with fractures in this patient population.
3. Compare the prevalence of comorbid diagnoses for fractures in older adults stratified by specific patient demographics (e.g., age, gender, race) and fracture context (location of fracture, hospital point of entry for fracture).
4. Generate hypotheses about fracture comorbidities indicative of signs of elder abuse.

**B. Research Strategy**

**B.1. Background and Significance**

Elder abuse takes many forms, one of which is physical abuse. It cuts across all races, gender, ethnic and religious groups and communities. Recent incidence studies place the number of abused elders in the United States at five million (Acierno et al, 2010; Erlingsson, 2007). This translates into approximately 1 in 10 older Americans. It is inflicted in homes and facilities, and causes untold suffering and expense. The Agency for Healthcare Research and Quality estimated that the hospital cost of elder abuse for one year (2005) was a staggering $13.3 million (Middleton, 2008). Undiagnosed and unreported elder abuse, combined with a growing population of older adults, significantly impacts California in that by 2020, 14% of the nation’s senior population will be living in California. The California Attorney General’s Office estimated that 200,000 older Californians are abused each year (California Office of the Attorney General, 2002). Yet, 80-90% of cases go unreported and there is little research to illuminate the issue (Lifespan of Greater Rochester, 2011).

Elder abuse research lags behind child abuse and intimate partner violence research with regard to identifying risk indicators of abuse. The child abuse literature has clearly shown that some bone fractures carry a higher specificity for abuse (Egge & Berkowitz, 2010). In a literature review, Egge and Berkowitz (2010) cited evidence to suggest that rib fractures in children carried the highest probability for abuse. Humerus, long bone, and skull fractures were also likely indicators of abuse given certain characteristics such as location and child’s age. Studies in the intimate partner violence literature have examined orbital, dental, and other maxillofacial fractures (Garbin, Guimarães e Queiroz, Rovida, & Garbin, 2012; Goldberg, McRill, Bruno, Ten Have, & Lehman, 2000; Hartzell, Botek, & Goldberg, 1996; Le, Dierks, Ueeck, Homer, & Potter, 2001). To date, there is little research on elder abuse in general, and almost none examining signs of elder abuse among patients presenting with fractured bones. In an effort to further the development of a knowledge base for elder abuse research, the National Research Council (NRC) published a report summarizing the status of elder abuse research (2003). This report noted that as a field, elder mistreatment was in the stage of development where child abuse and intimate partner violence (formerly called domestic violence) were over 20 years ago. The report emphasized the need for more evidence based research.

A number of aging-related diseases, such as, osteoporosis and gait instability, predispose older adults to fractures. As a result, a fracture in an older adult is not an unusual occurrence but the determination of cause becomes complicated, especially in those with dementia. As cautioned by Ziminski et al (2012), “it is important to be aware that although accidents are legitimate cause of injury for older adults with cognitive impairments, not all injuries are the result of accidents.” Currently there are no known red flags for elder abuse in fracture patients. That is, there are no known clinical signs that immediately alert physicians to the suspicion of elder abuse, hence corresponding diagnostic coding for possible abuse is underreported and rarely documented (Rovi, Chen, Vega, Johnson, & Mouton, 2009; Ziminski et al., 2012). Experts in the field of elder abuse in a recent consensus workshop (Pillemer et al, 2011) noted a need for improved risk profiles for both victims and abusers. This study has translational importance in that findings will provide evidence-based support for the creation of clinical guidelines for the possible identification of elder abuse.

The purpose of this study is to gather preliminary results on patient demographics of older adults treated for fractures and their comorbid diagnoses to inform a full application for extramural funds to develop clinical guidelines for treating older adults presenting with fractures that, combined with other comorbid diagnoses, may be indicative of possible elder abuse and/or neglect. The overall goal of this study is to evaluate the prevalence, patterns, and comorbidities of fractures for adults 65 years of age and older receiving care at UCI Medical Center. Once this is known we may then specifically study fracture patterns as they relate to elder abuse. These findings will ultimately provide evidence-based support for the creation of clinical guidelines for the possible identification of elder abuse

**B.2. Innovation**

**Translational importance**

Currently there are no known red flags for elder abuse in fracture patients. These findings will provide evidence-based support for the creation of clinical guidelines for the possible identification of elder abuse. ICD-9 coding of possible signs of elder abuse or neglect is often not done or is often captured inconsistently and subjectively by clinicians based on a number of factors including time for proper documentation, knowledge about possible coding, and willingness to document “unbillable” codes. Using Cohort Discovery and Honest Broker tools to examine comorbid diagnoses, patient demographic, fracture context, and any elder abuse indicators that might be gleaned from electronic medical records is an innovative first step to developing an elder abuse risk profile.

**B.3. Approach**

This is an exploratory study using retrospective secondary data analysis. We will use the **Cohort Discovery Tool** to run a query to determine the number of patients over age 65 who sought treatment for any type of fracture at a UCI healthcare facility (including main hospital and clinics). Then we will subset the data by age groups (65-74, 75-84, and 85 and older), gender, race, fracture type (i.e., location of fracture and point of entry), and comorbid conditions. The CDT query results will allow us to estimate the scope of our research question and time burden for data analysis. It will also allow us to refine the variables in our analysis by ensuring that the variables we are searching (e.g., patient demographics, fracture context) have sufficient sample sizes for analysis. This will eliminate the burden of requesting access to specific patient data that ultimately will not be used in the analysis because of insignificant sample sizes.

Next, we will utilize the **Honest Broker Services** at UCI to access de-identified health records for patients with fractures. Upon receipt of health records, we will analyze the data and create a clinical profile of older adult fracture patients (see Figure 1). Using a combination of evidence-based literature and consultation with physicians with elder abuse expertise, we will generate hypotheses about which comorbid diagnoses are suspicious and possibly indicative of physical abuse or neglect. We will identify possible ICD-9 codes for elder abuse and perform descriptive statistics to evaluate the prevalence of these codes among all fracture patients and comorbid diagnoses groups. If elder abuse appears at higher frequencies among comorbid groups that are significantly associated with fracture, we will generate a hypothesis about the link between elder abuse and specific clinical signs.

The following research steps will be conducted:

*Step 1*: Conduct a thorough review of the literature in child abuse, intimate partner violence, elder abuse, and medical coding to determine appropriate ICD-9 diagnostic codes to include in our initial Cohort Discovery query.

*Step 2*: Determine frequencies of demographic and fracture context of the study sample.

*Step 3*: Use descriptive statistics to create a profile of sample groups showing the distribution of prevalent comorbid diagnoses among all older adult fracture patients as well as the distribution of comorbid diagnosis within each demographic and fracture context group.

*Step 4*: Generate hypotheses about the relationship between fracture type and context, comorbid diagnoses, and patient demographics and elder abuse and neglect to be tested as part of the larger research study.

**B.4. Data collection and storage**

Data gathered through the liaison of the Honest Broker Services will be combined into one comprehensive, de-identified dataset and will be stored on a password protected secure server through UCI myResearch portal. Analyses of the data set which will be deposited to a myResearch portal account, will be completed using SAS/STATA/SPSS software available through the myResearch portal. CDT and Honest Broker services facilitate compliance with HIPAA and human subjects protection regulations.

**B.4.a. Research setting**

This pilot project is supported by the Program in Geriatric Medicine, Department of Family Medicine. Ranked the 35th top Program by U.S. News & World Report in 2012, the program in Geriatric Medicine will support this project by providing office and conference space, computers, and access to technical assistance and expertise from the Center of Excellence on Elder Abuse and Neglect which is also located in the Department of Family Medicine.

**B.5. Plan and timeline for future extramural fund applications**

The Patient Protection and Affordable Care Act of 2010 created the Patient-Centered Outcomes Research Institute (PCORI) to fund and promote research that advances “…the quality and relevance of evidence concerning the manner in which diseases, disorders, and other health conditions can effectively and appropriately be prevented, diagnosed, treated, monitored, and managed…,” and one of the main priority areas is to build a national research infrastructure that facilitates learning from clinical experiences (Selby et al., 2012). This pilot project will provide a methodological standard for collecting baseline data on possible comorbid elder abuse risk associated with fractures. Results of this pilot project will provide a patient profile of comorbid diagnoses of older adults with fractures that we will use to inform current practice in the care of older adults with bone fractures. This database will provide quantitative information to either support or refute what until now has been assumptions based solely on anecdotal evidence. A next step in our overall research agenda is to conduct a detailed patient records review, allowing us to confirm the mechanism of fracture as well as correlate specific comorbid diagnoses to elder abuse. Through the determination of fracture comorbidities and mechanism of fracture, we can start to develop an elder abuse risk profile for fracture patients. This risk profile will be used by clinicians to determine when further investigation of bone fractures is warranted. See proposed timeline below for pursuit of extramural funding for next steps.

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| **Timeline for future funding proposals** |
| **Activity**  | **Target deadline** |
| Convene advisory committee * Establish proposal working group
* Identify multidisciplinary stakeholders
* Identify community/patient stakeholders
 | October 15, 2012  |
| Convene working groups for each area * Assign roles to members
* Establish internal deadlines
* Hold regular meetings
* Conference calls as needed
 | Late October/early November, 2012  |
| Draft * Budget
* Logic model
* Problem statement
* Target population
* Organizational capability
 | November 2012 |
| Draft proposal and final budget  | January 2013 |
| **Submit LOI for PCORI grant “Assessment of Prevention, Diagnosis, and Treatment Options” program**  | **February 15, 2013** |
| Convene advisory committee* Working group presents final draft of proposal for feedback
 | Late February, 2013  |
| **Submit full proposal for PCORI grant** | **March 15, 2013** |
| PCORI Awards announced  | August/September 2013 |
| Pending PCORI Award decision, if not funded then * Convene advisory committee to discuss revision
 |  |
| **Submit full proposal for investigator-initiated NIH/NIA RO3 PA-11-262** | **October 16, 2013** |



Figure 1. Organizational profile of analysis plan.

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