I. **PROJECT DESCRIPTION**

Be as explicit as possible in your description. Please refer to the above instructions which outline the criteria by which applications are reviewed. Be sure to include the following in your outline of the project, not to exceed the available space (approximately 2 – 2 ½ pages).

1. **Background & Hypothesis.**

   One out of every three adults over the age of 65 will fall each year.\(^1\) In the over 65 age group, 35% of falls evaluated by a trauma service resulted in moderate to severe injuries.\(^2\) Many of these injuries result in decreased independence. Hip fracture is the most common fall-related injury resulting in increasing disability; 67% of older adults suffering hip fracture failed to regain their previous functional independence and 33% died within a year.\(^3\) Despite the risk posed by falls, 34% of adults over 65 categorize falls as one of their least important health concerns.\(^4\) Older adults can benefit from fall prevention but most are not aware of what they can do to prevent falls.\(^4\) Thus, there is a need to reach patients and their families in new ways, provide information in a manner that is personalized to their own needs and preferences, and prevent these adverse outcomes. The goal of this project is to provide patients with evidence-based suggestions that could make a substantial impact on their lives and well-being.

   Specifically, I am asking: for older adults over the age of 65, does an intervention that provides recommendations for addressing fall risk factors tailored to their personal circumstances result in a significantly decreased fall rate? I hypothesize that a tailored intervention that considers individual preferences and circumstances would lead to better adherence and a decreased fall rate compared to a non-tailored intervention or no intervention. Although some risk factors, such as age, cannot be changed, there are numerous modifiable fall risk factors with sufficient evidence to support intervention in the prevention of falls. However, for an intervention to be successful, patients must know of the risk factor and adhere to the plan to reduce it. I intend to review the literature on the implementation of fall-prevention programs with a specific eye for the effect of personal-tailoring on fall-rate, and the possible types of tailoring that may be effective.

   This research will ultimately guide the formation of a web-based interactive tool that will provide evidence supported, modifiable interventions from the literature and present it to patients in a new way. A web-based interactive tool is an efficient, cost-effective method to provide patients and their families with evidence-based health suggestions. In designing the content for this tool, I will review the literature for the evidence-supported fall-risk interventions and consider how to tailor the suggestions provided to individuals. Computers offer a way to reach a large number of people and a method of tailoring advice using algorithms; traditional pamphlets lack these benefits. A web-based tool for fall prevention could help make older adults aware of their own fall risk and the behavioral changes they can make to prevent falls.

2. **Study Design & Literary References (to include):**

   The goal of this project is to understand modifiable determinants of falls in older adults and shape this information into an interactive tool, which we will develop first as a paper format and eventually put online. The tool will provide tailored advice to older adults and their families about how to minimize the risk of falling. In the first phase of the project, I will be responsible for reviewing the literature on fall-prevention in the elderly in order to create the content for the paper tool. This research will be conducted in Summer 2015 under the guidance of Dr. Elizabeth Phelan and funded by the Medical Student Training in Aging Research Program (MSTAR). In subsequent phases, the paper tool will be converted to an online tool that will undergo pretesting and eventually undergo evaluation in a prospective case-control study.
During the literature review, I will primarily search PubMed with a variety of terms related to fall prevention, including: “fall prevention,” “falls older adults,” “falls elderly,” “fall risk older adults,” “fall risk elderly,” “balance older adults,” “strength falls older adults,” “drugs falls older adults,” “prescriptions falls older adults,” “fall intervention older adults,” “shoes falls older adults,” “activity falls older adults.” I will cull the results for only modifiable risk factors with a strong body of evidence in prospective case-control trials that supports the intervention. I will consider the specific patient populations for which intervention is supported and also consider the effects of tailoring of suggestions in studies of community fall avoidance programs.

Preliminary research identifies exercise or physical therapy as a statistically significant means of reducing fall risk (RR 0.87). Exercise factors can be broken down in explored in the categories of gait/balance/functional training, strength and resistance training, and general exercise. Vision is another promising avenue for investigation. First cataract surgery can reduce the risk of falling the elderly with bilateral cataracts, although the effect of surgery in the second eye is inconclusive. Polypharmacy is another risk factor for falling that can be managed by medication review, although the trade-offs of eliminating a medication must be considered. A prospective case-control trial in which patients in the intervention arm received up to three different prevention measures according to their individual risk factors found that the intervention group had a lower fall rate over 12 months (RR 0.75). This result supports the notion that active intervention can successfully reduce fall rates, but the efficacy of individual prevention measures would have to be considered separately.

Evidence from other health outcomes studies have shown that by tailoring to the tool to the individual, the rate of adherence can be increased. When a web-based tool providing diet suggestions was implemented with and without tailoring, the users who received tailored feedback were four times as likely to change their diet as those who received generalized advice. A meta-analysis of studies that compared health outcomes in patients who received either tailored and a generic message found that the tailored messages resulted in better health outcomes overall (OR=1.2).

As I progress in this study it is likely that I will narrow the scope of the review either by intervention type or by population. At this point, I am beginning my search with a broad focus in order to identify the most effective interventions before narrowing the topics to be presented in the III review paper and in the interactive fall prevention tool.

<table>
<thead>
<tr>
<th>Study</th>
<th>Population</th>
<th>Study Type</th>
<th>Intervention Type</th>
<th>Study duration</th>
<th>Relative Risk for Falling</th>
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</thead>
<tbody>
<tr>
<td>Moyer, 2012</td>
<td>Adults over 65</td>
<td>Meta-analysis</td>
<td>Exercise/physical therapy</td>
<td>N/A</td>
<td>Pooled RR=0.87 (95% CI 0.81-0.94)</td>
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<tr>
<td>Harwood, 2005</td>
<td>Women over 70 with bilateral cataracts</td>
<td>Randomized controlled trial</td>
<td>Cataract Surgery in First Eye</td>
<td>12 months</td>
<td>RR=0.66 (95% CI 0.45-0.96, p=0.03)</td>
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<tr>
<td>Foss, 2006</td>
<td>Women over 70 with bilateral cataracts</td>
<td>Randomized controlled trial</td>
<td>Cataract Surgery in Second Eye</td>
<td>12 months</td>
<td>RR= 0.68 (95% CI 0.39-1.19, p=0.18)</td>
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<tr>
<td>Tinetti, 2014</td>
<td>Adults over 70</td>
<td>Randomized controlled trial</td>
<td>Multi-factorial: management of postural hypotension, medications, gait, strength, environmental</td>
<td>12 months</td>
<td>RR = 0.69 (95% CI 0.52 – 0.90)</td>
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<tr>
<td>Hazards</td>
<td>Study</td>
<td>Population</td>
<td>Design</td>
<td>Intervention</td>
<td>Duration</td>
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<tr>
<td>Spice, 2009&lt;sup&gt;12&lt;/sup&gt;</td>
<td>Adults over 70</td>
<td>Randomized controlled trial</td>
<td>Multi-factorial: medication changes, physiotherapy, occupational therapy, nursing interventions, homecheck interventions, social service interventions</td>
<td>12 months</td>
<td>OR = 0.52 (95% CI 0.35 – 0.79, p=0.02)</td>
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References:


