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Longitudinal functional recovery after geriatric cardiac surgery



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ABSTRACT

Background: Impaired functional and cognitive status is an important outcome for older adults undergoing major cardiac surgery. We conducted this pilot study to gauge feasibility of assessing these outcomes longitudinally, from preoperatively up to two time points postoperatively to assess for recovery.

Methods: We interviewed patients aged ≥ 65 y preoperatively and repeated functional and cognitive assessments at 4–6 wk and 4–6 mo postoperatively. Simple unadjusted linear regression was used to test whether baseline measures changed at each follow-up time point. Then we used a longitudinal model to predict postoperative recovery overall, adjusting for comorbidity.

Results: A total of 62 patients (age 74.7 ± 5.9) underwent scheduled cardiac surgery. Preoperative activities of daily living (ADL) impairment was associated with poorer functional recovery at 4–6 wk postoperatively with each baseline ADL impairment conferring recovery of 0.5 fewer ADLs ($P < 0.05$). By 4–6 mo, we could no longer detect a difference in recovery. Preoperative cognition and physical activity were not associated with postoperative changes in these domains.

Conclusions: A preoperative and postoperative evaluation of function and cognition was integrated into the surgical care of older patients. Preoperative impairments in ADLs may be a means to identify patients who might benefit from careful postoperative planning,

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especially in terms of assistance with self-care during the first 4–6 wk after cardiac surgery.

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1. Introduction

In selected patients, cardiac surgery can improve quality-of-life [1] and long-term survival [2]. Today, procedures, such as coronary artery bypass grafting (CABG) [3,4], and valve replacement are routinely performed in older adults [5,6]. However, because older patients are at higher risk for complications, such as postoperative delirium and prolonged immobility, a growing body of literature supports the evaluation of basic [7] and instrumental [8] activities of daily living (IADLs) and cognitive function to enhance surgical risk assessment for older patients undergoing scheduled surgery [9–21], including cardiac surgery [17,22–27]. In addition, postoperative evaluation of function has been proposed as an important outcome in older surgical patients [10]. Presurgical and postsurgical evaluation of physical and cognitive function is not currently a formal component of usual cardiac surgery care at most institutions.

We conducted an interdisciplinary, prospective pilot study to test the feasibility of measuring both cognitive and physical function in a longitudinal fashion among cardiac surgery patients aged ≥ 65 y. We asked the question of whether components of a comprehensive geriatric assessment could be incorporated into the workflow of the standard cardiac surgery preoperative process, and whether we could capture functional recovery using postoperative telephone interviews as a potential outcome measure. Finally, as a secondary question, we tested whether specific components of the geriatric preoperative assessment could help identify older patients at higher risk for short- and intermediate-term functional loss, which could potentially be valuable for counseling older surgical candidates and manage their expectations of postoperative recovery.

2. Materials and methods

2.1. Overview

The University of Michigan Health System is a 931-bed, tertiary care medical center with a free-standing cardiovascular hospital. Approximately 250 cardiac procedures are performed annually in older patients (aged ≥ 65 y). Our prespecified goal was to prospectively identify and evaluate 80 older adults concurrent to their usual preoperative care for scheduled CABG, valve replacement or repair, or aortic surgery. All surgeries were performed with an open approach (i.e., none were “minimally-invasive”). We used a part-term cardiac research nurse who recruited from the scheduled patients of a weekly preoperative cardiac surgery clinic. Feasibility was defined as completing geriatric evaluations without disrupting the normal flow of preoperative surgical care, and contacting at least half of the patients at least once by telephone. Our initial time frame was a 6-mo enrollment

period; however, we extended the time frame to 14 mo because of higher-than-expected refusal rate. This study was approved by the University of Michigan Institutional Review Board. All subjects provided written informed consent.

We recruited patients aged ≥ 65 y who had upcoming preoperative visits using a combination of letters, telephone calls, and face-to-face contact. We enrolled most of the patients at the preoperative testing visit scheduled within 4 wk before the planned operative procedure. Patients were excluded if they did not undergo surgery.

At the time of enrollment, baseline assessment of cognitive and physical function was performed. All assessments were done in a separate room before or after the standard preoperative evaluations. Usual clinical care was uninterrupted. Results of the assessment were not conveyed to the clinical team.

We conducted follow-up interviews at 4–6 wk and 4–6 mo postoperatively. We aimed to conduct the 4–6-wk interview in person during the routine postsurgical follow-up visit; if this was not possible then this interview and the 4–6-month interview was conducted over the telephone. We selected these two time points (referred to as the “short-term” and “intermediate” time points), based on the assumption that most patients would be discharged from the acute hospitalization by 4–6 wk, and that any patients requiring after acute rehabilitation would be home by 4–6 mo. Interviews could be conducted with a proxy respondent if necessary for the functional status portion of the interview only.

2.2. Functional and cognitive measures

Physical function was assessed by patients’ self-reported ability to perform nine basic and IADLs as follows: shopping, finances, light housework, meal preparation, driving, use of alternative transportation, telephone use, bathing, and walking across a room. Of these nine activities of daily living (ADLs), seven are IADLs, which are typically more complex tasks [8]. We focused on IADLs because older patients with dependence in basic ADLs [7] are generally not offered elective cardiac surgery. We considered an ADL as impaired if the patient had either (1) difficulty with the ADL severe enough to require help from another person or (2) inability to perform it due to personal health limitations [28]. We considered an ADL as “able” if neither of these criteria were met, then summarized overall functional ability as the number of ADLs classified as “able.” This approach has been previously validated in older ambulatory care [29,30] and surgical populations [31,32]. For this study, we clarified during the follow-up interviews that routine lifting and driving restrictions (prescribed at the time of discharge until the first follow-up visit) should not be interpreted as inability, for example for the driving and light housework (“lifting”) items.

We also assessed preoperative physical activity level based on patients’ response to three questions from the Health and

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