Improved Preoperative Functional Assessment to Enhance Resource Allocation, Reduce Health Care Costs, Morbidity and Mortality

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Background: The health care system needs continued advancements in quality by improving patient outcomes while reducing expenses. One aspect of achieving this goal is refining risk-stratification prior to elective surgery to reduce risks. Accurate assessment of functional capacity is vital as low levels of functional capacity allude to high perioperative complications and mortality. The Duke Activity Status Index (DASI) is a validated, self-administered questionnaire that quantifies functional capacity by predicting metabolic equivalents (METs) of the patient based on the ability to perform specific physical activities. We tested the following hypotheses: 1) the DASI is more accurate at predicting METs than standard clinical interviews; and 2) the DASI could reduce costs or perioperative complications in comparison to traditional MET screening.

Methods: This study was conducted with Institutional Review Board (IRB) approval. DASI questionnaires were collected from 652 patients in a pre-evaluation testing clinic and compared METs assessments between the two to identify discrepancies. Our predefined, primary end point was calculating Number Needed to Treat (NNT) to detect one patient that would get a different screening test (i.e. stress test) if the DASI were used rather than interviews. Patient outcomes were extracted from the Vizient database to identify those with greater than expected length of stay (LOS), costs and morbidity or mortality. To calculate the effect that the DASI could have on annual expenses for our academic medical center, the data from these 652 patients was extrapolated to all patients undergoing surgical procedures (~15,000 patients per year).

Results: Compared to interviews, the DASI questionnaire can identify MET discrepancies (NNT = 9), warrant additional stress testing (NNT = 266), and avoid unnecessary stress tests (NNT = 177). Of the patients with greater than expected LOS there were 7.8% that would have been identified as less than 4 METs using DASI that were missed with interview. Likewise, of the patients with greater than expected hospital costs 7.4% were found to have DASI < 4 METs not identified on interview. Interestingly, of the patients with "above or well above expected morbidity or mortality" there were 17% that had DASI < 4 METs not identified on interview. Based on these findings, our hospital system would save $100,000 from unnecessary stress tests and order an additional 56 stress tests costing $67,000 for a net savings of $33,000 annually without including the cost savings that would be obtained by avoiding complications.

Conclusion: The DASI is an inexpensive clinical tool to assess functional capacity that can be implemented to provide safe, cost effective care. Using the DASI to enhance pre-evaluation testing can more accurately identify patients at increased cardiovascular risk. Assessments with increased sensitivity will lead to better utilization of hospital resources, which decreases morbidity and mortality and ultimately decreases costs. Risk-stratification with increased specificity leads to fewer unnecessary preoperative tests, which decreases healthcare expenditures. The DASI is a valuable tool to integrate into the electronic medical record system with a tangible impact on hospital length of stay and health care costs.

References: Hlatky, et al. 1989. A brief self-administered questionnaire to determine functional capacity (The Duke Activity Status Index). Am J Cardiol, 64, 651-654. PMID: 2782256; Polonsky, et al. 2015. Exercise Treadmill Testing. JAMA. Nov 10; 314(18):1968-1969. PMID: 26547469; Wijeysundera, et al. 2018. Assessment of functional capacity before major non-cardiac surgery: an international, prospective cohort study. Lancet. Jun; 391(10140): 2631-2640. PMID: 30070209.