Decision Analysis Applications in Orthopaedics

Karim A. Meijer, M.D.
Texas Sports Medicine and Orthopaedic Group

Joe Hahn and Jim Dyer
McCombs School of Business, UT Austin

Abstract: With the continued advances in the field of Orthopaedics, surgeons now have multiple options for treating many musculoskeletal system conditions. At the same time, there has been an increased focus on costs and risks in the health care system, and there is now more data available than ever on quantifiable financial cost for procedures and treatment outcome probabilities. This provides an ideal setting for the increased use of Decision Analysis tools to guide health care providers and patients in making decisions about their treatment plans. In this paper, we provide a compilation of work to develop decision making models for three conditions: adult mid-shaft clavicle (collarbone) fracture, osteoarthritis or other conditions necessitating knee replacement surgery, and Lisfranc injury (foot injury involving displacement of metatarsal bones). In each application, the objective is to minimize overall expected cost, including the possibility of secondary procedures, while also providing measures of the variance in expected costs and reporting the sensitivity to assumptions for both input costs and probabilities. The results of our analyses provide key insights into the treatment of these three conditions based upon available data, and also demonstrate the application of decision tree models that can be customized (e.g., to a particular health care facility and location) to facilitate decision making on a case-by-case basis.