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WORKING PAPER

On the design of custom packs: Grouping of medical disposable items for surgical procedures

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Abstract

Custom packs group medical disposable items into a single sterile package that is used for surgical procedures. Although custom packs constitute a well-known concept in the hospital setting, little is known on methodologies to configure them, especially if the number of medical items, procedures and surgeons is large. In this paper we propose a mathematical programming approach to guide hospitals in developing or reconfiguring their custom packs. In particular, we optimize the configuration process so that the number of material touch points, the number of configured packs and the cost of waste is optimized. We develop an intuitive integer non-linear programming model which we eventually linearize and apply to real data of a medium-sized Belgian hospital. We report on the crucial data gathering phase and the problems we encountered in retrieving accurate information. A computational experiment compares the optimized results with the performance of the current configuration settings and indicates how to improve the custom pack usage. Multiple scenarios are listed and evaluated, such as the development of surgeon-specific or discipline-wide custom packs. We point at some interesting insights that can be taken up by the hospital management to guide the configuration and accompanying negotiation processes, both internally (surgeons) and externally (vendors).

Keywords: Health care services, combinatorial optimization, integer linear programming, decision analysis