Editorial

When do we need to consider robotic-assisted radical nephrectomy?—repercussion to the health care cost between 2003 to 2015

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We would like to congratulate the authors on your research and manuscript, which keeps adding information about the cost of robotic and laparoscopic surgery. We would like to present some suggestions and considerations based on your conclusions. Two questions are important to discuss: (I) why do we need to do a Radical Nephrectomy? (II) Why do we need to use a robotic approach?

Partial nephrectomy is a higher-risk operation than radical nephrectomy and in the setting of larger (>4 cm) and complex masses, may entail considerable expertise and technical skill with a higher risk of procedure-specific complications such as hemorrhage and urinary fistulae (1,2). EORTC 30904 trial results failed to demonstrate a survival advantage for partial nephrectomy over radical nephrectomy for tumors <5 cm, despite improved renal functional outcomes in the partial nephrectomy group (3,4). Therefore, radical nephrectomy remains a surgical option for renal masses >4 cm based on the American Urological Association guidelines (5).

Recent review of the management for larger and complex renal masses (6) provide a take home message—individual patient factors, the risk of the operation and potential benefit to the patient must be carefully weighed before proceeding with surgery; hence an emerging paradigm that is driven more by evaluating risks and benefits than the size of the mass per se (6,7). This implies that the decision between radical *vs.* partial and laparoscopic *vs.* robotic nephrectomy should be based on the complexity more than the size of the renal mass or cost of the surgery.

Robotic surgical systems have high fixed costs, with prices ranging from $1 million to $2.5 million for each unit. Surgeons must perform between 150 to 250 procedures to become adept in their use. These systems also require costly maintenance and demand the use of additional consumables (10 uses, robotic appliances) (8). Certainly, the analysis provided in this manuscript is very relevant in a health system that is focusing on outcome and expenses. The main differences found in this manuscript when robotic was compared to laparoscopic nephrectomy were: (I) $1,000 more in supplies, (II) $1,800 in OR cost (46% cases >4 hrs in the OR), (III) $2,000 more in 90 days direct hospital cost. Therefore, the 90 days direct hospital cost is about 11% more for robotic surgery. One question that needs to be evaluated and was not mentioned in this manuscript, is the number of urologists practicing and performing robotic and laparoscopic surgery in each hospital. As we know, robotic surgery efficiency and outcomes depends on the team and surgeon experience (9,10). The hospitals with few robotic urologists and unexperienced teams, may take more OR time and spend >4 hrs/case. We believe hospital beds and number of urologists practicing may be equally important to evaluate in this cost analysis.

Another benefit that robotic may have over laparoscopic nephrectomy is increasing surgeon autonomy by handling 4 robotic arms with different instruments: camera, monopolar scissor, bipolar Maryland, bowel grasper,

vessel sealer, and surgical clips among other new robotic instruments. This allows the surgeon to be responsible for every step of the surgery and the assistant's level of expertise may not be as important as during laparoscopic surgery (11).

The diffusion of robotic technology depends on fragmented, not centralized, decision making. Decisions to purchase robots are made not by payers but by hospitals, which compete with one another to attract surgeons and their patients. Therefore, hospitals need to provide an effective robotic program and team for their surgeons, which will decrease time and cost (8,9). Surgeons will improve their skills as they progress in the learning curve. In addition, the FDA, who is responsible for providing the license to sell robotic platforms, needs to avoid monopoly in hopes of providing more options in the market and decreasing cost. Certainly, as is mentioned in this manuscript, robotic nephrectomy has increased 27% and robotic technology is here to stay.

The final decision of which technique should be used, laparoscopic or robotic, ultimately needs to be made by surgeons. This should be based on complexity of the case, surgeon skills, patient consent, availability and cost. However, cost alone should not be the only reason to select one technology over the other.

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