

Let's talk business: a public-private partnership in soft tissue knee surgery

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Abstract

Background

Public-private partnerships (PPPs) in orthopaedic surgery can help alleviate the burden on state hospitals and provide additional training capacity but need to be feasible with acceptable patient experience. The aim of this retrospective study was to analyse the costs, training capacity and hospital experience of a PPP to process knee arthroscopy of state patients in a private hospital.

Methods

This retrospective analysis was done for cases seen at a knee unit in a state hospital and operated on in a private facility between April 2019 and December 2019. The costs analysed included theatre time, bed nights, consumables, implants and salaries. The increase of theatre capacity and training exposure for registrars was evaluated. Furthermore, the hospital experience of the patients was assessed, using the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) score.

Results

Thirty-two participants (23 male, median age 24.5 years, interquartile range 10) were included. The average cost per patient was R44 442.71 (standard deviation [SD] R20 037.73). The average implant cost was on average R16 123.87 (SD R13 775.62), theatre time (including anaesthetists) was R20 816.22 (SD R7 865.36), consumables amounted to R5 206.68 (SD R1 855.53) and bed nights were R2 295.93 (SD R1 260.09). The surgical capacity of the unit increased by 16%. In 30%, trainees operated as primary surgeons under direct supervision and in 19%, the supervisor was unscrubbed. In 51% of surgical time the consultant was the primary surgeon, teaching trainees. The HCAHPS score was good to excellent in all categories but discharge communication.

Conclusion

The study found exposure to surgery for trainees was increased and patient satisfaction was excellent, although discharge information should be improved. This study also provides important information on a model of cost sharing in soft tissue knee surgery which can be used in future PPPs and to plan for National Health Insurance.

Level of evidence: Level 4

Keywords: public-private partnership, arthroscopic knee surgery, orthopaedic surgery, knee

Introduction

There is a worldwide challenge of high patient volumes and limited resources, independent of gross domestic product (GDP), which is even greater in developing countries.¹ A possible solution to increase capacity in South Africa is considered in a National Health Insurance (NHI), which is a large-scale model combining public and private health resources to improve equity to healthcare.¹⁻³ For orthopaedic care, such public-private partnerships (PPPs) in the form of outreach programmes is one of the main goals of the South African Orthopaedic Association for upcoming years. To date, various studies have focused on the feasibility of such partnerships, as public and private sectors are driven by different goals and principles with mixed outcomes.¹

PPP in healthcare can be arranged through various models. This ranges from private management of a public facility to joint ventures

with separate public and private infrastructure managed at different levels of care.⁴ Also, subsidised surgery can be provided to state patients in the form of operations carried out in private hospitals with private clinicians, which significantly reduces the waiting time for surgery.⁵ In South Africa, some private hospitals provide capacity for public theatre lists to assist with elective surgery (manned by public/state specialists).⁶ Altruistic models also exist, in which pro bono services of clinicians and personnel is organised by non-profit organisations, who subsidise for consumables, medication and implants via donations. Extensive logistical and organisational effort but also medicolegal issues around continuation of patient care are challenges of PPPs which need careful consideration.⁶ However, PPPs can provide important benefits such as innovation in specific collaborative healthcare aspects as well as increasing the quality of and access to healthcare for patients.^{3,7} It can also

serve as a solution for public healthcare providers to focus on clinical services instead of spending time on improving efficiency and infrastructure challenges.⁸

In March 2019, a PPP contract was set up between an urban tertiary care public hospital and a private hospital group. The motivation for this partnership for the private hospital group was to create a relationship with the state hospital, and as a corporate social investment strategy which aligns with broad-based black economic empowerment. The orthopaedic surgery department of the public hospital used this arrangement in the form of a monthly list for elective day case knee surgery.

No previous study has reported on such a PPP for orthopaedic day case surgery in an African country. We aimed to assess the costs, improvement in training capacity and subjective patient experience for this partnership.

Methodology

This is a retrospective analysis of costs, training capacity and the hospital experience of uninsured patients undergoing knee arthroscopies at an urban private hospital in South Africa between April 2019 and December 2019. Patients who were medically fit, were compliant with instructions, had transport to the private hospital and postoperative support at home, were selected to participate. Patients who needed complex procedures, were unfit for same-day discharge, or did not have means of private transportation were excluded from day surgery.

The patients were assessed two to four weeks preoperatively at the state hospital's knee clinic where postoperative analgesia, range of motion (ROM) braces and crutches were issued to facilitate postoperative discharge from the private hospital. A consultant orthopaedic knee specialist from the state hospital was present for all surgery, either performing surgery or supervising a trainee or fellow. Private anaesthetists were recruited as paid locums by the private hospital. Theatre staff was employed by the private hospital on a salary basis and accounted for as part of the costs of theatre time. The physiotherapists offered their services pro bono. The private hospital was located within 20 km of driving distance to the state facility. Patients presented to the private hospital on the day of surgery and all lists were performed on Fridays. This weekday was chosen due to lower volume of theatre bookings from private surgeons although these were not specifically documented during our study. In addition, no lists needed to be cancelled at the state hospital in order to be able to move the surgical team to the private hospital. However, academic meetings and ward rounds were missed by the state surgeons on this day and needed to be covered by colleagues.

The patients remained in the ward for observation after surgery until their review and discharge by the surgical, anaesthetic and physiotherapy teams. Patients unfit for discharge due to pain or inability to mobilise independently were able to stay overnight until Saturday. These patients were seen by the orthopaedic consultant and the physiotherapist team the following day before discharge.

Postoperatively, all follow-ups were organised at the state hospital by the treating surgeon. Postoperative rehabilitation was completed at the community health clinic near to the patient (e.g., day hospital, day clinic). For cost analysis, the invoices of implants, consumables and bed costs were reviewed.

Inclusion criteria

This study included patients who presented to a tertiary care academic hospital and had sustained soft tissue knee injuries requiring arthroscopic surgery. Furthermore, demographic information, type of surgery, level of supervision and experience of the surgical team, as well as duration of surgery were collected. The patient satisfaction survey, Hospital Consumer Assessment

of Health Providers and Systems (HCAHPS), was assessed telephonically. This is a quality assurance survey obtained from the Agency for Healthcare Research and Quality (AHRQ).⁹ This survey focuses on nurse communication, doctor communication, responsiveness of hospital staff, communication about medicine, discharge information and care transition, as well as the overall rating of the hospital and willingness to recommend the hospital. It offers a top box score, compared to scores obtained from other international hospitals. It provides a percentile bracket rating for each of the domains mentioned above and the rating of the service provided. The domains of the questionnaire we included were: communication with doctors, communication with nurses, communication about medicines, cleanliness of hospital environment and discharge information. Overall hospital rating score and willingness to recommend the hospital were also analysed. The care transition domain was excluded from the survey as patients were discharged home rather than to another care facility. Top box score refers to the percentage of the respondents that selected the top choice for the specific question in the domain.⁹ Comparisons of top box scores were made of the 4 438 hospitals (globally) which had provided HCAHPS scores up until April 2019.¹⁰

Statistical analysis

Data was reported using mean and standard deviation values or median with interquartile ranges where applicable. The distribution of data was assessed using the Shapiro-Wilk test with level of significance set at $p < 0.05$. The statistical tests were performed on IBM SPSS v27.0. Data was captured using REDCap, a secure web application for building and managing online surveys and databases.¹¹

Results

Thirty-two participants with a median age of 24.5 years (IQR 10) were included. Anterior cruciate ligament (ACL) reconstruction was the most common procedure, followed by medial patellofemoral ligament reconstruction and meniscal surgery (*Table 1*). Four of 32 patients needed to stay overnight either for pain control or drowsiness. Two patients stayed two days postoperatively and two stayed for a single night.

Table 1: Types of procedure

Type of procedure	n (%)
Anterior cruciate ligament reconstruction	20 (63)
Medial patellofemoral ligament reconstruction	4 (13)
Meniscus debridement ± repair	4 (13)
Osteochondral autograft transfer (OAT)	1 (3)
Medial collateral ligament reconstruction	1 (3)
Lateral collateral ligament reconstruction	1 (3)
Manipulation under anaesthesia	1 (3)
Total	32

n = number of procedures; % = percentage

Exposure to trainees

Thirty-two knee arthroscopy cases were performed. This represented 39% of 83 arthroscopic cases processed in the knee unit between April 2019 and December 2019. Specific to ACL reconstruction, 20 of the 44 cases operated during the same period were processed at the private facility. A total of 41 hours and 43 minutes (2 503 minutes) surgical training time with a mean duration per surgery of 78 (SD 33.9) minutes was provided by the private

hospital with the breakdown of supervision shown in *Table II*. This was 16% of the total 263 hours and 47 minutes (15 827 minutes) available to provide training in our unit for this year. In 30%, trainees operated as primary surgeons under direct supervision and in 19%, the supervisor was unscrubbed. The consultant surgeon was the primary surgeon for 51% of the total surgical time.

Table II: Distribution of surgical exposure to the trainee in terms of supervision

Type of teaching	Minutes of surgery	Percentage of total theatre time (%)
Surgical demonstration by consultant	1 285	51
Registrar as primary surgeon with consultant assisting	756	30
Registrar primary surgeon, consultant supervising unscrubbed	462	19
Total	2 503	

Cost of the collaboration

Table III indicates the respective cost categories: theatre running and anaesthetics costs, consumables, bed nights and implant costs. The mean cost per case was R44 442.71 (SD 20 037.73). Regarding the expenses, 64% were covered by the private hospital and 36% were covered by the state hospital.

Invoices for three patients were not available from the vendor of the implants, and the prosthetic costs of these patients were not included in the study.

Patient satisfaction

Twenty-seven patients were traceable for a telephonic interview. Their feedback on the hospital experience can be seen on the HPCAHPS survey in *Table IV*. These results were measured against the HCAHPS database online and percentiles calculated. Discharge information was rated only in the fifth percentile when compared to the database.¹⁰

Table III: Breakdown of costs for individual categories

Items	Mean (SD)	Total	Percentage of cost
Theatre running and anaesthetics costs	R20 816.22 (R7 865.36)	R666 119.10	47%
Consumables	R5 206.68 (R1 855.53)	R166 613.73	12%
Bed nights	R2 295.93 (R1 260.09)	R60 606.95	5%
Implant costs (state hospital rates)	R16 123.87 (R13 775.62)	R515 963.91	36%
Total	R44 442.71 (R20 037.73)	R1 422 166.64	

Table IV: Patient satisfaction scores

Domains	Top box score	2019 percentile comparison of HCAHPS scores ¹⁰
Nurse communications	98.77	95th percentile
Doctor communications	100	95th percentile
Communication about medicines	81.48	95th percentile
Cleanliness of hospital environment	100	95th percentile
Discharge information	73.08	5th percentile
Overall hospital rating	74.07	50th percentile
Willingness to recommend hospital	92.59	95th percentile

HCAHPS = Hospital Consumer Assessment of Healthcare Providers and Systems

Discussion

The findings of this retrospective audit show a positive hospital experience of patients treated and provides an overview of cost. It further highlights the benefit of added supervised surgical exposure for orthopaedic trainees and fellows, increasing their opportunity for surgical skill development.

Patient demographics

Soft tissue knee surgery was performed on a young cohort of patients (median age 24.5 years, IQR 10), with few comorbidities and low anaesthetic risk. This demographic is ideal for day case surgery as they have a lower anaesthetic risk and do not require prolonged postoperative mobilisation with associated increased hospital costs.¹²⁻¹⁴ This was in keeping with a previously published incident rate of soft tissue injury rate in patients between 16 and 39 years of age.¹⁵ Also, an operative treatment approach is preferred in this younger age group, due to a higher activity level.^{15,16} This is therefore an ideal patient group for day case surgery, which is also reflected in our study.

Increased capacity

Partnerships with private hospitals increase capacity to care for patients awaiting surgery in public healthcare facilities, which is especially important for time-sensitive conditions and injuries.⁵ This was also true in our study. Many patients with such injuries develop further cartilage damage resulting in more complex surgery with prolonged waiting times.¹⁷ Another important advantage of this programme was that young, healthy patients with low perioperative risk were selected into an appropriate setting of day surgery which left capacity for more complex cases needing anaesthetic care in a tertiary facility setup.

The programme also provided nearly 42 hours of surgery time for training and teaching purposes and increased the yearly capacity for surgical training by 16%. In half of the cases, trainees were operating under supervision. Especially for elective surgery, this training time is limited in South African academic hospitals with a large trauma burden,^{18,19} although most orthopaedic surgeons will end up working in the private sector where these procedures are more common.²⁰ This might only be the start as PPPs in other countries have shown a capacity increase of 163%.²¹

Costs

The total cost of this programme was R1 422 166.64 with a mean of R44 442.71 (SD 20 037.73) spent per patient, with theatre running costs and implant costs being the largest portion. Most (64%) of this cost was carried by the private hospital. Unfortunately, there were no cost analyses in South African hospitals for knee arthroscopy to allow comparison, but an American study reported much higher average costs for soft tissue knee surgery of 9 399.49 USD (R135 822.63).²² In this PPP, costs were reduced by decreasing bed nights with day case surgery, but also via competitive locum fees and pro-bono work by the physiotherapists at the private hospital. Furthermore, some consumables such as braces, crutches and postoperative take-home medication were provided by the state and have not been taken into account. Although costs could be reduced in this way, we believe that individual stakeholders should be remunerated adequately to allow for sustainability and accountability, especially when team members change as time goes on. Avoiding overnight stays could further decrease these costs which can be achieved via improved patient education, adequate perioperative analgesia and nausea prevention.²³⁻²⁵

Patient experience

The majority of participants reported great satisfaction with nurses' and doctors' communications at the hospital and clinics. The results obtained for these domains were above the 95th percentile of the global hospital score with a top box score of 99% and 100% for nurses' and doctors' communications domain, respectively. Communications about medications, cleanliness of hospital environment and willingness to recommend the hospital also scored high (93%). We recognise that most of our patients included in this study were from lower socioeconomic status which can lead to higher hospital rating compared to patients with higher socioeconomic backgrounds.²⁶ An important factor to improve on was discharge information, with a score of 73% compared to other domains. Eleven out of 27 interviewees found that counselling of postoperative warning signs must be improved. Short hospital stays limit the amount of time available for patient education postoperatively²⁷ which must therefore be done verbally, ideally preoperatively, and in the form of written information packs for the patients.²⁸ Pain management, incision/wound care and activity guidelines are the three most important points for postoperative patients which should, therefore, be included.²⁷

One of the limitations of this study was the long duration between surgery and telephonic feedback (ranging from 10 months to 17 months postoperatively) which may increase recall bias,²⁹ although it also reflects the patients' experience of the entire recovery period. Also, some of the costs could not be recorded, such as physiotherapy fees at the private hospital or prosthetics costs for braces and crutches, take-home medication provided by the state hospital or a call-out fee for the surgeon visiting patients who needed an overnight stay on Saturday. Some selection bias might have been introduced by the criteria needed to perform outpatient surgeries, such as having transport to the hospital or a telephone for communication. We recognise the flaw of this system which excludes patients without the means of transport and mobile phone communication. Another limitation is the fact that this study was performed retrospectively and does not include a comparison to costs or hospital experience in patients only treated at state hospitals.

Conclusion

This private-public partnership increased the surgical capacity to treat young and otherwise healthy patients with soft tissue knee

injuries from a state hospital. The costs in each domain and specific to each partner of the PPP were calculated as well as the average cost per patient. An increased capacity to process patients and expose trainees to supervised surgery along with a positive hospital experience for the patients were the main benefits of this programme. Further improvements in this collaboration should focus on communication around discharge information and postoperative continuation of care. This study also provided a unique insight into the costs associated with PPP in South Africa and compared favourably to international costs. Further work is needed to evaluate continuation of care as well as specific perioperative morbidity and complications. Also, the administrative burden on the healthcare team must be evaluated. Further models, such as private surgeons performing surgery, and other innovative funding models, should be explored. Overall, this study can be used as a pilot for future projects in preparation for a National Health Insurance.

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Ethics statement

The author/s declare that this submission is in accordance with the principles laid down by the Responsible Research Publication Position Statements as developed at the 2nd World Conference on Research Integrity in Singapore, 2010.

Prior to the commencement of the study ethical approval was obtained from the following ethical review board: University of Cape Town, Faculty of Health Sciences Human Research Ethics Committee, 147/2020.

All procedures were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008. Informed consent was obtained from all patients for being included in the study.

Declaration

The authors declare authorship of this article and that they have followed sound scientific research practice. This research is original and does not transgress plagiarism policies.

Author contributions

WCY: contributed to the study conceptualisation, design, data analysis and manuscript preparation

JIR: contributed to the study conceptualisation, design, data analysis and manuscript preparation

RvB: contributed to manuscript preparation and other contributions (protocol editing and review)

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