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Quality and Patient Safety

Cost-effectiveness of a systematic e-assessed follow-up of postoperative recovery after day surgery: a multicentre randomized trial

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Abstract

Background: Most surgeries are done on a day-stay basis. Recovery assessment by phone points (RAPP) is a smartphone-based application (app) to evaluate patients after day surgery. The aim of this study was to estimate the cost-effectiveness of using RAPP for follow-up on postoperative recovery compared with standard care.
Methods: This study was a prospective parallel single-blind multicentre randomized controlled trial. Participants were randomly allocated to the intervention group using RAPP or the control group receiving standard care. A cost-effectiveness analysis was performed based on individual data and included costs for the intervention, health effect [quality-adjusted life-years (QALYs)], and costs or savings in health-care use.
Results: The mean cost for health-care consumption during 2 weeks after surgery was estimated at €37.29 for the intervention group and €60.96 for the control group. The mean difference was €23.66 (99% confidence interval −46.57 to − 0.76; P=0.008). When including the costs of the intervention, the cost-effectiveness analysis showed net savings of €4.77 per patient in favour of the intervention. No difference in QALYs gained was seen between the groups (P=0.75). The probability of the intervention being cost-effective was 71%.
Conclusions: This study shows that RAPP can be cost-effective but had no effect on QALY. RAPP can be a cost-effective tool in providing low-cost health-care contacts and in systematically assessing the quality of postoperative recovery.
Clinical trial registration: NCT02492191.

Key words: ambulatory surgery; cost effectiveness; mobile applications; postoperative period

The majority of all surgeries are performed as day surgery, and most patients are discharged on the day of surgery.[1] After discharge, patients, perhaps with support of relatives or friends, are expected to take care of their postoperative recovery themselves.[2 3] Some patients experience insecurity about how the recovery is proceeding.[4] They feel a lack of professional support and do not know where to turn for help and support,[3] and this may lead to unplanned health-care contacts.[5] Routines for

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Editor's key points

- Patient evaluation tools should lead to better quality health care, and this should be cost-effective.
- Convenient and repeated measurement of patient recovery can enhance a sense of recovery after surgery.
- This study found that a smartphone-based application measuring quality of recovery was cost-effective.

follow-up after discharge vary. Some departments provide a follow-up telephone call during the first postoperative days; others involve the patient's general practitioner. However, many day-surgery departments lack a routine for follow-up.[6]

In Sweden, 81% of the population has access to a smartphone.[7] Recovery assessment by phone points (RAPP) is a smartphone application (app) for assessing postoperative recovery. RAPP includes the Swedish Web version of the Quality of Recovery (SwQoR) questionnaire and the yes/no question: 'Do you want to be contacted by a nurse?'.[8 9] It has been demonstrated that day-surgery patients find it hard to get in contact with the caregiver, and using RAPP for follow-up gives patients a sense of security and is an easy way of getting in contact with the caregiver.[9]

Our study hypothesis was that using RAPP for follow-up is cost-effective. The aim of this study was to estimate the cost-effectiveness of RAPP for follow-up on recovery after day surgery compared with standard care.

Methods

This study was a prospective, multicentre parallel randomized controlled trial. The primary outcome was cost-effectiveness of RAPP use. A cost-effectiveness analysis was performed from a health-care perspective, using individual data.[10] The analysis considered costs for the stakeholders of RAPP, the health effect, and costs or savings in health-care use. Gained quality-adjusted life-years (QALYs) were used to calculate the health effect.

Procedure and intervention

The study was conducted from October 2015 to July 2016 at four day-surgery departments in Sweden, was approved by the regional ethical review board in Uppsala, Sweden (reference number 2015/262), and registered with the US National Institutes of Health Clinical Trials Registry (NCT02492191). It was conducted in accordance with the study protocol.[5] Inclusion criteria were as follows: undergoing day surgery; >17 yr of age; access to a smartphone; and ability to understand spoken and written Swedish. Exclusion criteria were as follows: visual impairment; alcohol or drug abuse, or both; cognitive impairment; and undergoing surgical abortion.

A research nurse at each of the four day-surgery departments was responsible for participant inclusion. Information about the study was provided both in writing and verbally to all participants, and signed informed consent was obtained before data collection. Participants were randomly allocated to the intervention (RAPP for follow-up after day surgery) or control group. Both groups received the same perioperative care that was standard at each day-surgery unit, which also included information about where to call if there were concerns or questions after discharge. All participants were instructed to contact the Swedish 24 h telephone helpline if they had questions or concerns out of office hours. Participants were advised to contact the local hospital emergency department if needing emergency care. No changes for follow-up appointments after the surgery were made in either of the groups.

Randomization was done using sealed envelopes with computer-generated randomization allocation. The study was single-blinded, in that investigators performing the analysis were blinded to group allocation. The intervention group answered the RAPP daily for 14 days after surgery. This was guided by an earlier study evaluating the feasibility and acceptability of using RAPP after day surgery, in which the patients reported that follow-up for 7 days was too short; instead, they wanted to use RAPP for at least 9 days after surgery.[9] Participants in the intervention group requesting to be contacted were called within 24 h (weekdays) by a registered nurse (RN) from the department where the surgery had been performed. The app was installed on the participants' smartphones, and participants were trained in app use before discharge. Data collection regarding quality of life was performed before surgery and on postoperative day 14 using the Short Form–Six Dimensions (SF-6D) instrument.[11] Study-specific yes/no questions (n=5) regarding number of and reasons for all surgery-related health-care contacts with primary care, the emergency department, Sweden's 24 h helpline, outpatients, via the RAPP (intervention group only), and 'other' were collected on postoperative day 14. A 14 day follow-up was chosen because the majority of care contacts have been reported to be made in the first 2 weeks after day surgery.[12] Patient characteristic data, including sex, age, ASA class, type/length of surgery, and type of anaesthesia, were collected from the medical records.

Sample size

To our knowledge, this type of intervention has not previously been tested. Therefore, the sample size was guided by QALY weights in patients with asymptomatic gallstone disease (weight 0.76) and patients with a surgical scar (0.79).[13] Sample size calculation was based on the assumption of detecting a difference of 0.03 in QALY weights between the groups (intervention group 0.79 *vs* controls 0.76), with an α or (two-sided) type I error of 0.01 and a power of 0.90, indicating a sample size of 477 participants per group. Taking dropouts into account, the sample size was estimated at 1000 participants.[5]

Health economic evaluation

Description of costs

The analysis considered costs associated with the intervention (RAPP) and the cost of health-care contacts after discharge. Costs associated with RAPP included the application software, licence, Web administrator interface, data storage, security and IT support (obtained from RAPP AB according to business plan), and time the RN spent downloading, handling data, and instructing the participant on app use (procured from the accounting department at the included hospitals). Costs for health-care contacts were obtained from the KPP database (Swedish patient cost database), cost per NordDRG 2016 (Scandinavian diagnosis-related group system), weight (calculated from KPP data), the Swedish 24h helpline, 1177 and price lists from Region Örebro County, Region Jönköping County, and Dalarna County Council. Costs for the RNs' time for follow-up calls initiated via RAPP were procured from the accounting department, as described above. The prices are valid for 2016.

All cost estimates included social fees and overheads and were converted from Swedish krona (SEK) to euros using an approximate exchange rate of 9.40 SEK=€1 (February 2016 rate).[14] The cost-effectiveness analysis (CEA) included only

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