

Implementation of a 23-h surgery model in a tertiary care hospital: a safe and feasible model with high patient satisfaction

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Background: The 23-h surgery model consists of elective operative care with an overnight hospital stay for patients unsuitable for day case surgery. The aim of this study was to assess the success of the 23-h surgery model.

Methods: This was a prospective follow-up study of patients undergoing surgery with the planned 23-h model in a tertiary-care university hospital during a 12-month period 2 years after the model was implemented. Patients were interviewed 2 weeks after surgery, and the hospital operative database and patient records were searched. The primary outcome was the success of the process, defined as discharge before 10.00 hours on the first morning after surgery. Secondary outcomes were 30-day readmission and reoperation rates, adverse events, and patient satisfaction with the process.

Results: Between May 2017 and May 2018, 993 adult patients underwent surgery with the 23-h model, of whom 937 adhered to the model as planned (success rate 94.4 per cent). Gynaecological, gastrointestinal and orthopaedic surgery were the three most common surgical specialties. The surgical process was changed to an in-hospital model for 45 patients (4.5 per cent), and 11 (1.1 per cent) were discharged on the day of surgery. The readmission rate was 1.9 per cent (19 of 993), and five patients (0.5 per cent) had a reoperation within 30 days of surgery. Fifty-nine adverse events were noted in 53 patients (5.3 per cent), most commonly infection. Patient satisfaction was a median of 6–7 (maximum 7) points for various aspects of the model.

Conclusion: The success rate and patient satisfaction for the 23-h surgery model was high.

Funding information

Finnish Cultural Foundation
Governmental VTR Fund
Hospital District of Northern Savo, Kuopio, Finland

Paper accepted 19 January 2020

Published online 28 February 2020 in Wiley Online Library (www.bjsopen.com). DOI: 10.1002/bjs.5.50267

Introduction

The surgical 23-h model includes elective operative care with an overnight hospital stay. The goal of the 23-h model is to provide a predictable short-stay surgery programme in a non-ward environment for high-volume procedures that require extended time for recovery. The model is intended for procedures unsuitable for day surgery, where the patient is discharged on the same day that surgery is performed¹. However, there are sparse data regarding success, adverse events and patient satisfaction for the 23-h surgical process with a large number of different surgical specialties.

To succeed, the 23-h surgery model should be protocol-driven, and the patient's cardiorespiratory fitness and

health-centred operative model should include systematic preoperative preparation and nurse-led discharge. Patient fitness for the 23-h model must be ensured in the preoperative assessment by the patient's history of illness, and physical and mental capacity assessments^{2,3}.

The readmission rate is one of the quality indicators for elective surgery, but is rarely studied with the 23-h surgery model. In a Cochrane review⁴ based on data from 492 patients, readmission after laparoscopic cholecystectomy with the 23-h model occurred in 2 per cent of the patients. Within the first 30 days after thyroid surgery with the 23-h model, 7–8 per cent of patients had unplanned emergency department (ED) visits, and half of the visits

resulted in hospital readmission^{5,6}. Patients may also visit primary healthcare clinics⁶. Predictors of readmission after short-stay surgery are older age, obesity, high ASA grade and duration of surgery of 1 h or more^{7,8}.

Another quality indicator is the postoperative complication rate. However, complication rates for the 23-h model have not been widely reported. In the Cochrane analysis⁴, adverse events causing morbidity were noted in 0.5 per cent of patients after laparoscopic cholecystectomy with the 23-h model.

In the 23-h surgery model, criteria for length of hospital stay vary, and success and discharge failure rates remain unknown. In Australia, 23-h care is recorded from the time of admission to the recovery unit to the time of discharge from the unit⁹. Recently, Raspanti and colleagues¹⁰ reported a success rate of 90 per cent in 1700 patients who had thyroid surgery within the 23-h model, with a mean hospital stay of 1.1 days.

The 23-h surgery model was implemented in Kuopio University Hospital (KUH) in May 2015. The aim of the present study was to assess the success of the 23-h surgical model during a 12-month period 2 years after implementation of the model.

Methods

The study protocol was approved by the Research Ethics Committee of the Northern Savo Hospital District in Kuopio, Finland (number 73/2017, 7 February 2017), and received organizational approval. The study design was a prospective follow-up study of an elective 23-h surgery model in KUH. The study was carried out between 16 May 2017 and 15 May 2018. Patients were given oral and written information on the study before surgery; all gave written informed consent.

Only adults aged 18 years or more who were selected for the 23-h surgery model during the 12-month study period were enrolled. Patients who were unwilling to participate were excluded.

Implementation of the 23-h model

The implementation process of the 23-h surgery model has been described in detail elsewhere¹¹. In short, KUH is a tertiary-care 590-bed teaching hospital with a catchment area of 813 500 citizens in Central and Eastern Finland. A new hospital building with an operating theatre section was opened in May 2015, and the new 23-h surgery model was implemented. Patients selected for the 23-h model were operated on in the same operating facilities as other patients, but postoperative care was undertaken in

a dedicated recovery unit. By 2016, after a 9-month pilot project, all surgical specialties had adjusted to this 23-h surgery model.

Patient eligibility for the 23-h model was assessed by the operating physician. The extension of surgery, substantial risk of a serious postoperative complication and need for parenteral opioid analgesics in the early phase of postoperative recovery are the main indicators for the 23-h surgical model. Proposed procedures for this model are, for example, cholecystectomy in chronic cholecystitis¹², extended shoulder or wrist surgery, anterior cruciate ligament reconstruction and hysterectomy¹³, all shown to be associated with moderate or severe early postoperative pain. Procedures where postoperative bleeding can have devastating complications, such as thyroid surgery¹⁴, cervical discectomy and prostate surgery, are eligible for the 23-h model. The patient's medical condition and social aspects are also taken into consideration. Attending anaesthetists in the anaesthesia preoperative clinic assessed the patient's suitability for the 23-h model based on medical records, and the ASA physical status was recorded.

Patients were admitted to the 23-h model of postoperative care from Monday to Friday, and the last discharge day was Saturday. The postanesthesia care unit (PACU) has 12 beds in a dedicated section designated for the 23-h model. Patients were discharged according to the hospital's discharge criteria: oriented to time and place, stable vital signs, no or mild pain, pain well controlled with oral analgesics, no vomiting, no or mild nausea, able to tolerate fluids and food by mouth, capable of independent movement without or with assisted device, and secure voiding or urinary function. According to the hospital's 23-h model, the patient was expected to be discharged before 10.00 hours after a 1-night stay in the 23-h unit.

Outcome measures

The primary outcome was the success of the process, defined as discharge before 10.00 hours on the first postoperative morning.

Secondary outcomes were 30-day readmission and reoperation rates, any contact with the healthcare providers owing to adverse events related to the surgery, and patient satisfaction with the process.

Data collection

The following patient data were collected from electronic medical records (EMRs): age, sex, surgical specialty, ASA physical status and BMI. The following operative data were collected: duration of surgery, change in the surgical

process, cancellation of surgery, and duration of hospital stay, calculated from the time the patient entered the operating theatre to the time of discharge from the 23-h unit in the PACU. Hospital ED visits and readmissions within the first 30 days were retrieved from the Uranus® and Oberon® EMRs (CGI, Helsinki, Finland). Data on reoperation within the first 30 days after surgery were collected from the operative database records by Orbit® (CGI) and Centricity Perioperative Anaesthesia™ (General Electric Healthcare, Helsinki, Finland). The data for days 15–30 after surgery were collected only from the KUH hospital EMR. One-year mortality data were collected from patients' EMRs.

Patients were interviewed 14 days after surgery by telephone with closed and open-ended questions. Questions for the interview addressed details of the patient's recovery, complications after surgery, contact with and visits to the primary healthcare or other healthcare provider, and re-admission within the first 14 days after surgery. Patients were asked whether they were suspected of having an infection or needed antibiotics during the follow-up period.

Patient satisfaction was evaluated with a 7-point numerical rating scale (1, totally dissatisfied; 7, totally satisfied). The patients were asked to evaluate their satisfaction with the 23-h process for five events: the first visit in the surgical outpatient clinic with the operative decision-making process; preoperative planning led by specialized nurses; operative treatment; postoperative care in the 23-h unit in the PACU; and instructions for postoperative care and rehabilitation. Patients were also encouraged to give open feedback. During the interview, patient information was computerized into an electrical database (SurveyPAL®, Tampere, Finland).

Statistical analysis

No formal sample size calculation was performed, but a 12-month study period was considered to provide appropriate data on the success of the 23-h surgical model in the hospital. A 12-month study period was assumed to detect seasonal variation in the success, if any.

Statistical analysis was performed with the IBM SPSS® 25 (IBM, Armonk, New York, USA). Categorical variables are expressed as the frequency and proportion of patients. Continuous variables are expressed as median (range) values. Categorical variables were analysed with χ^2 tests, and continuous variables with the Mann–Whitney or Kruskal–Wallis test, as appropriate. The Spearman rank correlation test was used to determine the correlation between the duration of surgery and success of the 23-h model. Two-tailed $P < 0.050$ was considered significant.

The cumulative rate of visits to the ED during the first 30 days after surgery is shown in a Kaplan–Meier figure.

Results

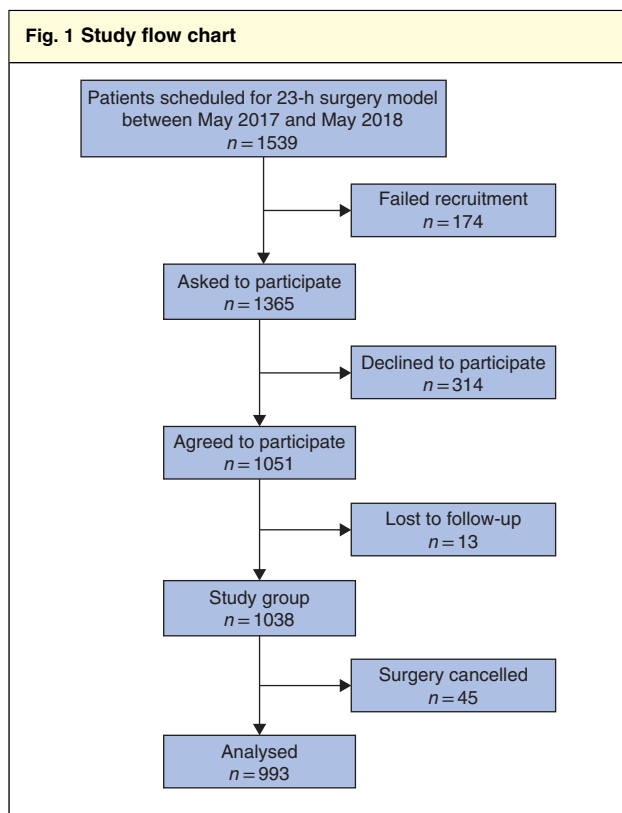
A total of 1038 patients were scheduled for the 23-h surgery model and agreed to participate in the prospective study. Surgery was cancelled on the day of surgery for 45 patients (4.3 per cent) (Table 1). A total of 993 patients were included in the final study cohort and had surgery with the 23-h model (Fig. 1). Each day, there were a median of 8 (range 1–12) patients scheduled for the 23-h model.

Patient characteristics are shown in Table 2. Some 59.9 per cent of the patients were women. Obesity was more common in women: 103 of 386 women (26.7 per cent) and 50 of 290 men (17.2 per cent) had a BMI of 30 kg/m² or

Table 1 Success of the 23-h surgery process in surgical specialties

Specialty	Total (n = 993)	Successful (n = 937)	Cancelled (n = 45)	Model change	
				In-hospital (n = 45)	Day surgery (n = 11)
Gynaecological surgery	175 (17.6)	141 (80.6)	6 (0.6)	26 (2.6)	8 (0.8)
Gastrointestinal surgery	174 (17.5)	170 (97.7)	7 (0.7)	4 (0.4)	0 (0)
Orthopaedic surgery	141 (14.2)	138 (97.9)	10 (1)	2 (0.2)	1 (0.1)
Urological surgery	116 (11.7)	113 (97.4)	4 (0.4)	3 (0.3)	0 (0)
Hand surgery	111 (11.2)	107 (96.4)	4 (0.4)	3 (0.3)	1 (0.1)
Plastic surgery	105 (10.6)	102 (97.1)	2 (0.2)	3 (0.3)	0 (0)
Neurosurgery	80 (8.1)	79 (99)	7 (0.7)	1 (0.1)	0 (0)
Vascular surgery	49 (4.9)	46 (94)	1 (0.1)	2 (0.2)	1 (0.1)
ENT and maxillofacial surgery	40 (4)	39 (98)	4 (0.4)	1 (0.1)	0 (0)
Eye surgery	2 (0.2)	2 (100)	0 (0)	0 (0)	0 (0)

Values in parentheses are percentages. ENT, ear, nose and throat.



higher ($P = 0.001$). Gynaecological (29.4 per cent) and plastic (16.8 per cent) surgery were the two most common operations in women, and urological (28.1 per cent) and

gastrointestinal (22.6 per cent) surgery in men. The variety of surgical specialties is presented in *Table 3*.

Primary outcome: success of the 23-h process and related factors

The 23-h surgery process succeeded in 937 of the 993 patients, with a success rate of 94.4 per cent. The surgical process was changed to an in-hospital model in 45 patients (4.5 per cent), and into day surgery for 11 patients (1.1 per cent).

Process failure was associated with the surgical specialty ($P < 0.001$). The success rate was lowest for gynaecological surgery, with a success rate of 80.6 per cent (141 of 175), whereas for other surgical specialties the success rate was 94 per cent or above (*Table 1*).

Duration of surgery had a weak negative correlation with failure ($r_s = -0.102$, $P = 0.001$). It was less than 60 min for 451 procedures (45.4 per cent), of which 16 (3.5 per cent) failed, 60–90 min for 261 procedures (26.3 per cent), of which 17 (6.5 per cent) failed, and more than 90 min for 281 procedures (28.3 per cent), of which 23 (8.2 per cent) failed. Failure was not associated with patient age, ASA physical status or BMI, the day of the week of the operation, operation start time after 14.00 hours, anaesthesia method, or the distance from the patient's home to the hospital.

Twenty-nine (64 per cent) of the 45 operation cancellations were preventable owing to: scheduling difficulties (for 17 patients (38 per cent) the previous case(s) took more

Table 2 Patient and surgical data for the 993 patients who had surgery planned in the 23-h model

	Men (n = 398)	Women (n = 595)	Total (n = 993)
Median (range) age (years)	60 (18–89)	56 (18–84)	58 (18–89)
ASA fitness grade	n = 396	n = 593	n = 989
I–II	295 (74.5)	513 (86.5)	808 (81.7)
III–IV	101 (25.5)	80 (13.5)	181 (18.3)
BMI (kg/m²)	n = 290	n = 386	n = 676
Median (range)	27 (17–49)	27 (18–48)	27 (17–49)
Specialty			
Gynaecological surgery	0	175 (29.4)	175 (17.6)
Gastrointestinal surgery	90 (22.6)	84 (14.1)	174 (17.5)
Orthopaedic surgery	73 (18.3)	68 (11.4)	141 (14.2)
Urological surgery	112 (28.1)	4 (0.7)	116 (11.7)
Hand surgery	42 (10.6)	69 (11.6)	111 (11.2)
Plastic surgery	5 (1.3)	100 (16.8)	105 (10.6)
Neurosurgery	49 (12.3)	31 (5.2)	80 (8.1)
Vascular surgery	9 (2.3)	40 (6.7)	49 (4.9)
ENT and maxillofacial surgery	17 (4.3)	23 (3.9)	40 (4.0)
Eye surgery	1 (0.3)	1 (0.2)	2 (0.2)

Values in parentheses are percentages unless indicated otherwise. ENT, ear, nose and throat.

Table 3 Main procedures performed for each surgical speciality	
	Volume within speciality
Gynaecological surgery	<i>n</i> = 175
Hysterectomy: abdominal LAP (<i>n</i> = 65), vaginal (<i>n</i> = 34)	99 (56.6)
Repair of cystocele, urethrocele or enterocele	39 (22.3)
Ovarian or tubal resection, LAP	32 (18.3)
Other (myoma embolization, myomectomy)	5 (2.9)
Gastrointestinal surgery	<i>n</i> = 174
Cholecystectomy: LAP (<i>n</i> = 75), abdominal (<i>n</i> = 5)	80 (46.0)
Hernia repair: inguinal or ventral; LAP, TEPP, TAPP, open	75 (43.1)
Anal haemorrhoids or fissure	8 (4.6)
Fundoplication LAP	8 (4.6)
Other	3 (1.7)
Orthopaedic and hand surgery	<i>n</i> = 252
Forearm or wrist area including ARTH	98 (38.9)
Shoulder ARTH (<i>n</i> = 30), rotator cuff repair (<i>n</i> = 35)	65 (25.8)
Lower-limb ARTH: knee (<i>n</i> = 29) and hip (<i>n</i> = 7), ACL (<i>n</i> = 5) repair	36 (14.3)
Upper arm or elbow area including ARTH	22 (8.7)
Lower leg or tarsus	21 (8.3)
Peripheral nerve decompression	7 (2.8)
Other	3 (1.2)
Urological surgery	<i>n</i> = 116
TURP (<i>n</i> = 70), TUIP (<i>n</i> = 5)	75 (64.7)
TURB	24 (20.7)
Cystourethroscopy or ureteroscopy	6 (5.2)
Other	11 (9.5)
Plastic surgery	<i>n</i> = 105
Reduction mammoplasty	45 (42.9)
Mastectomy, partial: benign and malignant	35 (33.3)
Skin or scar excision, burns	14 (13.3)
Breast reconstruction with flap	11 (10.5)
Neurosurgery	<i>n</i> = 80
Lumbar discectomy	31 (39)
Anterior cervical discectomy	27 (34)
Lumbar decompression (<i>n</i> = 12) or laminectomy (<i>n</i> = 8)	20 (25)
Other	2 (3)
Vascular surgery	<i>n</i> = 49
Partial thyroid lobectomy	44 (90)
Other (varicose vein ligation, lymphadenectomy)	5 (10)
ENT and maxillofacial surgery	<i>n</i> = 40
Cochlear implant or ossicular chain surgery	18 (45)
Tonsillectomy	8 (20)
Laryngomicroscopy	6 (15)
Other	8 (20)
Eye surgery	<i>n</i> = 2
Eye muscle surgery	1 (50)
Pars plana vitrectomy	1 (50)

Values in parentheses are percentages. LAP, laparoscopy; TEPP, laparoscopic totally extraperitoneal preperitoneal repair; TAPP, laparoscopic transabdominal preperitoneal repair; ARTH, arthroscopy; ACL, anterior cruciate ligament; TURP, transurethral resection of the prostate; TUIP, transurethral incision of the prostate; TURB, transurethral electroresection of the urinary bladder.

time than scheduled); acute shortage of operating room personnel (5 patients, 11 per cent); failure to arrive at hospital (3 patients, 6.7 per cent); and spontaneous healing or change in surgical indication (4 patients, 9 per cent). The 16 unpreventable cancellations were related to acute infection (11 patients, 24 per cent) or acute exacerbation of chronic cardiac or vascular disease (5 patients, 11 per cent).

The 56 changes from the 23-h surgery model to day surgery or the in-hospital model (Table 1) were most commonly due to patient-related factors (46 patients). In eight patients the model failed because the 23-h unit in the PACU was closed for 4 weeks during the summer holiday period, and in two patients the extent of the procedure changed.

Reasons for patients' slow recovery after surgery, which led to delayed discharge from the 23-h PACU unit or in-hospital admission, were multifactorial. They most commonly included protracted postoperative nausea and vomiting (12 patients), disturbed urinary function (11), tiredness or fatigue (10), and severe postoperative pain (10).

Emergency department visits, readmissions, reoperations and other postdischarge contact

Fifty-six patients (5.6 per cent) visited the ED a total of 69 times within the first 30 days after surgery, most (36 patients) within the first 7 days. Fifty-three of these ED visits were due to 59 surgery- or anaesthesia-related adverse events (Table 4). Thirteen patients had symptoms predictive of wound infection, two of which were a deep wound infection and an abscess. Two women had a pulmonary embolism, and one woman had a deep vein thrombosis of the leg. One man had a severe haemorrhage after hemithyroidectomy. Of 249 patients who had spinal anaesthesia, two (0.8%) had postdural puncture headache.

Men had more surgery- and anaesthesia-related ED visits than women (30 of 398 (7.5 per cent) versus 26 of 595 (4.4 per cent) respectively; $P = 0.034$). The proportion of patients who visited the ED according to different surgical specialties is presented in Fig. 2.

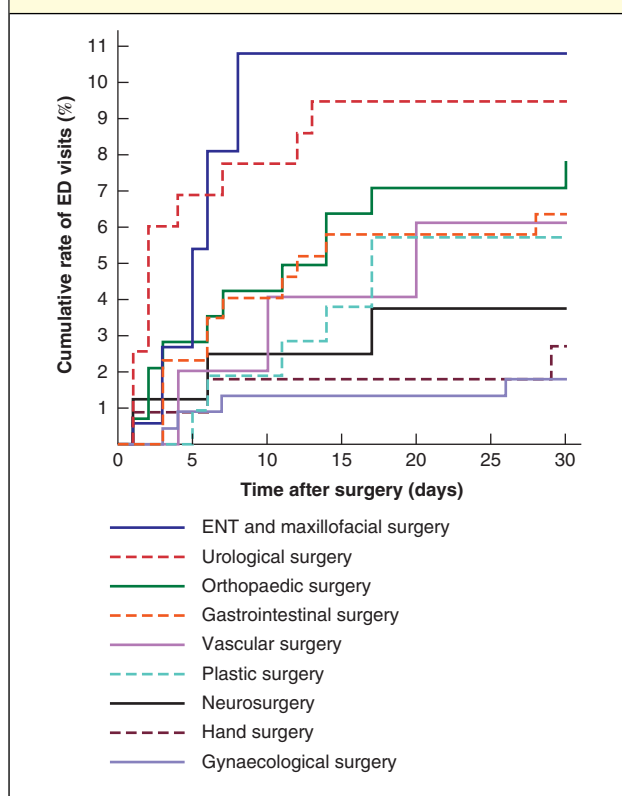
Some 101 (10.2 per cent) of the 993 patients telephoned the hospital, and 41 (4.1 per cent) reported that they had visited other healthcare facilities within the first 14 days after surgery. The in-hospital readmission rate was 1.9 per cent (19 patients) (Table 4).

Thirteen procedures were performed on 12 patients during the first 30 days after surgery. There were six reoperations in five patients (0.5 per cent); seven operations in six patients were not related to the 23-h surgery (Table 4). During the first 12 months after surgery there were four deaths, all related to malignancy and not to previous procedures.

Table 4 Surgery- or anaesthesia-related adverse events in 53 patients necessitating reoperation or hospital visit after discharge

	No. of adverse events (n = 59)	Readmission	Reoperation
Postoperative infection	13	5	2
Postoperative pain	11	2	
Wound bleeding/ haematoma	7	3	2
Haematuria	6	5	1
Wound swelling	6		
Urinary retention	4		
Wound dehiscence	3		
Pulmonary embolism	2		
Postdural puncture headache	2	1	
Other (bowel occlusion, cast pressure, deep vein thrombosis, dizziness, fatigue, hallucinations)	5	3	1

Fig. 2 Time to procedure-related emergency department visit after discharge according to the proportion of operations in each specialty



ED, emergency department; ENT, ear, nose and throat.

At telephone interview 2 weeks after surgery, 48 patients (4.8 per cent) reported symptoms indicative of infection, and 21 (2.1 per cent) were prescribed antibiotics. Women had more infection-related symptoms than men (37 (6.2 per cent) *versus* 11 (2.8 per cent) respectively; $P = 0.013$). The most common symptoms were those of superficial wound infection (18), urinary tract infection (9) and influenza-like symptoms (7); one woman had a deep abscess. Fourteen patients had symptoms indicative of infection with no known focus.

Patient satisfaction

All 993 patients who participated in the study were contacted by telephone 14 days after surgery (response rate 100 per cent). Patient satisfaction was high: median 6.5 of 7 (range 1–7) for the preoperative visit in the surgical outpatient clinic; 7 of 7 (range 1–7) for preoperative planning in general, for operative treatment and for postoperative care; and 6 of 7 (range 1–7) for postoperative counselling and instructions.

Discussion

This study assessed the implementation of a 23-h surgery model in a tertiary care hospital in facilities designed and built for this purpose¹¹. The new 23-h model was sufficiently successful, as 94.4 per cent of the patients were treated in the 23-h unit in the PACU and discharged in a timely manner. Moreover, the data show that the 23-h surgical model was feasible, well adapted and safe for the patients, and patient satisfaction was high.

Changing the surgical model to an in-hospital model was the main cause of failure, and 11 patients were discharged on the day of surgery. Cancellation of the operation on the day of surgery was fairly uncommon: for 45 patients (4.3 per cent), the operation was cancelled only after they had arrived at the hospital or late in the day when a new case could not be scheduled.

Changing the surgical model is a two-faceted issue. When a patient who had surgery planned with the 23-h model was discharged on the day of surgery, the resources scheduled to be used in the 23-h PACU unit for the evening and night were not used. However, patients admitted to in-hospital care were observed overnight in the 23-h unit in the PACU and discharged from the ward only during the next morning, so that they had close supervision during the first postoperative night and the surgical ward had time to prepare for an unscheduled admission. Moreover, the underutilized 23-h unit beds could offer flexibility to the management of patients having emergency outpatient

surgery, such as acute appendectomy, and those having late-night emergency surgery who require a few hours of follow-up after surgery to ensure a smooth postoperative recovery¹⁵.

In the present study, duration of surgery had a weak negative correlation with failure of the 23-h model. For procedures lasting more than 90 min, the failure rate was twofold higher than that of procedures lasting less than 60 min. Studies of 23-h surgical model success-related factors are rare. For day cases, prolonged duration of surgery has been reported to be associated with unplanned hospital admission⁷.

The late cancellation rate in this study of 4.3 per cent is similar to that reported previously from the authors' hospital, which was 4.6–4.7 per cent in 2013–2016 for different types of elective surgical operation¹⁶. These rates are slightly lower than those reported in earlier publications, where cancellation rates varied between 6 and 15 per cent^{17–19}. Late cancellation is an issue in surgical services because it is not always possible to fill the open appointment^{18,19}. Late cancellation causes lost operating theatre time, and causes negative psychological impacts and prolonged suffering for patients^{20,21}.

Skilled preoperative patient evaluation is known to decrease the cancellation rate²². Although the cancellation rate was relatively low, it can be reduced further with proper planning and preoperative assessment. In theory, 29 (64 per cent) of the 45 late cancellations in the present study were potentially preventable by more precise waiting-list scheduling, staff allocation or thorough tailored pre-evaluations (4 patients did not need an operation, and 3 did not show). Acute infection and acute exacerbation of chronic disease, which occurred in 16 of the 45 patients with a late cancellation, cannot be anticipated, but healing, for example, could be predetermined by telephone contact before surgery or during the re-evaluation process before the day of surgery^{18,19,23}. Two-thirds of the late cancellations were due to preventable reasons, the most common being scheduling difficulties. In many cases, the previous procedure lasted longer than expected. In contrast to other reports¹⁹, hospital bed capacity was not a limiting factor in the present study, indicating success in estimating patient flow into the 23-h unit in the PACU.

Consistent with earlier reports, the ED visit, readmission and reoperation rates were relatively low. Earlier studies^{4,24} have indicated that short-stay surgery does not increase the number of complications, ED visits or readmissions compared with in-hospital surgery. In the present study, no operation-related mortality occurred during the first 12 months after surgery. Three patients (0.3 per cent) developed thrombotic events, two of whom developed a

small pulmonary embolism. A wound infection rate of 1.3 per cent was expected; most cases were superficial, although two patients had a deep wound infection. The surgery-related visit rate to the hospital ED was 5.6 per cent, which is similar to or lower than rates reported in previous studies^{6–8,25}. The readmission rate of 1.9 per cent was also similar to that reported in previous studies, such as the rate reported in patients undergoing cholecystectomy within a 23-h surgery model⁴.

Although the numbers of unplanned ED visits and unplanned admissions were acceptable, 10.2 per cent of the patients contacted the hospital soon after surgery. The authors did not implement a follow-up call during the first 24–48 h after discharge, which is common practice in some institutions¹⁷. In a Swedish report²⁶ of patient-centred phone applications, contact was most common 3–14 days after surgery; some patients made up to three calls during the first 14 days. Therefore, it is not known whether a single telephone call 24–48 h after surgery may reduce to the frequency of contact with healthcare providers.

Patient satisfaction with the 23-h surgical model was high. However, it can be influenced by the Hawthorne effect²⁷. High satisfaction may also be related to thorough preoperative evaluation, preparation for surgery, and appropriate counselling at discharge. It has been shown that hospital staff training and patient and caregiver counselling regarding postoperative care after discharge improve the quality of recovery and patient satisfaction with the surgical process²⁸. In the preoperative preparation process provided by the hospital, the patients receive oral and written information about the surgical operation, anticipated recovery characteristics, wound care, pain medication, and rehabilitation. Moreover, these instructions are reinforced at discharge. In the KUH perioperative preparation process, patient-centred modification of the surgical model has a high priority, and is similar and integrated in all specialties.

The strength of the present study is the wide range of surgery specialties and procedures that were studied. The study cohort represented the population of patients having surgery within the 23-h model well, as 64.5 per cent of patients who had 23-h surgery during the 12-month study period participated, and 100 per cent of patients in the study cohort were contacted by phone 14 days after the operation. One limitation of the study is that the study was undertaken shortly after the 23-h model had been implemented. Second, data for ED visits to other healthcare facilities 15–30 days after surgery were not collected, so some of these contacts may have been missed. Third, this

study was undertaken in a new surgical building and special non-ward 23-h unit at KUH¹¹, so the findings are not necessarily generalizable to other hospitals.

Acknowledgements

The authors acknowledge the statistical guidance of T. Selander.

Funding support for this study was provided from the Finnish Cultural Foundation and the Governmental VTR fund of the Hospital District of Northern Savo, Kuopio, Finland (U-MR). The funders were not involved in planning and designing the study, in analysing or interpreting data, or in writing the manuscript and the decision to publish the results. The trial was registered in www.clinicaltrials.gov (registration number NCT04142203).

Disclosure: The authors declare no conflict of interest.

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