

Is day surgery safe? A Danish multicentre study of morbidity after 57,709 day surgery procedures

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Background: Day surgery is expanding in several countries, and it is important to collect information about quality. The aim of this study was to assess morbidity and unanticipated hospital visits 0–30 days post-operatively in a large cohort.

Methods: We prospectively recorded data from 57,709 day surgery procedures performed in eight day surgery centres over a 3-year period. We cross-checked with the National Patient Registry to identify complications 0–30 days post-operatively, and registrations from The Danish Register of Cause of Death were requested. We retrieved the records of 1174 patients to assign a relation between secondary contact and day surgery.

Results: The overall rate of return hospital visits was 1.21% [95% confidence interval (CI): 1.12–1.30%] caused by a wide range of diagnoses. No deaths were definitely related to day surgery. The return hospital visits were due to haemorrhage/haematoma 0.50% (95% CI: 0.44–0.56%), infection 0.44% (95% CI:

0.38–0.49%) and thromboembolic events 0.03%. Major morbidity was rare. The surgical procedures with the highest rate of complication were tonsillectomies 11.4%, surgically induced abortions 3.13% and inguinal hernia repairs 1.23%.

Conclusion: This large-scale Danish national study confirmed that day surgery is associated with a very low rate of return hospital visits. Despite the rapid expansion of day surgery, safety has been maintained, major morbidity being very rare, and no deaths being definitely related to day surgery.

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DAY surgery is expanding in Denmark and other Scandinavian countries.¹ Minimal invasive techniques which reduce tissue trauma and blood loss, and improvement in anaesthesia techniques with fast short-acting intravenous drugs, locoregional anaesthesia and focus on prophylaxis against postoperative nausea and vomiting have made it possible to carry out procedures, formerly requiring inpatient care for days.² Safety, a high degree of patient satisfaction^{3–9} and clear economic benefits^{10–12} are obvious advantages of the day surgery concept.

Day surgery is considered to be safe. Deaths and major morbidity are very rare,^{13–16} and minor morbidity and adverse events are also known to occur rarely.^{13,15,17,18} The rate at which patients return to hospital with complications after day surgery has been estimated in several studies, ranging from 0.15% to 4%.^{13,15,17,19–24} The different return rates reflect heterogeneity of the studies regarding case

mix, populations and organisations.^{13,17} An underestimation of the return rate occurs if returns only to the original day surgery unit under investigation are included.^{13,23}

Unanticipated direct admission and readmission, same day return to the operation theatre and return hospital visits are internationally recommended clinical quality indicators of ambulatory surgery.*

The few surgical complications that do arise may also serve as useful outcome indicators for continuous quality improvement in the day surgery units.^{13,25}

The purpose of this study was to provide a national overview of the quality of day surgery in Denmark, identifying return hospital visits following discharge 0–30 days post-operatively, focusing

*<http://www.iaas-med.com/joomla/index.php/recommendations/clinical-indicators> [Accessed 25 March 2011]

primarily on previously identified outcome indicators of quality.

Methods

This is a 3-year cohort study with prospectively collected historical data including all patients having day surgery at eight day surgery centres in Denmark. The centres were self-contained units with same day discharge at the hospital sites. The centres included both university and regional hospitals, all of which were part of the public health-care facilities. The study was approved and registered by the National Council for Data Protection (id 750.16-6) and the National Board of Health (j.no. 7-604-04-2/113). Declaration to the Ethics Committees is not needed for studies based on register data.

In Denmark, all citizens have a unique personal identification number stored in the Civil Registration System.²⁶ All hospital visits of patients are registered under the personal identification number in the local patient administration systems. Data from these systems are electronically reported to the National Patient Registry (NPR). When a person living in Denmark dies, the death certificate with personal identification number is filed in the Danish Register of Cause of Death.

The study population

For all day surgery operations performed during 1 January 2005 to 31 December 2007 at the eight day surgical centres, we received information on: personal identification number, surgery performed, date of surgery and hospital. Thereby, an original data set consisting of 57,709 primary day surgery procedures was formed. This data set was sent to the NPR asking for data on those patients who had had one or more contacts (in the following: 'secondary contacts') up to 30 days post-operatively with specified diagnosis codes of International Classification of Disease, tenth revision (ICD-10),[†] (Appendix A), covering diagnoses of both minor and major morbidity. Day surgery from our original data set could therefore return several secondary contacts from the NPR.

Cases returned from the NPR included data regarding hospital visited, date of visit and type of contact, e.g. emergency, outpatient or inpatient readmission. This enabled us to retrieve the relevant medical records.

In addition, the Danish Register of Cause of Death was searched for deaths occurring in the cohort.

Contacts to general practitioners (GPs) were not considered.

The data extraction from the NPR resulted in 3796 hospital contacts. Figure 1 illustrates the process of retrieving all cases relevant for further analysis.

The authors B. M. and J. B. reviewed the data set and agreed on exclusion of 2622 cases, for the reasons shown in Fig. 1.

The remaining 1174 cases all had a secondary contact coded with one of the specified codes that might indicate a complication resulting from the primary operation.

For each of these cases, the full medical record was searched, and detailed data of the case were entered into a database by one of the investigators, including assessment of the relationship between the secondary contact and initial day surgery.

Based on data from the actual patient records, 316 of the selected cases turned out not to be day surgery (75) or the secondary contact was obviously not related to the primary operation (241). The remaining 803 cases had secondary contacts related to day surgery. However, we excluded 106 cases with unanticipated admissions directly following day surgery. It is not possible on behalf of the register data only, to identify unanticipated direct admissions following day surgery. The 106 directly admitted cases were generated randomly by the search query and represent only a small proportion of the true number of directly admitted patients. Thereby, we included 697 cases of return hospital visits (to the accidents and emergency, as readmissions or to an outpatient clinic) following discharge from day surgery.

Deciding whether a secondary contact was related to day surgery (definitely, likely, possibly or not related) was based on the criteria listed in Table 1, modified from Engbæk and colleagues.¹³ The inter-rater reliability of the criteria was tested by three senior consultants who independently examined the records and assessed the relation between complications and day surgery in 10 patients. The rate of agreement for the consultants having complete agreement was 77% [95% confidence interval (CI) 56–91%]. Partial agreement was reached in 19% of the decisions. The rate of disagreement was 4%.

All records were studied by one of the authors (B. M., A.-M. G. U., L. B., C. S. L., P. A., H. O. or J. E.). If the relationship to day surgery was assessed to be either likely or possible, the case was discussed between authors from two different centres or

[†]<http://www.who.int/classifications/icd/en/> [Accessed 24 August 2011]

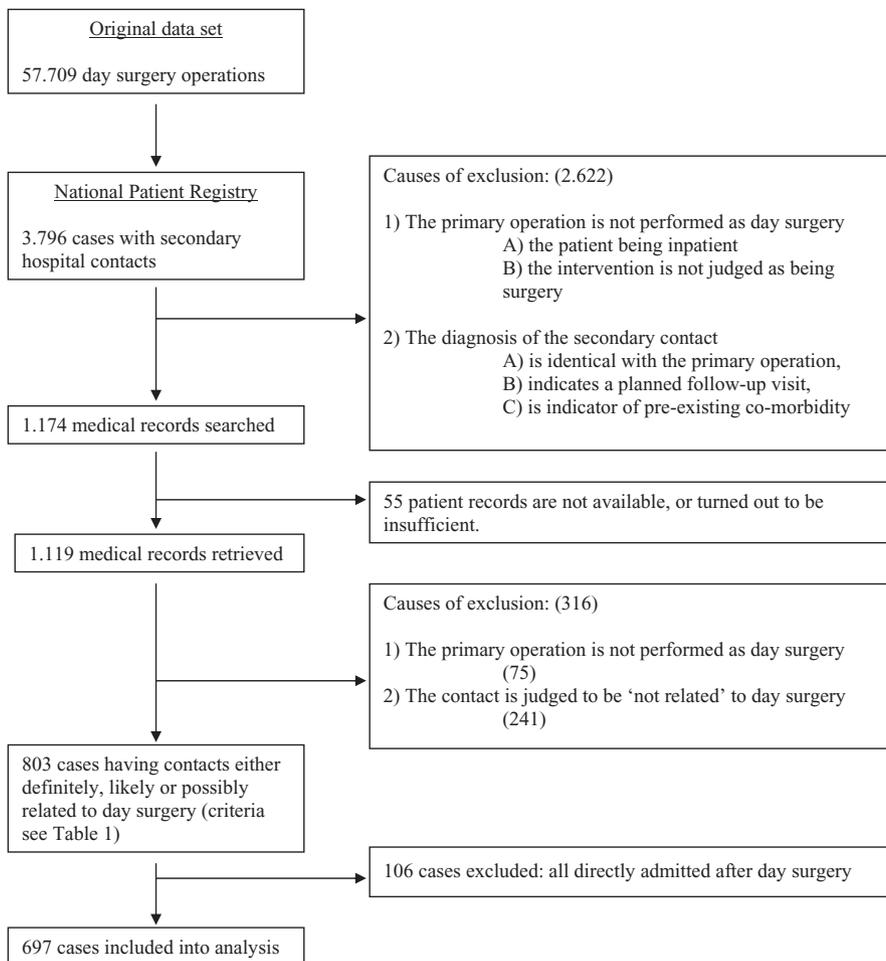


Fig. 1. Flow diagram.

Table 1

Definitions for relation of contacts and day surgery.

Definitely related:

Complications in the operative field OR closely related to the operative field

Likely related:

Close time relation between complication and surgery

The complication is in close relation to the operative field.

The complication is not normally spontaneously occurring.

Observation without treatment AND a close time relation to primary surgery.

Possibly related:

Presence of a chronic disease AND a time interval between complication and surgery makes the relationship less likely.

Observation without treatment AND a time interval between complication and surgery makes the relationship less likely.

Time interval between complication and surgery makes the relationship less likely.

Not related:

Unlikely correlation between diagnosis and the time of day surgery

A disease diagnosis is already present at the time of day surgery, but coded as a concomitant disease.

The diagnosis is identical with the referral diagnosis for day surgery.

Morbidity is related to other surgery than day surgery.

Scheduled contacts due to diseases already present at the time of day surgery.

Time interval makes it unlikely.

between the first author B. M. and author J. E. until agreement was reached.

Statistics

Chi-square test or Fisher’s exact test was used for dichotomous covariates, and Mann–Whitney test/*t*-test, as appropriate, was performed for continuous covariates.

Multiple logistic regressions were used for testing the association between complications and multiple factors. All variables were entered into the model, and reported *P*-values were based on the Wald test.

All tests were two sided, and *P* < 0.05 was considered significant. Data were processed in IBM SPSS statistics 19.0 (2010.IBM, Somer, NY, USA).

Results

During the study period, 57,709 day surgery procedures were performed. The median age of patients being 44 years (range 0 to 100 years), with 58.7% women and 41.3% men. The case mix and number of day surgery procedures performed at each of the eight day surgery centres are shown in Table 2.

The rate of return hospital visits caused by morbidity defined from the ICD-10 diagnosis codes, time to onset of symptoms, duration of readmission and recovery are shown in Table 3. Tonsillectomies and adenoidectomies were performed at centre 1 only, and for this reason, are dealt with separately.

The most frequently performed day surgery procedures and their related return rates are listed in Table 4.

Twenty-four deaths occurred 0–30 days post-operatively. Of these, 17 were not related to day surgery, and two could not be assessed due to lack of access to relevant reports. Of the remaining five deaths, three were likely related to day surgery, and two were possibly related (Table 5).

Table 6 shows hospital return visits definitely or likely related to day surgery caused by infection (0.44%) (95% CI 0.38–0.49%), which were mostly wound related, by haemorrhage/haematomas (0.50%) (95% CI 0.44–0.56%) or by thromboembolic events (0.030%). Major morbidity was rare. Various other reasons for return visits were found in 50 patients of whom 16 were readmitted. The diagnoses were: pulmonary oedema in a patient readmitted with respiratory failure at the day of surgery. One patient with peptic ulcer, five patients suspicious of septic arthritis and nine under suspicion for deep venous thrombosis failed to have the diagnosis confirmed. Unspecific coding revealed other

Table 2

Day surgery forming the original data set of 57,509 primary operations. The distribution of case mix (rows) and number and proportions of procedures regarding each surgical speciality (columns) from each of the eight centres.

Centre no.	1	2	3	4	5	6	7	8	Total
Surgical gastroenterology	749 (12.2%)	929 (15.9%)	723 (12.0%)	735 (11.4%)	1174 (12.4%)	1643 (20.3%)	1769 (19.3%)	858 (13.1%)	8580 (14.9%)
Gynaecology	2102 (34.2%)	1953 (33.5%)	544 (9.0%)	1292 (20.0%)	0 (0%)	1631 (20.2%)	2368 (25.8%)	0 (0%)	9890 (17.1%)
Skin/miscellaneous	1 (0.0%)	3 (0.1%)	67 (1.1%)	13 (0.2%)	7 (0.1%)	5 (0.1%)	99 (1.1%)	13 (0.2%)	208 (0.4%)
Vascular surgery	13 (0.2%)	38 (0.7%)	209 (3.5%)	467 (7.2%)	49 (0.5%)	20 (0.2%)	261 (2.8%)	235 (3.6%)	1292 (2.2%)
Breast surgery	0 (0%)	570 (9.8%)	32 (0.5%)	6 (0.1%)	346 (3.7%)	3 (0.0%)	124 (0.4%)	571 (8.7%)	1652 (2.9%)
Ophthalmology	0 (0%)	0 (0%)	1687 (28.0%)	0 (0%)	50 (0.5%)	0 (0%)	12 (0.1%)	567 (8.7%)	2316 (4.0%)
Orthopaedic neurosurgery*	132 (2.1%)	83 (1.4%)	162 (2.7%)	350 (5.4%)	1066 (11.3%)	431 (5.3%)	511 (5.6%)	557 (8.5%)	3292 (5.7%)
Orthopaedic surgery	1342 (21.8%)	1649 (28.3%)	1966 (32.6%)	2583 (40.0%)	6739 (71.3%)	3750 (46.4%)	3970 (43.3%)	3333 (51.0%)	25,332 (43.9%)
ENT	1282 (20.8%)	0 (0%)	57 (0.9%)	1 (0.0%)	8 (0.1%)	0 (0%)	50 (0.5%)	391 (6.0%)	1789 (3.1%)
Urology	533 (8.7%)	603 (10.3%)	581 (9.6%)	1012 (15.7%)	12 (0.1%)	600 (7.4%)	3 (0.0%)	6 (0.1%)	3350 (5.8%)
Total	6154	5828	6028	6459	9451	8083	9167	6531	57,701

Data for the surgical specialities are missing for eight patients in the cohort.

*Mostly carpal tunnel release.

ENT, ear, nose and throat.

Table 3

Study population	Return rates <i>n</i> % (95% CI)	Time to onset of symptoms	Duration of hospital stay after readmission	Recovery status at the end of hospital treatment
All (0–100 years) (<i>n</i> = 57709)	697 1.21 (1.12–1.30)	–	–	–
All (0–15 years) (<i>n</i> = 3475)	29 0.84 (0.54–1.14)*	–	–	–
All (excluding tons/ad) (<i>n</i> = 57060)	623‡ 1.09§ (1.10–1.18)	Within 24 h: 11% Within 7 days: 66% Within 14 days: 90%	Mean time: 1 day (range 0–157) Discharged after 1 week: 85.3% Discharged after 2 weeks: 92.8%¶	Fully recovered: 449 pt (72.1%) Recovered to habitual status: 75 pt (12.0%) Recovered with sequelae: 36 pt (5.8%) Unresolved status: 61 pt (9.8%) Died: 2 pt After 1 year: 11 patients still undergoing treatment
Tons/ad (5–67 years) (<i>n</i> = 645)	74** 11.4 (9.06–14.1)	Within 24 h: 8% Within 7 days: 74% Within 13 days: 100%	Mean time: 2 days (range 0–13) Discharged after 3 days: 82% Discharged after 6 days: 95%	–
Tons/ad (16–67 years) (<i>n</i> = 418)	61 14.5 (6.5–22.5)	–	–	–
Tons/ad (5–15 years) (<i>n</i> = 227)	13 5.7 (0.4–11.0)†	Within 8 days: 100%	–	–

* $P = 0.038$, All (0–15 years) and All (0–100 years) compared.

† $P = 0.001$ Tons/ad (5–15 years) and Tons/ad (16–67 years) compared.

‡Definitely or likely related = 604, possibly related = 19 (thromboembolic or respiratory events, 15 with known co-morbidity). Inpatient readmission rate, 333 cases (0.58%). Contacts to other hospitals, 161 cases (23.1%).

§Return rate with readmission = 333 cases (0.58%).

¶12 patients (nine readmissions definitely/likely related, three possibly related) remained in hospital for more than 1 month due to major morbidity: four apoplexies and eight severe infections, three being septic arthritis of the knee.

**Reasons for a return visit was haemorrhage = 68 patients [10.5% (three adenoidtonsillectomies, 65 tonsillectomies)], half of whom required surgery and/or blood transfusion. Signs of infection = 11 patients (one abscess, 10 possible pharyngitis).

CI, confidence interval; tons/ad, tonsillectomies and adenoidectomies.

diagnoses: seroma, catheter problem and urine retention, problems with plastering/prosthetic material, social reason, dysaesthesia (corresponding to the cutaneous branches of the femoral nerve), wound pain, seeping or wound defects and pain (mainly abdominal pain after gynaecological surgery or laparoscopies).

When adjusted for surgical specialty, age, sex and day surgery centre, we found that there was a significant effect of centre, surgical specialty and gender ($P < 0.0001$), whereas age had no impact on the risk of return hospital visits. The surgical specialty with highest risk of a return hospital visit was surgical gastroenterology followed by vascular surgery and gynaecology.

Tonsillectomies and adenoidectomies

The rate of return hospital visits caused by morbidity, time to onset of symptoms and duration of readmissions are shown in Table 3.

Discussion

The most important finding of this study is that day surgery is safe, major morbidity (stroke, myocardial infarction, pulmonary embolism, deep venous thrombosis, lung stasis, sepsis, pneumonia and peptic ulcer) is rare, and no deaths were definitely related to day surgery. This result is in agreement with those of other studies from Denmark, Canada and United States.^{13,15–17,27}

The expected 30 days mortality in a population matching ours for sex and age is 40 deaths.‡ However, only 24 deaths occurred in this day surgery population, indicating that this population was healthier than the background population, probably due to the selection of individuals for day surgery.

‡<http://www.statistikbanken.dk/HISB9> [Accessed 20 June 2011]

Table 4

Top 18 procedures in day surgery including tonsillectomies and adenoidectomies.

	Frequency <i>n</i>	Proportion %	Return hospital visits, proportion and 95% CI
Tonsillectomy and adenoidectomy	649	1.1	11.4 (9.06–14.1)
Surgically induced abortion	2854	5.0	3.13 (2.52–3.84)
Cholecystectomy	1148	2.0	2.26 (1.48–3.30)
Excision of pilonidal sinus	1508	2.6	1.92 (1.29–2.75)
Breast surgery	1503	2.6	1.86 (1.24–2.68)
Inguinal hernia repair	3016	5.2	1.23 (0.89–1.69)
Anal surgery	1173	2.0	1.02 (0.53–1.78)
Surgery on foot and ankle	3704	6.4	0.84 (0.57–1.19)
Knee operations	8597	14.9	0.78 (0.61–1.00)
Cystoscopy	1489	2.6	0.74 (0.37–1.32)
Miscellaneous	2149	3.7	0.70 (0.39–1.15)
Hysteroscopy (TCER and polypectomy)	2363	4.1	0.63 (0.36–1.04)
Hardware removal	2624	4.5	0.61 (0.35–0.99)
Phacoemulsification (cataract)	1396	2.4	0.50 (0.20–1.03)
Dupuytren's contracture and other hand surgery	2511	4.4	0.44 (0.22–0.78)
Skin, subcutaneous tissue and nail	2540	4.4	0.35 (0.16–0.67)
Tubal ligation	1198	2.1	0.33 (0.09–0.85)
Carpal tunnel syndrome	2663	4.6	0.30 (0.13–0.59)
Shoulder surgery	3659	6.3	0.19 (0.08–0.39)
Total		80.9	

CI, confidence interval; TCER, transcervical endometrial resection.

Table 5

Death within 30 days with a likely/possible relationship to day surgery.

Likely related:

- 1) 63-year-old male, American Society of Anesthesiologists (ASA) class II: smoker and body mass index 34. He had surgery for umbilical hernia. Seven days post-operatively, he was brought to the hospital due to witnessed cardiac arrest. Resuscitation was without success.
- 2) 47-year-old woman, ASA class II: suffered from von Recklinghausen's disease and well-treated epilepsy. She had laparoscopic tubal ligation. On the 24th post-operative, day she collapsed and was found having cardiac arrest with asystole. Resuscitation attempts failed. The day before she died, she had complained of shoulder pain.
- 3) 66-year-old male. ASA class III: alcoholic cirrhosis of the liver, bladder cancer under radiotherapy. Smoker. He had a follow-up cystoscopy. He was readmitted 13 days post-operatively due to cystitis and haematuria. As inpatient, he developed sepsis, endocarditis and meningitis. He died following a stroke 29 days post-operatively.

Possibly related:

- 4) 76-year-old woman. ASA class III: breast cancer, hypertension and dyspnoea in progress. She had breast surgery. Shortly thereafter, she developed fever and was treated with roxitromycin. Twenty-two days post-operatively, she had cardiac arrest with successful resuscitation. She incurred an anoxic brain damage and died on the 30th post-operative day.
- 5) 54-year-old male. ASA class III: alcoholic cirrhosis of the liver and smoker. He had surgery for umbilical hernia. Readmitted after 1 week due to weight gain and nephropathy. Five days later, a peptic ulcer perforation was found, and staphylococci were grown from ascites fluid. He died 22 days postoperatively.

We found five deaths (1 : 11,542) either likely or possibly related to day surgery, all having at least a week's delay between day surgery and death, and none of which could have been avoided had they been inpatients rather than day cases.

The rate of return hospital visits was 1.21%, which is in accordance with results of previous studies in a range of countries ranging from 0.15% to 3.7%.^{13,15,17,19–24} The study with 3.7% returns, a Finish study based on data from 2007, included 5.2% tonsillectomies and adenoidectomies which may

explain the relatively high return rate.²² In a previous Danish study, the cohort was smaller, and the rate of return was 0.8%. The increase may reflect a different case mix with more complex surgery, and a gradual easing of referral criteria was also reported in the Finnish study.²² Also, the morbidity of 5% of the surgically induced abortions were not included in the 0.8% return rate in the Danish study.

We found an effect of the day surgery centre on the risk of return hospital visits. The reasons may be centre variations in the selection of patients for day

Table 6

Subdiagnoses for definitely or likely related return visits due to infection, haemorrhage/haematoma or thromboembolic events. Exclusive of tonsillectomies and adenoidectomies.

Subdiagnosis	No.	Further explanations
Infections <i>n</i> = 249		
Abscess	27	–
Wound infection, superficial	91	–
Wound infection, deep	33	Mainly patients undergoing surgical gastroenterology/orthopaedic surgery. ASA I (15), ASA II (14), ASA III (4).
Pneumonia	4	a) Male 79 years, ASA II, hernia repair under general anaesthesia, has been intubated. b) Male 42 years, ASA II, heavy smoker, hernia repair under general anaesthesia. c) Two women, ASA I, having had orthopaedic surgery.
Septic arthritis	17	Arthroscopic knee surgery only, the incidence of septic arthritis being 0.2% (1:506)
Sepsis	4	a) Male, 58 years, ASA III, hardware removal, admitted for 13 days. b) Male, 75 years, urosepsis following cystoscopy with urinary retention after discharge. c) Male, 52 years, ASA III, smoker, BMI 27, sepsis following umbilical hernia repair. Long course in ICU. d) Male 76 years, ASA II, sepsis following eyelid surgery.
Endometritis/salpingitis	44	Mainly related to surgical induced abortions
Urinary tract infection	6	–
Other*	23	–
Haemorrhage / haematoma <i>n</i> = 286		
Bleeding requiring surgery/transfusion	65	72 being women, 50 having had gynaecological surgery (surgically induced abortions 28, cervical conisation 11, hysteroscopy 4, laparoscopic tubal ligation 3 and others 3).
Haematoma requiring surgery/transfusion	48	Other kinds of surgery (63) were in decreasing frequency: inguinal hernia repair, breast surgery, orthopaedic surgery (including knee arthroscopies), nasal surgery, anal surgery and surgery on scrotum and testes.
Bleeding not requiring surgery/transfusion	104	–
Haematoma not requiring surgery/transfusion	57	–
Urinary bleeding	3	–
Other†	9	–
Thromboembolic events <i>n</i> = 17		
Stroke	2	a) 85-year-old woman with atrial fibrillation having cataract surgery, b) 66-year-old male‡ with cirrhosis and bladder cancer having a cystoscopy
Deep venous thrombosis	9	Seven patients being women. Mainly knee surgery or ankle/foot surgery. None have received any prophylaxis against thrombosis.
Superficial thrombophlebitis	2	–
Myocardial infarction	1	44-year-old male, smoker, previous bypass surgery and percutaneous coronary intervention
Pulmonary embolism	3	a) Two patients having orthopaedic surgery with immobilisation of the leg, b) 74-year-old male, ASA-class III and having inguinal hernia repair.

*Sinusitis, fever, phlegmone, intra-abdominal infection etc.

†Bleeding peptic ulcer, haemarthrosis, swelling, anal fissure etc.

‡Dies 29 days post-operatively (patient no. 3 in Table 4).

ASA, American Society of Anesthesiologists; BMI, body mass index; ICU, intensive care unit.

surgery and in the type of surgery performed within the surgical specialties. Also, demographical differences in the threshold for patients presenting to the hospital with a complication may be the case.

In Denmark, all hospital contacts are reported to the NPR, thereby offering a unique opportunity to identify all secondary contacts to hospitals. We found that 23.1% of the secondary contacts were made to a hospital different from that of day surgery. However, reporting of complications to the NPR may be incomplete and misleading in about one third of cases.²⁸ The rate of return hospital visits in the present study may therefore be underesti-

mated by one third due to the reporting practice of complication diagnosis in the NPR.

Apart from tonsillectomies and adenoidectomies, we found the single most common reason for hospital contacts following day surgery to be haemorrhage/haematoma (0.50%), corresponding to 41% of all morbidity. This is in accordance with previous studies which reported bleeding to cause between 40% and 50% of all return hospital visits.^{13,15,22,23} Infections (0.44%) were found to be the second most frequent reason for return to hospital. This is, however, lower than the 3.5% found in a Norwegian study addressing wound infections fol-

lowing day surgery by examining all day surgery patients.²⁹ We presume that most infections following day surgery are dealt with GPs. The NPR covers hospital contacts only, and patients approaching their GP for advice or treatment are not included in this type of follow-up. Seventeen patients developed septic arthritis following knee arthroscopy, the risk rate 0.197% being similar to what was previously observed.¹³ Infection rates up to 0.4% following knee arthroscopy have been reported.³⁰ In a large epidemiological study, venous thromboembolism (Deep venous thromboembolism and pulmonary embolism) was found in 1 : 815 middle-aged women up to 12 weeks after day surgery.³¹ We found 12 cases, mainly women (1 : 4809). There are conflicting views about prophylaxis against venous thromboembolism.^{32,33} A review from 2007 concluded that in day surgery, it should be given only to patients with two or more risk factors, e.g. oral contraceptives, family history, cancer, obesity etc.³⁴ However, a study designed to identify high-risk groups for venous thromboembolism following knee arthroscopy failed to identify any high-risk groups, and the authors concluded that, given the low incidence of venous thromboembolism, it 'seems justified to withhold routine pharmacological prophylaxis'.³² Our incidence of one in 4809 suggests that prophylaxis seems reasonable on indication only.

We found gastroenterology, followed by vascular surgery and gynaecology to be the surgical specialties most frequently causing return visits. Similar results have been found by others.^{7,20}

Haemorrhage following tonsillectomy is a serious and potentially life-threatening condition. In our study, tonsillectomies and adenoidectomies had a high return rate (11.4%). Most of the morbidity after tonsillectomies and adenoidectomies were caused by haemorrhage, with only six out of 74 return hospital visits occurring during the first 24 h after discharge. This in agreement with a Danish study from 2001 not finding any difference in the incidence of post-operative haemorrhage between day surgery and inpatients, 45% of the haemorrhage episodes occurring more than 8 h post-operatively.³⁵ The procedures are therefore fully accepted for day surgery also in children.³⁶

Conclusion

This study is a large-scale Danish national study indicating day surgery to be safe, with a low rate of return hospital visits. Despite the rapid expansion of day surgery, safety is maintained, major morbidity is

very rare, and no deaths are definitely related to day surgery.

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Appendix A

Diagnosis and related ICD 10 codes

Diagnosis	Code interval
Streptococcal septicaemia and other septicaemia	DA40-DA419B
Specified and unspecified bacterial diseases, others.	DA48-DA499A
Post-procedural disorder of the nervous system, unspecified	DG979
Ischaemic heart diseases	DI20-DI259
Pulmonary embolism	DI26-DI269A
Cerebrovascular diseases	DI60-DI698
Phlebitis and thrombophlebitis	DI80-DI809B
Diseases of the respiratory system	DJ00-DJ989
Pyogenic arthritis	DM00-DM009
Complications following abortion and ectopic and molar pregnancy	DO08-DO089A
Haemorrhage from respiratory passages	DR04-DR049
Complications of surgical and medical care, not elsewhere classified (post-operative haemorrhage, haematoma, disruption of operation wound and abscess)	DT80-DT899