

Poor agreement between data from the National Patient Registry and the Danish Patient Insurance Association

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ABSTRACT

INTRODUCTION: Septic arthritis after knee arthroscopy requires in-patient treatment and should thus be reported to the National Patient Registry (NPR). It also meets the requirements for financial compensation if claimed to the Danish Patient Insurance Association (DPIA). The aim of this study was to assess data from the two independent data sources, the NPR and DPIA, with a view to comparing the registration of septic arthritis after knee arthroscopy.

MATERIAL AND METHODS: This was a retrospective study assessing two three-year periods. From the NPR, we initially received all contacts coded as arthroscopic knee surgery. A second NPR query was made for patients found in the first query who had had a hospital contact within 30 days postoperatively with codes indicating septic arthritis (450 patients). Correspondingly, the DPIA files of patients claiming an infection following knee arthroscopy were searched to identify those (157 patients) with post-arthroscopic septic arthritis.

RESULTS: We found poor agreement between the 450 patients in the second NPR data extraction and the 157 verified patients from the DPIA. Only 105 patients from DPIA were found in the NPR, while 52 patients in the DPIA were not returned as part of the second NPR data extraction.

CONCLUSION: Coding of infections after arthroscopy in the NPR is inconsistent and incomplete. An underreporting of septic arthritis to the DPIA might exist.

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The National Patient Registry (NPR) records data on all patient contacts to hospitals – both public and private. These data form the basis for health statistics, contribute to medical research and to quality assurance in health care [1]. The NPR data quality has been questioned as far as the registration of complications is concerned [2].

Data in the NPR are electronically transferred from patient administration systems. Each contact is listed under the patient's individual unique personal identification number (CPR number) [3] and includes date of contact, hospital identification, diagnosis codes (Internat-

tional Classification of Diseases, version 10 (ICD-10)) [4] and surgery performed (NOMESCO classification of surgical procedures) [1, 5].

Septic arthritis following knee arthroscopy is a complication that requires in-patient treatment. All cases should thus be reported to the NPR. Septic arthritis conforms to the requirements of financial compensation if claimed to the Danish Patient Insurance Association (DPIA); a public organisation that determines whether patients harmed during medical treatment or examination in Danish healthcare are entitled to financial compensation. In cases of malpractice, patients are compensated without having to prove that an error occurred. However, there is a minimum compensation threshold of DKK 10,000 (€ 1,341). Compensation is generally granted if any of the following four conditions are met: 1) if an experienced specialist would have acted differently

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Evacuation of purulent matter from knee with septic arthritis.

 TABLE 1

Diagnosis codes used for the second data extraction from the National Patient Registry.

DM00	Pyogenic arthritis
DM000	Staphylococcal arthritis and polyarthritis
DM000A	Staphylococcal arthritis and polyarthritis, direct infection of joint
DM000B	Staphylococcal arthritis and polyarthritis, indirect infection (post-infective arthropathy)
DM001	Pneumococcal arthritis and polyarthritis
DM001A	Pneumococcal arthritis and polyarthritis, direct infection of joint
DM001B	Pneumococcal arthritis and polyarthritis, indirect infection (post-infective arthropathy)
DM002	Other streptococcal arthritis and polyarthritis
DM002A	Other streptococcal arthritis and polyarthritis, direct infection of joint
DM002B	Other streptococcal arthritis and polyarthritis, indirect infection (post-infective arthropathy)
DM008	Arthritis and polyarthritis due to other specified bacterial agents
DM009	Pyogenic arthritis, unspecified
DT81.4	Infection following a procedure, not elsewhere classified
DT81.8	Other complications of procedures, not elsewhere classified
DT81.9	Unspecified complication of procedure

whereby the injury would have been avoided, 2) if the injury is due to the malfunction or failure of technical apparatus, instruments or other equipment; 3) if the injury might have been avoided using another available treatment technique or treatment method that would have been equally effective; or 4) if an injury is more extensive than the patient should reasonably have to endure [6].

Post-arthroscopic septic arthritis is usually considered to be “more extensive than the patient should reasonably have to endure”. As the CPR number is used by all national registries, linkage between them is possible. Ideally, data from the NPR on septic arthritis following knee arthroscopy should be identical to data from the DPIA.

The aim of the present study was to assess data from these two independent data sources, the NPR and the DPIA files, with a view to comparing the registration of the specific complication septic arthritis following knee arthroscopy. We assessed two separate three-year periods.

MATERIAL AND METHODS

This was a retrospective study based on data from the NPR and the DPIA. We extracted data covering the 1998-2000 and 2003-2005 periods. The DPIA has a five-year limitation period for complaints filed before 2007.

The study was approved by the Data Protection Agency (J.no: 2007-58-0015) and the National Board of Health (J.no: 7-505-29-1012/1).

An initial data query was made in the NPR to extract all contacts (whether admitted to hospital as in-patients, outpatients or via Accident & Emergency (A&E)) with the procedure codes [5] for arthroscopic knee surgery (first data extraction). Next, a second query was made in the NPR for patients found in the first query having a contact within 30 days postoperatively containing the diagnostic codes (**Table 1**) for septic arthritis (second data extraction). A thirty-day period was chosen as almost all readmissions due to post-arthroscopic septic arthritis occur within such a period [7-10].

Correspondingly, all DPIA files of patients claiming a postoperative infection following knee arthroscopy were identified by extracting files with a NOMESCO procedure code for knee arthroscopy in combination with an ICD-10 code for deep infection following an invasive procedure (DT814). Next, the files were then hand-searched to identify those with post-arthroscopic septic arthritis. DPIA files contain all documents of the case including medical records. To verify the occurrence of septic arthritis following knee arthroscopy, we recorded the date and operation code of the primary arthroscopy and the following data regarding the infection: symptoms (dolour, tumour, calour, rubour and fever), delay between symptoms and admission, secondary operations due to infection and whether any bacteria were grown. In addition, we recorded if the arthroscopy was performed as day surgery, and if the patient had had previous knee surgery.

From the DPIA's internal database we extracted data on injury and financial compensation with reference to the clauses of the DPIA Act.

The study population

The first NPR data extraction yielded 109,908 individuals

 TABLE 2

Secondary data extraction from the National Patient Registry and cases reported to Danish Patient Insurance Association. The values are n.

Category assigned according to the second data extraction from the NPR	Not reported to the DPIA	Reported to the DPIA, all verified with septic arthritis following knee arthroscopy ^a	Total
I) Septic arthritis not following knee arthroscopy	473	7	480
II) Septic arthritis possibly related to knee arthroscopy	352	98	450
I + II	825	105	930
III) Not in the second data extraction from the NPR	-	52	-
Total	-	157	-

DPIA = Danish Patient Insurance Association

NPR = National Patient Registry

a) 14 of the patients were not returned in the first data extraction from the National Patient Registry.

who had undergone a total of 131,132 knee arthroscopies. During the study period, 17,325 individuals had undergone more than one such operation. The second NPR data extraction returned 930 patients with a diagnosis code of septic arthritis, or one of three unspecific diagnose codes (T81.4, T81.8, T81.9) 0-30 days postoperatively (Table 1). Coding in the NPR corresponds to a single contact. If a patient is discharged or passed on to another department, the coding is completed and a new entry opened in the NPR. The same patient may therefore have several time-differentiated diagnosis codes of septic arthritis that all refer to the same case. To estimate whether the 930 patients returned in the second data extraction had suffered from septic arthritis following knee arthroscopy, their contacts were hand-searched using a decoding tool to facilitate review of all contacts both from the first and the second query. This allowed the two authors, BM and JB, to make assessments of the patterns of contacts, assigning them to two groups according to predefined criteria: Patients (480) with septic arthritis NOT following knee arthroscopy and patients (450) with septic arthritis possibly related to knee arthroscopy (Table 2). Cases were discussed until consensus was reached.

In the DPIA, we found 174 claims regarding postoperative infection after arthroscopic knee surgery. Files were searched and patients verified as having had septic arthritis following arthroscopic knee surgery on the basis of medical records and/or on the opinion of an orthopaedic medical consultant employed by the DPIA. If in doubt, BM and JKC discussed and agreed on cases. Seventeen cases were excluded, which left 157 patients verified (Figure 1).

Statistics

The χ^2 test or Fisher's exact test was used for dichotomous covariates, and where appropriate the Mann-Whitney test/t-test was performed for continuous covariates. All tests were two-sided and $p < 0.05$ was considered significant. Data were processed in IBM SPSS statistics 19.0.

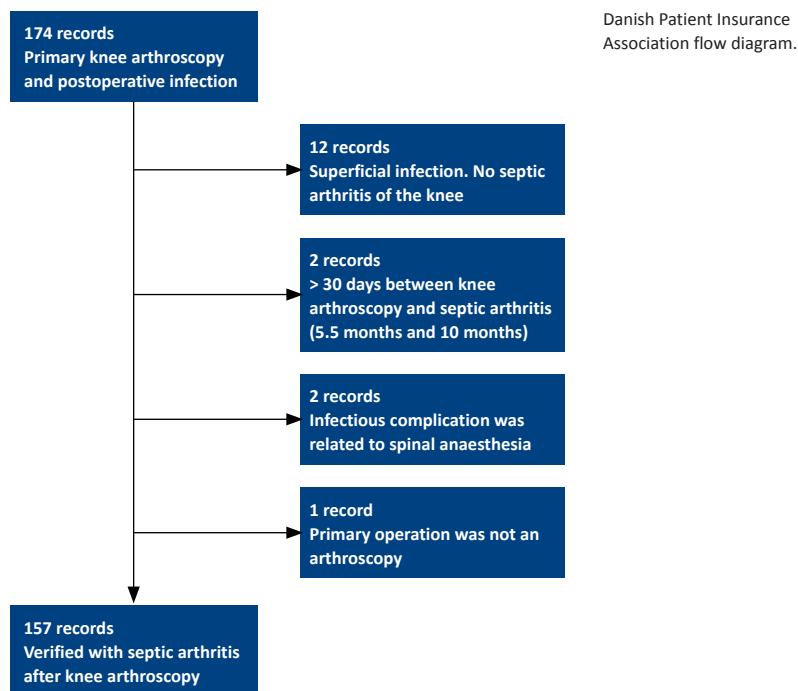
Trial registration: not relevant.

RESULTS

We found poor agreement between the 450 patients in the secondary data extraction from the NPR who were assigned septic arthritis possibly related to knee arthroscopy and the 157 verified patients from the DPIA. Only 105 patients from the DPIA were found in the NPR (Table 2), while 52 of the patients in the DPIA were not returned in the second data extraction from the NPR.

The median age in the first data extraction from the NPR was 39 (IQR 27-51); 55% of the operations were

FIGURE 1



performed on men. Table 3 summarizes the arthroscopies performed.

We identified 14 patients from the DPIA (9%) whose primary arthroscopy did not come up in the first NPR data extraction. Four of these non-reported patients had undergone surgery in private practice and four patients in public hospitals. The remaining six patients were in the second NPR data extraction because their knee arthroscopies were reported as having been performed as a part of their treatment for post-arthroscopic septic arthritis. These six patients were assigned as having "septic arthritis NOT following knee arthroscopy".

We also found seven patients who were verified in the DPIA, but who failed to have their readmission for septic arthritis registered with the NPR.

The remaining patients found in the DPIA, but not in the second data extraction all appeared in the NPR, but not with the codes selected for the query (Table 1). Instead, twenty-four other codes had been used.

The frequency of septic arthritis following knee arthroscopy estimated from the 157 verified cases in the DPIA and the 131,132 knee arthroscopies from the first NPR data extraction was 0.12% (95% confidence interval 0.118%-0.121%).

The number of cases reported to the DPIA rose by 114% (from 50 to 107 complaints) between the study periods, while the number of knee arthroscopies performed increased by only 22.4% (from 49,354 to 60,416).

 TABLE 3

Primary arthroscopies, Danish Patient Insurance Association cases and arthroscopies from the primary National Patient Registry data extraction

NOMESCO Classification of Surgical Procedures	DPIA		Primary data extraction, NPR	
	frequency, n	%	frequency, n	%
Exploratory procedures on knee (KNGA)	31	19.7	34,971	26.7
Operations of meniscus of knee (KNGD)	59	37.6	44,933	34.3
Operations of capsules and ligaments of knee joint (KNGE)	36	22.9	14,871	11.3
Operations on synovia and joint surfaces of knee (KNGF)	26	16.6	29,797	22.7
Miscellaneous operations on knee joint (KNGH)	5	3.2	3,001	2.3
Other			3,559	2.7
Total	157	100.0	131,132	100.0

DPIA = Danish Patient Insurance Association

NPR = National Patient Registry

In the files from the DPIA, the median age was 40 years (IQR 31.5-49) and 131 (83.4%) were men. A total of 78% (123) of the patients were treated as day cases, and 40% of the patients (63) had undergone surgery on the infected knee, whereas only 15.9% (17,325/109,908) of the patients from the first NPR data extraction had had such surgery before.

A total of DDK 22,157,772 (€ 2,971,365) was awarded to 113 patients, mainly with reference to Section 20.1.4: an injury more extensive than the patient should reasonably have to endure.

DISCUSSION

Ideally, the second data extraction from the NPR covering septic arthritis possibly related to knee arthroscopy (Table 2) should include all the validated files from the DPIA. However, the occurrence of cases from the second extraction from the NPR not corresponding to a DPIA file suggests underreporting to the DPIA of septic arthritis following arthroscopic knee surgery. The lack of correspondence between DPIA files and cases from the second NPR data extraction suggests either underreporting of post-arthroscopic septic arthritis to the NPR or inaccurate coding. In addition, the criteria in our NPR query may not have been sufficiently clear to identify all patients in the NPR suffering from septic arthritis following knee arthroscopy.

The lack of correspondence between DPIA files and any cases in the first NPR data extraction is due to failure to report the primary arthroscopic procedure to the NPR. The frequency (9% (14/157) of DPIA cases) of such

failure to report is indicative of the completeness of the NPR with regard to registration of surgical procedures. Since the NPR switched to using the ICD-10 [4] in 1994, only little research has focused on the validity and the completeness of surgical and medical data in the NPR. The validity of administrative data is known to be high [11, 12]. One study, focussing on hysterectomies, showed that complications requiring re-operation had incomplete or misleading diagnosis codes in 39% of complications [2]. A survey of the NPR as a tool for continuous production and quality control [13] found the validity of diagnosis codes to be lower than that of procedure codes. We found that a total of 52 DPIA cases (33.1%) were not present in the second NPR data extraction (nine of which did not appear in the primary extraction either). This suggests an inability of the available diagnosis codes to describe and define complications in the NPR. Reporting to NPR was not mandatory for private practice surgeons before 2007. This accounts for a small part of the DPIA cases missing from the NPR.

We found no patterns suggesting systematic errors in coding and reporting of complications, but the coding pattern seemed inconsistent.

It is mandatory to report to the NPR. The mandatoryness may occasionally run counter to the carefulness with which the reporting is actually done. However, correct coding practice is an area with room for improvement and has been incorporated in many departments as a part of their training programmes [14].

The structure of the NPR is based on "contacts", which makes it difficult to extract information about coherent disease courses across contacts. Such structure makes cumbersome control of patient records necessary and it reduces the value of the NPR for medical research.

The disagreement between the NPR and the DPIA data shows that our NPR query failed to identify all patients in the NPR suffering from septic arthritis following knee arthroscopy. Query criteria including synovectomies up to 30 days postoperatively, regardless of the ICD-10 code used, would have identified some of the 52 DPIA cases. The number of irrelevant cases resulting from the queries would also have increased.

The poor accordance between the NPR and the DPIA suggests that an estimate of the incidence of post-arthroscopic septic arthritis based on the query criteria would be of limited value. Review of the complete patient records of all the 930 cases from the second NPR data set would hardly be possible. Using the 450 cases assigned as septic arthritis possibly related to knee arthroscopy, the incidence is 0.35% (450/131,132), which is comparable to that reported in the literature where the incidence ranges from 0.1% to 0.4% [7, 10, 15]. The majority (98) of validated cases in the DPIA lie within this group, which suggests that the criteria for extraction of

data succeed in finding most cases of septic arthritis following knee arthroscopy. But the sensitivity and the specificity of the method are obviously not impressive.

Previous studies of complications following surgery have suggested under-reporting [10, 16-19]. A Danish study from 2004 suggested that the underreporting factor of post-arthroscopic septic arthritis to the DPIA may be approx. 100 [10], meaning that as little as one case in every one-hundred may be claimed.

Despite poor agreement between the two data sources used for this study, the findings do not suggest considerable under-reporting. Two-thirds of the cases from the DPIA were included in the 450 cases of septic arthritis possibly related to knee arthroscopy from the second NPR data extraction. It is extremely unlikely that the number of cases of post-arthroscopic infections without a coding indicating a postoperative infection exceeds 450. Unfortunately, the agreement between the two data sources in this study does not provide sufficient basis to estimate the scope of underreporting.

There was a significant increase in the number of cases referred to the DPIA between the first and second study period. We ascribe this to the efforts made on the part of the DPIA to raise awareness of its existence and aims, both in the press and through training of doctors [20].

CONCLUSION

We found poor agreement between the reporting of cases made to the NPR and to the DPIA. The coding of infections after arthroscopy in the NPR is inconsistent and incomplete. Under-reporting may exist in the claiming of septic arthritis to the DPIA, and the extent of such under-reporting is uncertain and impossible to determine on the present basis.

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