





High Validity and Completeness of the Septoplasty Surgical Procedure Code in the Danish National Patient Registry

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Introduction: Ensuring the validity and completeness of clinical data is crucial when utilizing nationwide registers such as the Danish National Patient Registry (DNPR) for epidemiological research. The literature on this topic is, however, strongly lacking for Ear-nose-and-throat (ENT) surgery. The aim of this study was to assess the validity and completeness of the septoplasty surgical procedure code in DNPR.

Methods: This population-based validation and completeness study included all cases of septoplasty surgical procedure codes registered in the DNPR in 2021 and 2022 at the ENT department at Odense University Hospital (OUH) in Denmark. The unique personal registration number was used to identify cases from the DNPR in OUH data registrations. All surgical notes were evaluated manually to determine whether septoplasty had been performed. The primary outcomes were validity (PPV) and completeness assessed as the sensitivity, presented with 95% confidence intervals (CI).

Results: A total of 479 cases were identified from the DNPR. Upon evaluation of the surgical notes and after withdrawal of duplicates, 470 cases were confirmed to have undergone septoplasty, resulting in a PPV of 99% (95% CI (97.6–99.7)). From the OUH data registrations, 485 registrations of septoplasty were identified. Evaluation of the surgical notes left 475 cases of confirmed septoplasty, corresponding to five missing cases in the DNPR, resulting in a sensitivity of 99% (95% CI (97.6–99.7)).

Conclusion: This study showed high validity and completeness for registrations of the septoplasty surgical procedure code in the DNPR. We therefore conclude that the DNPR is a reliable tool for epidemiological research concerning septoplasty.

Keywords: completeness, epidemiology, nasal congestion, national registers, septoplasty, validity

Introduction

Since 1977, the Danish National Patient Registry (DNPR) has systematically collected vast amounts of both clinical and administrative data, including more than 99.4% of discharges from all private and public hospitals in Denmark.¹ As such, the register constitutes an important data source for register-based epidemiological studies. However, although the register has been validated across administrative variables, the validity of clinical variables such as diagnosis and surgical procedure codes remains highly uncertain across several specialties, including that of Ear-nose-and-throat (ENT) surgery.^{1,2}

Within the field of ENT surgery, septoplasty is one of the most commonly performed procedures.³ In Denmark alone, more than 4000 surgeries were performed annually in 2021 and 2022, respectively.⁴ Despite being a procedure performed in that volume each year, epidemiological studies concerning the procedure are limited. Clinical quality registers, such as The Swedish National Septoplasty Register (SNSR), could serve as an important data source for continuous quality improvement as well as large, population-based studies.⁵ The SNSR was established in 1997, with the purpose of gathering prospective data on septoplasties performed at Swedish hospitals. However, the completeness of the SNSR has

been less than satisfactory, ranging between 48 and 61% in reports from 2019 to 2021.⁶ Considering these issues, nationwide administrative healthcare registers, such as the DNPR, offer an alternative data source for epidemiological studies concerning septoplasties. Studies based on such vast cohorts could contribute important new knowledge to the field of rhinology worldwide. However, ensuring the validity and completeness of clinical data, such as surgical procedure codes, is essential when utilizing registers like the DNPR for epidemiological research. For the field of ENT surgery, the literature is limited in this regard and lacking completely for the field of rhinology.¹

The aim of this study was to assess the validity and completeness of the septoplasty surgical procedure code in the DNPR, for all cases registered with this surgical procedure at a Danish hospital in a 2-year period, using patient medical records as the reference standard.

Methods

Study Design

The study was designed as a population-based validity and completeness study including all cases of septoplasty surgical procedure code registered in the DNPR and from OUH data registrations at the ENT department at Odense University Hospital (OUH) in Denmark from 1st of January 2021 through 31st of December 2022.

In accordance with the Danish Health Act §42D, informed consent is not required in quality assurance studies like the present study. According to the Danish National Committee on Health Research Ethics, quality assurance studies, such as validation studies, are exempt from ethical approval and evaluation by the committee.⁷ Permission to extract data from the patient medical records in the present study was obtained from the administration at OUH in accordance with current legislation.

For this article, the reporting guideline for validation studies based on the modified STARD guidelines was used.⁸

Setting

The Danish health care system is fully tax funded. This ensures equal access to all health care services across geographical and socio-economic status. Since 1968, the Civil Registration System in Denmark has assigned a unique ten-digit personal registration number to all residents. These can never be allocated to other individuals. The personal registration number is used to register all contacts with the Danish health care system, from general practitioner to hospitals both public and private as well as all registrations in Danish national registers. This means that the personal registration number can be used to cross-link data from all Danish registers on an individual level.^{9–11}

Data Sources

The DNPR served as data source for extracting administrative data such as the personal registration numbers and surgical procedure codes. The surgical notes from the patient medical records, identified through OUH data registrations, served as the reference standard. Surgical procedures are coded according to the Nordic Medico-Statistical Committee Classification of Surgical Procedures (NOMESCO) in both the DNPR as well as OUH data registrations and patient medical records.¹²

Study Population

The study population consisted of all cases registered with the septoplasty surgical procedure code (DJD20) at OUH in 2021 and 2022, sourced from both the DNPR and from OUH data registrations. No exclusion criteria were applied.

Data Collection

To estimate the validity, the personal registration number obtained from cases in the DNPR was used to identify relevant patient medical records on-site at OUH. From the patient medical records, the surgical notes were evaluated manually by the same data collector (JØB) to determine whether the cases had indeed undergone a septoplasty or not. In cases of uncertainty, two additional reviewers (KSL, ABR) were consulted, and in cases of further disagreement, an experienced septoplasty surgeon (ADK) was consulted to break ties.

A random control sample, constituting 10% of the cases (48 cases), was assessed secondarily by the two reviewers (KSL, ABR) blinded from both the primary and each other's evaluation. This secondary evaluation resulted in a 93.8% concordance with the initial evaluation.

To evaluate the completeness, we reviewed all registrations of septoplasty surgical procedure code from OUH data registrations during the validation period and compared them to registrations in the DNPR.

Data from the DNPR was stored and analyzed in the secure, access-logged research environment "Forskermaskinen" hosted by the Danish Health Data Authority. Data from patient medical records was pseudonymised and stored on secure, access-logged servers hosted by the Region of Southern Denmark. The used data complies with relevant data protection and privacy regulations.

Statistical Analysis

The statistical analysis was conducted using STATA/BE 18.0.¹³ The primary outcomes were validity assessed as the positive predictive value (PPV) using the re-abstracted record method and completeness assessed as the sensitivity using independent case ascertainment.¹⁴ The PPV was calculated as the proportion of correct registrations in the DNPR when compared to the total number of registrations in the DNPR. The sensitivity was calculated as the proportion of correct registrations in the DNPR compared to data from OUH data registrations. Both PPV and sensitivity was calculated with 95% CIs.

Results

A total of 479 cases of septoplasty in 468 unique patients were identified in the DNPR. Of these, 38% were female, and the median age was 33 ranging from 13 to 82 years.

To ensure the representation of all national septoplasties, cases at OUH were calculated as a proportion of cases nationwide. The septoplasty surgical procedure code was registered in the DNPR for 3583 cases across all Danish public hospitals (1612 in 2021 and 1971 in 2022).⁴ This implies that OUH accounted for an estimated 14% of all septoplasties performed nationwide at public hospitals.

Validity

Of the 479 cases identified in the DNPR, four cases were registered twice, and were subsequently withdrawn, ensuring that only original cases were assessed (Figure 1). From the 475 remaining cases, five cases with no septoplastic procedure are described in the surgical note. Consequently, 470 cases had in fact undergone a septoplasty, resulting in a PPV of 99% (95% CI (97.6–99.7)) for registrations of the septoplasty surgical procedure code in the DNPR.

Completeness

A total of 485 cases of septoplasty were identified from OUH data registrations. The same four cases that were registered twice in the DNPR were also registered twice in OUH data and were subsequently withdrawn. From the remaining 481 cases, six had no septoplasty performed (five of these were the same cases evaluated through the DNPR list), resulting in 475 cases from OUH data registrations included in the completeness assessment (Figure 1). This resulted in five cases that were missing in the DNPR compared to OUH data registrations, yielding a sensitivity of 99% (95% CI 97.6–99.7) for registrations of the septoplasty surgical procedure code in the DNPR.

Of the 485 cases from OUH data registrations, data was gathered on the six cases missing in the DNPR. These cases were registered under other departments than the ENT department. Three septoplasties were performed in conjunction with neurosurgery, and two septoplasties with maxillofacial surgery, while the patients were admitted to these separate departments. One septoplasty was performed, while the patient was admitted to the Department of Hematology.

There were no missing cases from the DNPR in OUH data registration.

Discussion

In this study, we observed a validity of 99% and a completeness of 99% of the septoplasty surgical procedure code in the DNPR.

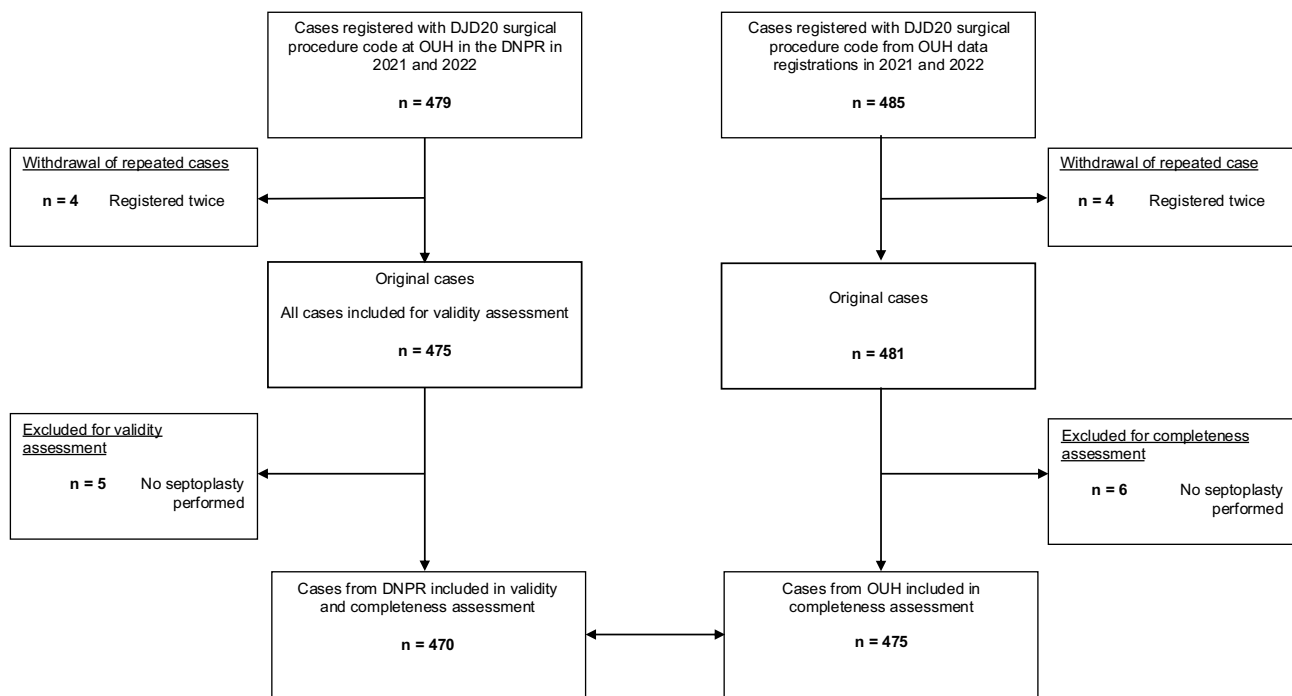


Figure 1 Flowchart of included and excluded cases from Odense University Hospital (OUH) data registrations and the Danish National Patient Registry (DNPR).

No studies have previously validated the registrations of septoplasty surgical procedure code in the DNPR. The high PPV, together with the high sensitivity, emphasizes the reliability of registrations of septoplasty surgical procedure code in the DNPR. As previously noted in the work of Schmidt et al,¹ the reliability of the surgical procedure code enables future research that relies on the DNPR as a data source for septoplasty research. It has been stated that the validity of coding in the DNPR may vary, but it has also been noted that surgical procedure codes are among the most reliable registrations, as surgeons typically become familiar with a limited number of codes.¹⁵ Furthermore, no other obvious surgical procedure code representing septoplasty is available in the NOMESCO coding system. Combined with the high validity and the substantial number of septoplasties conducted at OUH, this implies that the DNPR could indeed function as a potential data source for establishing a national septoplasty cohort.

When comparing our results to those of other validation studies of the DNPR, only one ENT specific study exist, reporting a PPV of 98.1% (95% CI 95.5–100) and a completeness of 91% (95% CI 87.0–94.1) for the surgical procedure codes denoting cholesteatoma surgery in 28 patients.² However, the methodology of Djurhuus et al was based on the matching of surgical procedure codes registered in the DNPR with the code denoted in the patient medical records, rather than validating according to the surgical note. As such, the two studies are not entirely comparable.

When looking at studies concerning other specialties, it is sometimes necessary to combine diagnosis codes with surgical procedure codes to obtain high PPVs in identifying cases of interest.^{16,17} As is evident from our results, the registration of septoplasty in the DNPR seems to be of very high validity, and the surgical procedure code alone is sufficient in identifying patients for research purposes concerning septoplasties.

In our study, we saw a high degree of completeness. However, we still saw missing cases from the DNPR in our initial data extraction. This was also the case for Pedersen et al¹⁸ in their validation of the Danish Hip Arthroplasty Register, although they saw a considerably higher number of missing cases. In our study, the missing cases could all be attributed to registrations in other departments, even though septoplasty was performed by the ENT department. Our extraction from the DNPR only included registrations from the ENT department. This finding suggests that caution should be exercised when narrowing DNPR search strategies to departmental levels.

Strengths and Limitations

This study was strengthened using a cohort consisting of 100% of all relevant cases in the study period. Although no consensus on the optimal population size for validation studies exist, some suggest the use of 10% sample sizes.¹⁹ With OUH responsible for approximately 14% of all septoplasties performed nationwide, we believe that our study represents an acceptable sample of the Danish population.

Despite this, a potential selection bias may be present, as the validation was conducted exclusively at one hospital. However, Danish physicians receive little to no formal training in surgical procedure coding and the coding for septoplasty is, as mentioned above, unambiguous in the NOMESCO coding nomenclature. As such, there is no reason that surgical coding of septoplasty should be performed differently or more thoroughly at OUH compared to the other nine ENT departments in Denmark. Although journal systems vary across regions, NOMESCO coding is standardized nationwide. We therefore believe that the PPV and the sensitivity of septoplasty surgical procedure code at OUH can be safely applied to other registrations of septoplasty the DNPR on a national level.

A possible limitation to this study is the initial validation only being conducted by one reviewer. Nevertheless, this evaluation involved consultation with more experienced colleagues and was followed by a control assessment, which achieved an agreement rate of 93.8%. We consider this level of accordance acceptable.

Another limitation was that the data extraction from the DNPR was limited to the ENT department. Although the number of missing cases was minor (n=6), and we believe this did not impact our findings, we would have achieved a sensitivity of 100% if we had included all departments. This also highlights that the DNPR has a sensitivity of 100%, suggesting that future validation studies can benefit from including all departments.

Conclusion

In this study, we found a high validity, with a PPV of 99%, and a high completeness, with a sensitivity of 99%, regarding registrations of the septoplasty surgical procedure code in the DNPR. As such, DNPR can be considered a reliable tool in epidemiological research concerning septoplasty.

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Disclosure

Professor Anette Kjeldsen participated in WAYPOINT randomised controlled study on Biological therapy for chronic rhino sinusitis for AstraZeneca and is a member of medical advisory board on iron therapy for Pharmacosmos. The authors declare no other conflicts of interest in this work.

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