


Postprocedural Disorders of Eye and Adnexa Admissions Profile

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Purpose: The aim of this study was to examine hospitalisation profiles related to postprocedural disorders of eye and adnexa in England and Wales.

Patients and Methods: This was an ecological study using publicly available data extracted from the “Hospital Episode Statistics (HES) database” in England and the “Patient Episode Database for Wales (PEDW)” for the period between April 1999 and April 2020. Diagnostic code for postprocedural disorders of eye and adnexa (H59) was used to identify hospital admission. We used the chi-squared test to assess the difference between the hospital admission rates between 1999 and 2020.

Results: Hospital admission rate decreased by 6.3% [from 4.98 (95% CI 4.79–5.17) in 1999 to 4.67 (95% CI 4.50–4.84) in 2020 per 100,000 persons, trend test, $p < 0.05$]. The most common hospital admissions causes were other postprocedural disorders of eye and adnexa “Chorioretinal scars after surgery for detachment.” The age group 75 years and above accounted for 44.3% of the total number of admissions. Hospital admission rate among females decreased by 30.2% [from 5.90 (95% CI 5.61–6.19) in 1999 to 4.12 (95% CI 3.89–4.35) in 2020 per 100,000 persons]. Hospital admission rate among males increased by 30.2% [from 4.02 (95% CI 3.77–4.26) in 1999 to 5.23 (95% CI 4.97–5.49) in 2020 per 100,000 persons].

Conclusion: This study revealed that hospital admission rates for postprocedural disorders of the eye and adnexa decreased over the course of the study period. Eye and adnexa disorders accounted for the preponderance of hospital admissions among the elderly. Further research is required to identify risk factors that can be avoided.

Keywords: admission, adnexa, eye, disorders, postprocedural

Introduction

In the healthcare system, surgical procedure is a fundamental part.¹ Worldwide, over 230 million principal surgeries are performed annually.² All postoperative complications (serious or transient) are significant to patients.³ The potential for postoperative complications is influenced by several factors, including the following: the pre-existing comorbid condition of the patients, the surgery type, and the perioperative management.³ Furthermore, studies have demonstrated that aspects associated with postoperative complications include the following: anaesthesia, advanced age, longer duration of surgery, higher body mass index, intraoperative adverse events, comorbidities, combined organ resection, and smoking.^{4–10}

Although surgery risks are low for most patients, evidence increasingly indicates that postoperative complications are a significant reason for mortality.^{11–14} Studies estimate that the proportion of patients who will experience postoperative complications when undergoing major surgical procedures is 7–15%.^{15,16} Globally, about three million of the 25 million patients who undergo high-risk surgeries die before being discharged from the hospital each year.^{14,17} The overall postoperative mortality rate is estimated at 0.8%–5.7%.¹⁸ In the UK, approximately 10% of surgical patients are at high risk for complications.³

In addition to the fact that postoperative complications cause suffering and death, they cause hospital stays for more extended periods and thus increase costs even more.^{3,18,19} Postoperative complications can be specific to certain operations or general.³ In this article, we examined trends of hospital admissions due to postprocedural disorders of eye and adnexa in England and Wales from 1999 to 2020. Between 2018 and 2019, about 20,000 cataract surgeries were performed in Wales and

452,000 in England.²⁰ According to a national ophthalmology database audit, 47,248 patients underwent procedures on both eyes.²⁰ No previous studies in the United Kingdom have examined hospitalisation due to postprocedural disorders of eye and adnexa. The aim of this study was to examine hospitalisation profiles related to postprocedural disorders of eye and adnexa in England and Wales. Understanding and handling postprocedural disorders are of utmost importance in ensuring the welfare of patients who have had ocular operations or procedures. Furthermore, the examination of postprocedural complications in the ocular region and its surrounding structures has the potential to drive progress in surgical methodologies, postoperative care guidelines, and the creation of procedures that are both safer and more efficient. Enhancing patient outcomes in the future can be facilitated by comprehending the etiology and risk factors associated with these complications.

Methods

Study Sources and the Population

This was an ecological study using publicly available data extracted from the “Hospital Episode Statistics (HES) database” in England and the “Patient Episode Database for Wales (PEDW)” for the period between April 1999 and April 2020.^{21,22} These medical databases were previously used to examine hospitalisation profiles for different health conditions.^{23–27} The HES and PEDW databases contain hospital admission data for patients with postprocedural disorders of eye and adnexa from all age groups, which are subdivided into four categories; “below 15 years, 15–59 years, 60–74 years, and 75 years and above.” Diagnostic code for postprocedural disorders of eye and adnexa (H59) was used to identify hospital admission. HES and PEDW databases record all hospital admissions, Outpatients, and Accident and Emergency (A&E) activities performed at all National Health Service (NHS) trusts and any independent sector funded by NHS trusts. Data for hospital admissions in England and Wales are available from the years 1999/2000 onwards. Available data include patient demographics, clinical diagnoses, procedures, and duration of stay. Mid-year population data were collected from the Office for National Statistics (ONS).

Statistical Analysis

Hospital admission rates with 95% confidence intervals (CIs) were calculated using the finished consultant episodes of postprocedural disorders of eye and adnexa-related admission divided by the mid-year population. We used the chi-squared test to assess the difference between the hospital admission rates between 1999 and 2020. Trends in hospital admissions were assessed using a Poisson model. All analyses were conducted using SPSS version 25 (IBM Corp, Armonk, NY, USA).

Results

The total annual number for postprocedural disorders of eye and adnexa hospital admissions for various causes increased by 7.3% from 2598 in 1999 to 2788 in 2020, representing a decrease in the hospital admission rate of 6.3% [from 4.98 (95% CI 4.79–5.17) in 1999 to 4.67 (95% CI 4.50–4.84) in 2020 per 100,000 persons, trend test, $p < 0.05$].

The most common postprocedural disorders of eye and adnexa hospital admissions causes were other postprocedural disorders of eye and adnexa, which accounted for 79.1% (Table 1). The average length of stay for keratopathy (bullous

Table 1 Percentage of Postprocedural Disorders of Eye and Adnexa from Total Number of Admissions

ICD Code	Description	Percentage from Total Number of Admissions
H59.0	“Keratopathy (bullous aphakic) following cataract surgery”	11.4%
H59.8	“Other postprocedural disorders of eye and adnexa (Chorioretinal scars after surgery for detachment)”	79.1%
H59.9	“Postprocedural disorder of eye and adnexa, unspecified”	9.5%

Abbreviation: ICD, International Classification of Disease.

aphakic) following cataract surgery and postprocedural disorder of eye and adnexa, unspecified was 1 day. The average length of stay for other postprocedural disorders of eye and adnexa (Chorioretinal scars after surgery for detachment) was 2 days.

Over the study duration, postprocedural disorders of eye and adnexa admissions rates for the postprocedural disorder of eye and adnexa, unspecified and keratopathy (bullous aphakic) following cataract surgery were decreased by 88.7% and 62.8%, respectively. Besides, postprocedural disorders of eye and adnexa hospital admissions rates for other postprocedural disorders of eye and adnexa were increased by 29.3% (Figure 1, Table 2).

Concerning age group difference for postprocedural disorders of eye and adnexa, not elsewhere classified hospital admission: the age group 75 years and above accounted for 44.3% of the total number of postprocedural disorders of eye and adnexa, not elsewhere classified hospital admissions, followed by the age group 60–74 years with 33.3%, the age group 15–59 years with 20.8%, and then the age group below 15 years with 1.7%. Rates of hospital admission for postprocedural disorders of eye and adnexa, not elsewhere classified among patients aged below 15 years decreased by 63.5% [from 0.53 (95% CI 0.39–0.68) in 1999 to 0.20 (95% CI 0.11–0.28) in 2020 per 100,000 persons]. Rates of hospital admission for postprocedural disorders of eye and adnexa, not elsewhere classified among patients aged 15–59 years increased by 36.1% [from 1.40 (95% CI 1.27–1.53) in 1999 to 1.90 (95% CI 1.76–2.05) in 2020 per 100,000 persons]. Rates of hospital admission for postprocedural disorders of eye and adnexa, not elsewhere classified among patients aged 60–74 years increased by 1.7% [from 10.81 (95% CI 10.04–11.59) in 1999 to 11.00 (95% CI 10.33–11.67) in 2020 per 100,000 persons]. Rates of hospital admission for postprocedural disorders of eye and adnexa, not elsewhere classified among patients aged 75 years and above decreased by 40.2% [from 34.64 (95% CI 32.79–36.48) in 1999 to 20.73 (95% CI 19.49–21.97) in 2020 per 100,000 persons] (Figure 2).

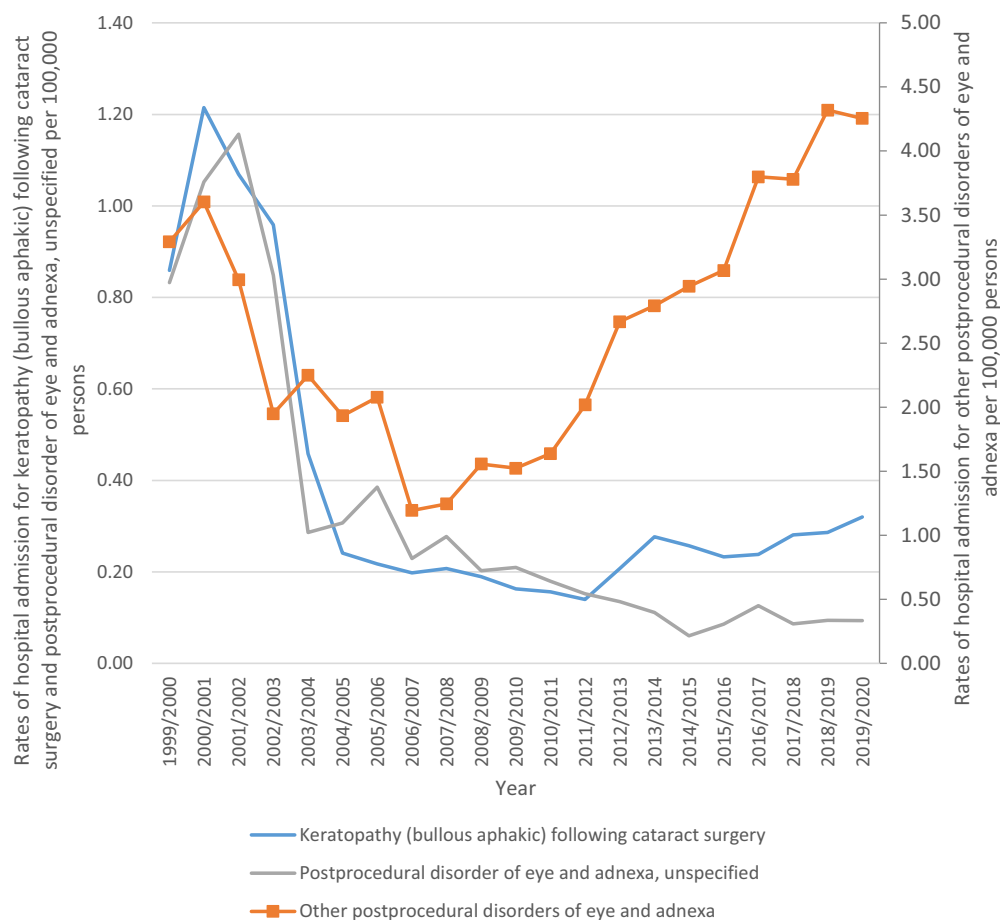


Figure 1 Rates of hospital admission stratified by type.

Table 2 Percentage Change in Hospital Admission Rates

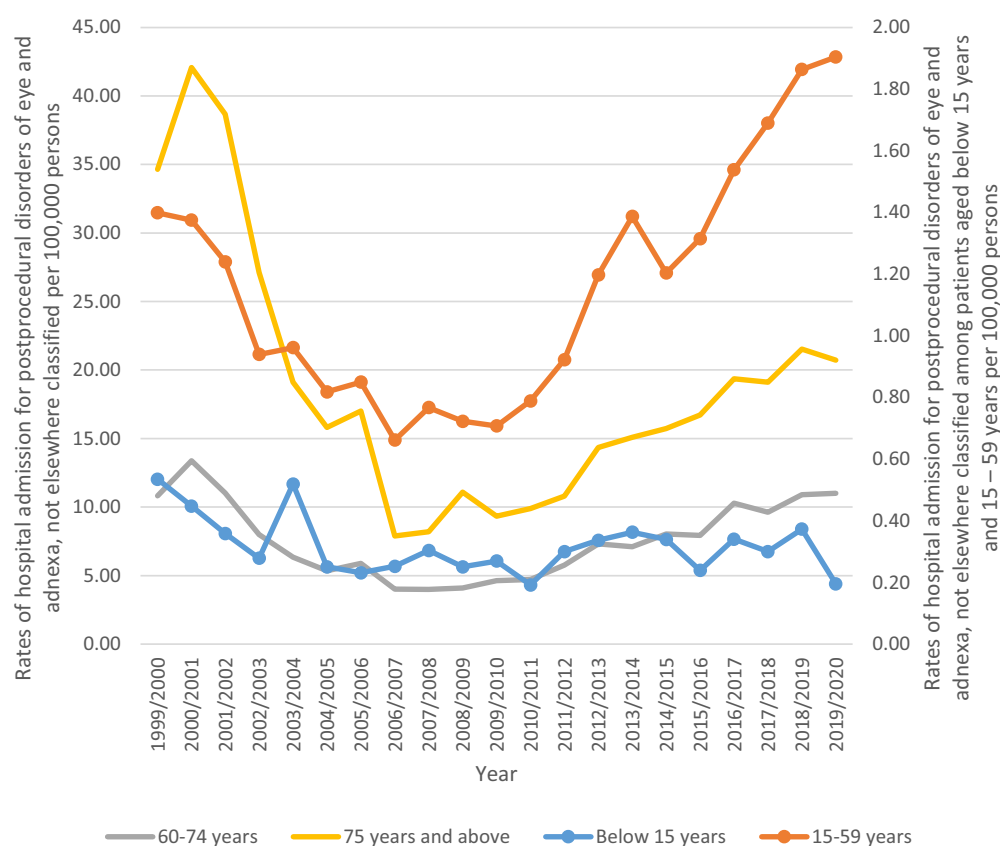
Disorders	Rate of Disorders in 1999 per 100,000 Persons (95% CI)	Rate of Disorders in 2020 per 100,000 Persons (95% CI)	Percentage Change from 1999–2020
“Keratopathy (bullous aphakic) following cataract surgery”	0.86 (0.78–0.94)	0.32 (0.27–0.37)	–62.8%
“Other postprocedural disorders of eye and adnexa”	3.29 (3.14–3.45)	4.25 (4.09–4.42)	29.3%
“Postprocedural disorder of eye and adnexa, unspecified”	0.83 (0.75–0.91)	0.09 (0.07–0.12)	–88.7%

Abbreviation: CI, Confidence interval.

A total of 38,984 postprocedural disorders of eye and adnexa, not elsewhere classified hospital admission episodes were reported in England and Wales during the study time. Females contributed to 52.4% of the total number of postprocedural disorders of eye and adnexa, not elsewhere classified hospital admission accounting for 20,443 hospital admission episodes by a mean of 973 per year. Postprocedural disorders of eye and adnexa, not elsewhere classified hospital admission rate among females decreased by 30.2% [from 5.90 (95% CI 5.61–6.19) in 1999 to 4.12 (95% CI 3.89–4.35) in 2020 per 100,000 persons]. Postprocedural disorders of eye and adnexa, not elsewhere classified hospital admission rate among males were increased by 30.2% [from 4.02 (95% CI 3.77–4.26) in 1999 to 5.23 (95% CI 4.97–5.49) in 2020 per 100,000 persons] (Figure 3).

Postprocedural Disorders of Eye and Adnexa, Not Elsewhere Classified Admission Rate by Gender

All postprocedural disorders of eye and adnexa, not elsewhere classified hospital admission rates were higher among females compared to males (Figure 4).

**Figure 2** Total rates of hospital admission stratified by age.

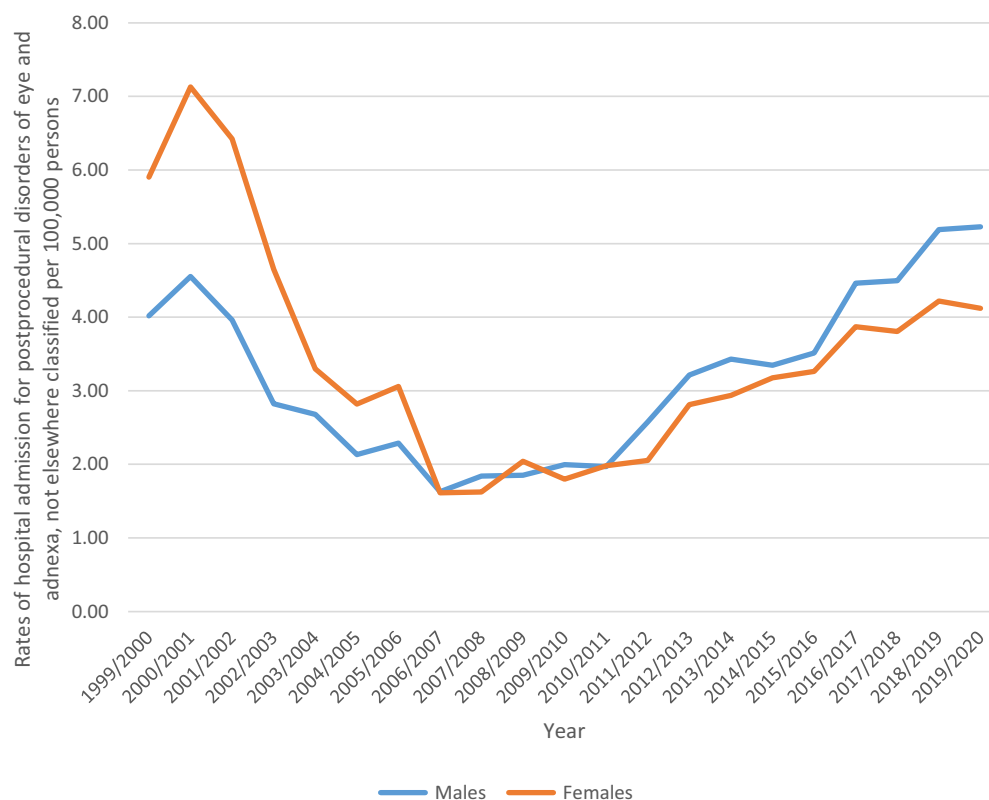


Figure 3 Rates of hospital admission stratified by gender.

Postprocedural Disorders of Eye and Adnexa, Not Elsewhere Classified Admission Rate by Age

All postprocedural disorders of eye and adnexa, not elsewhere classified hospital admission rates were directly related to age (more common among the age group 75 years and above), [Figure 5](#).

Discussion

This ecological study looked at hospital admission rate for postprocedural disorders of eye and adnexa in the UK between 1999 and 2020. We found that the total annual number for postprocedural disorders of eye and adnexa, not elsewhere classified hospital admissions for various causes increased by 7.3% from 2598 in 1999 to 2788 in 2020, representing a decrease in the hospital admission rate of 6.3% [from 4.98 (95% CI 4.79–5.17) in 1999 to 4.67 (95% CI 4.50–4.84) in 2020 per 100,000 persons]. The most common postprocedural disorders of eye and adnexa, not elsewhere classified hospital admissions causes were other postprocedural disorders of eye and adnexa, which accounted for 79.1%. Concerning age group difference: we found that the age group 60 years and above accounted for the majority (77.0%) of the total number of postprocedural disorders of eye and adnexa, not elsewhere classified hospital admissions, followed by other age groups. We also found that females contributed to 52.4% of the total number of postprocedural disorders of eye and adnexa, not elsewhere classified hospital admission.

Previous studies investigating the overall trend in post-operative eye surgeries complications are limited, and most of the studies focused on specific eye surgeries or diagnosis. However, the findings of the study are generally consistent with previous study that looked into the rate of postprocedural complications of eye and adnexa. A previous study by Alrawashdeh et al investigated the trend of hospital admissions concerning diseases of the eye and adnexa in the United Kingdom in the past 20 years using HES data, and they concluded that the postprocedural complications of eye and adnexa were decreased by 6% over the study period.²⁸ These findings were consistent with our results as we found that postprocedural disorders of eye and adnexa, not elsewhere classified hospital admissions rates for postprocedural



Figure 4 Hospital admission rates stratified by gender.

disorders of eye and adnexa, unspecified and keratopathy (bullous aphakic) following cataract surgery decreased by 88.7% and 62.8%, respectively.

Lens and eye surgeries are the most common ophthalmic procedures, in which the risk of hospitalization for these two conditions can be considered generally low.²⁹ In addition, taking into consideration the advancement in the medical technology, one-day surgery, and the cost-effectiveness approaches, the results of this study seem to be a representative estimate of the current clinical practice in the UK and the reduction the hospital admission.



Figure 5 Hospital admission rates stratified by age.

The most common postprocedural disorders of eye and adnexa, not elsewhere classified hospital admissions causes were other postprocedural disorders of eye and adnexa including chorioretinal scars after surgery for detachment, which accounted for 79.1%, this was followed by Keratopathy (bullous aphakic) following cataract surgery, which accounted

for nearly 11% of the hospital admissions. These results were also in line with previous studies that investigated frequency of retinal detachment admissions and vitreo-retinal surgery procedures performed between 2000 and 2018 in England. The authors found that the frequency of admissions to hospital for surgically treated retinal detachment seems to have been increasing significantly since 2000.³⁰ This observation can also be explained by multiple reasons including the aging population. Several studies have reported that age is an important risk factor for retinal detachment conditions,^{31,32} and other factors that may explain this observation include an increase in number of comorbidities including diabetes and improvement in public awareness.³³

This study found that the older age group 60 and above accounted for the majority of the hospital admission cases, these findings can be explained by multiple reasons including the fact that majority of the eye procedures are for the older age group but also may be explained by the fact that older age group usually have other comorbidities such as diabetes, hypertension, which may increase the risk of post-procedural complications such as infections.^{30,34,35}

This study showed a decreasing trend in hospital admission rate for postprocedural disorders of eye and adnexa in the UK during the past two decades in the UK. This indicates a better health-care system and early detection, fewer complications, and cost-effectiveness approaches.³⁶ However, the rise in other postprocedural disorders of eye and adnexa, including chorioretinal scars after surgery for detachment, is also related to the increase in the aging population.

This study has several strength points including that this is the first study to explore trends in hospital admission rate for postprocedural disorders of eye and adnexa in the UK between 1999 and 2020. The study was a population study at the national level, and we analyse the data stratified by age and gender variations over 20 years' period. However, this study has some limitations, in this study we did not have patient-level data and our data do not directly address the underlying reasons for the trends.³⁷ Factors such as demographic changes obesity, lifestyles, health guidelines, and comorbidities were not considered in our analysis. In addition, for each ICD-10 code range, we were unable to specifically identify which eye problems had the greatest impact on the hospital admission rate.

Conclusion

This study found that postprocedural disorders of eye and adnexa, not elsewhere classified hospital admissions rates for postprocedural disorders of eye and adnexa, were decreased over the study period. Elder age group accounted for the majority of hospital admission due to disorders of eye and adnexa.

Data and Materials Availability

All data associated with this study are presented in this paper. The data accessed complied with relevant data protection and privacy regulations.

Ethical Approval

The study was approved by the Institutional Review Board at Isra University, Amman, Jordan (SREC/22/08/49).

Author Contributions

M.R.N. and A.Y.N. participated in protocol design, data collection, investigation, supervised this study, and drafted the first manuscript. All authors reviewed and approved the final manuscript. All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising, or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

No conflicts of interests to be declared.

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