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Emergency department utilization after elbow arthroscopy

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Background: Elbow arthroscopy has defined indications for which technical pearls and outcomes have been described. However, other aspects of the postoperative course, such as postprocedural emergency department (ED) visits, have received less attention. The current study defined the incidence and factors associated with ED visits in the 90 days following elbow arthroscopy by leveraging a large, national, multiinsurance, administrative database.

Methods: Adult patients who underwent elective elbow arthroscopy were identified in the 2010 to Q1 2022 PearlDiver Mariner161 national administrative database. Those who visited the ED in the 90 days following surgery were identified and compared to those who did not based on age, sex, Elixhauser Comorbidity Index, geographic region of the United States, and insurance type by multivariate analyses. The timing (weeks following surgery), reasons for ED visit (elbow-related or not), and ED-to-hospital admission (presence or absence) were also assessed. Finally, the rate of those who were admitted during an ED visit was described.

Results: A total of 16,310 elbow arthroscopy patients were identified, of which ED visits in the 90 days following surgery were noted for 1086 (6.7%). ED visits were independently associated with younger age (odds ratio [OR, 95% confidence interval (CI)]: 1.23 [1.17, 1.29] per decade decrease), higher Elixhauser Comorbidity Index (OR [95% CI]: 1.21 [1.19, 1.23] per 1-point increase), different geographic region (OR [95% CI]: 1.42 [1.19, 1.71] for Midwest relative to West), and insurance (OR [95% CI]: 1.88 [1.48, 2.39] for Medicaid relative to Commercial) ($P < .001$ for each). The incidence of all-cause ED visits was highest during the first two postoperative weeks and gradually decreased over the following weeks. The reason for ED visits related to the elbow decreased from 65% in month one, to 37.7% in month two, to 26.6% in month three. Of those visiting the ED, 12.4% went on to be admitted (for any reason).

Conclusion: A significant proportion of patients from a large cohort of elbow arthroscopy patients visited the ED at least once in the 90 days following surgery. The defined associated factors and timing of these ED visits can help optimize postoperative care pathways.

The use of elbow arthroscopy has increased since its development in the 1980s,[20] a trend largely attributed to advances in techniques and instrumentation.[2] Its applications have broadened, and it is now used for a range of indications such as removal of loose bodies, synovectomy, tendon release, and débridement.[6]

Most primary cohort studies regarding elbow arthroscopy have been limited by sample size. For example, Lee et al studied the outcomes of elbow arthroscopy in managing terrible triad injuries for 24 patients and found an excellent safety profile.[19] Haasters et al found that elbow arthroscopy was superior to conventional radiographs in assessing complicated radial head fractures in 20 patients.[10] Jhan et al recommended early and aggressive arthroscopic intervention for overhead throwing athletes in a study of 15 active athletes with diagnosed elbow osteoarthritis who play on professional or national teams.[12]

To address power limitations, other elbow arthroscopy studies have used national databases to address rates and risk factors of postoperative complications. Noticewala et al, utilized the National Surgical Quality Improvement Program database to identify 530 elbow arthroscopy cases and found the 30-day reoperation rate to be 2.83% and identified American Society of Anesthesiologists physical classes 3 and 4 as independent risk factors for acute postoperative complications.[25] Camp et al, used the Medicare

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Standard Analytic Files to identify 2704 Medicare patients and found independent risk factors for increased rates of infection following elbow arthroscopy, including an age of 65 or greater, alcohol use, and intraarticular corticosteroid injection at the time of arthroscopy.[4]

Some larger reviews exist. Batko et al identified 21,285 patients undergoing elbow arthroscopy across multiple studies and found complications in 5.62% of cases.[1] Neurological injuries were the most common type of complication (1.79% of cases), specifically ulnar nerve palsy (0.65% of cases).[7] A meta-analysis of 95 studies and 14,289 elbows by Ahmed et al found the most common postoperative complications to be elbow stiffness, reoperation, and nerve injury (4.5%, 4.1%, and 3.4%, respectively). A systematic review by Tsenkov et al[28] found overall postoperative complication rates to be between 1.5 and 11% but referenced Desai et al, a survey of 372 members from American Society for Surgery of the Hand that suggested general underreporting of complication rates after elbow arthroscopy in the literature.[5]

While prior studies found varying rate of complications following elbow arthroscopy, few other metrics have been described and populations have been limited by the data sources utilized and study follow-up periods. The current study aimed to characterize one such metric: 90-day postelbow arthroscopy emergency department (ED) visits, by leveraging a large, national, multiinsurance database. Age, sex, Elixhauser Comorbidity Index (ECI), geographic region of the United States, and insurance type were explored as predictors as in previous studies of emergency department utilization following orthopedic surgeries.[13-15] Given the known risk for adverse events following elbow arthroscopy, we hypothesize that there is an elevated ED utilization rate that warrants further attention from surgeons to refine postoperative care practices.

Materials and methods

Study population identification

Data for the current study was sourced from the 2010 to March of 2022 PearlDiver Mariner 161 national administrative claims database, which contains over 161 million patient records. Studies using this database were deemed exempt from review by our Institutional Review Board as data is output in a patient-deidentified and aggregated form.

All adult patients who underwent elbow arthroscopy were identified in database using Current Procedural Terminology (CPT) codes 29830, 29834, 29835, 29836, 29837, and 29838: partial or complete synovectomy, débridement, or removal of loose bodies. Patients with diagnoses of trauma, tumors, or infection within the 90 days prior to surgery were excluded. Patients who were not active in the database in the 90 days following surgery were also excluded.

Patient characteristics were then abstracted from the dataset. These included patient age, sex, ECI (a quantitative measurement of comorbidity burden[29]), geographic region of the United States (West, Northeast, South, or Midwest), and insurance type (commercial, Medicare, or Medicaid).

ED visits within 90 days after elbow arthroscopy

Based on CPT coding for ED care (CPT-99281 through CPT-99285), the study cohort of patients who visited the ED in the 90 days following surgery was identified. The timing and frequency of such ED visits were then defined. In assessing the weekly incidence of ED visits, a baseline rate was defined by determining the average rate of ED visits for the study cohort over five consecutive weeks at the time of one year after surgery, a method established in prior studies investigating ED visits following orthopedic surgeries.[13,26] This was done to determine whether ED utilization rates were acutely elevated following surgery.

The primary reason for ED visits was determined by characterizing the International Classification of Diseases 9 and 10 codes associated with patients during these visits. These codes were outputted into a spreadsheet and manually categorized into two categories (elbow-related or not) by their associated descriptions. This was performed for each of the three postoperative months. Finally, the total number of all-cause admissions to the hospital, and specifically the number of patients admitted during a postoperative ED visit were determined.

Data analyses

Those who did and did not visit the ED in the 90 days following elbow arthroscopy were compared in relation to age, sex, ECI, geographic region, and insurance plan by univariate analysis with Pearson's chi-squared test. Further, each characteristic was analyzed on multivariate logistic regression yielding odds ratios (ORs) with 95% confidence intervals (95% CIs) to determine whether they were independent predictors of ED utilization.

All statistical tests were performed within PearlDiver's RStudio suite (R Studio, Boston, MA, USA). Tables and graphs were created in GraphPad Prism 10 (GraphPad, San Diego, CA, USA) and Microsoft Office (Redmond, WA, USA). Statistical significance was defined as $P < .01$.

Results

Study population

A total of 16,310 adult patients who underwent elbow arthroscopy and met inclusion criteria were isolated (Table I). The patients had a mean age of 48.8 years and 65.4% were male. The population was of relatively low overall ECI (2.4), were more likely to be in the South (36.7% of patients) than other geographic regions, and most likely to have commercial insurance (87.4% of patients).

Of the study population, all-cause ED visits within 90 days after surgery were identified for 1086 (6.7%). Compared to those who did not visit the ED, those who did tended to be younger ($P = .007$), female ($P < .001$), had more comorbidities ($P < .001$), and had different distributions of geographic region and insurance plan (both $P < .001$).

After controlling for all other patient characteristics using multivariate analysis, those who visited the ED were independently associated with younger age (OR [95% CI]: 1.23 [1.17, 1.29], per decade decrease, $P < .001$), higher ECI (1.21 [1.19, 1.23] per 1-point increase, $P < .001$), different geography (1.42 [1.19, 1.71] for Midwest relative to West, $P < .001$), and Medicaid insurance (1.88 [1.48, 2.39] relative to Commercial, $P < .001$) compared to patients who did not visit the ED (Table II, Fig. 1).

Characterization of ED visits within 90 days after elbow arthroscopy

Among the overall patients who visited the ED, 491 (45.2%) visited once, 406 (37.4%) visited twice, 90 (8.3%) visited three times, 61 (5.6%) visited four times, and 38 (3.5%) visited more than 4 times (Fig. 2). Between those who visited the ED once vs. more than once, on univariate analysis, those with Medicaid belonged more to the latter group ($P = .009$), while age, sex, ECI, and geographic region did not differ. The incidence of ED visits was highest during the first

Table I
Overall patient demographics shown, including a breakdown by those who visited the emergency department within 90 days following elbow arthroscopy and those who did not.

	All patients (n = 16,310; 100%)	No ED visit (n = 15,224; 93.3%)	ED visit (n = 1086; 6.7%)	*P* value
Mean age ± SD (y)	48.8 ± 13.8	48.9 ± 13.8	47.7 ± 13.9	
18-29	1693 (10.4)	1562 (10.3)	129 (11.9)	**.007**
30-39	2168 (13.3)	2007 (13.2)	161 (14.8)	
40-49	4185 (25.6)	3906 (25.7)	278 (25.6)	
50-59	4711 (28.9)	4406 (28.9)	307 (28.2)	
60-69	2523 (15.5)	2372 (15.5)	152 (14.0)	
≥70	1030 (6.3)	971 (6.4)	60 (5.5)	
Sex				
Female	5645 (34.6)	5201 (34.2)	444 (40.9)	**<.001**
Male	10,665 (65.4)	10,023 (65.8)	642 (59.1)	
ECI ± SD	2.4 ± 2.8	2.3 ± 2.6	4.3 ± 3.7	
0-1	7838 (48.0)	7522 (49.4)	272 (25.0)	**<.001**
2-3	4307 (26.4)	4030 (26.5)	277 (25.5)	
4-5	2146 (13.2)	1959 (12.9)	207 (19.1)	
>5	2019 (12.4)	1713 (11.2)	330 (30.4)	
Region (%)				
West	2310 (14.2)	2173 (14.3)	136 (12.6)	**<.001**
Northeast	3543 (21.8)	3330 (21.9)	214 (19.8)	
South	5966 (36.7)	5589 (36.8)	375 (34.6)	
Midwest	4447 (27.3)	4092 (27.0)	357 (33.0)	
Insurance (%)				
Commercial	13,812 (87.4)	12,953 (87.8)	834 (78.7)	**<.001**
Medicare	1341 (8.5)	1252 (8.5)	95 (8.9)	
Medicaid	652 (4.1)	554 (3.7)	131 (12.4)	

ED, emergency department; *SD*, standard deviation; *ECI*, Elixhauser Comorbidity Index.
Bold = statistically significant with $P < .01$.

Table II
Multivariate logistic regression used to determine whether patient characteristics individually predict emergency department utilization in the 90 days following elbow arthroscopy.

	OR (95% CI)	*P* value
Age (per decade decrease)	1.23 (1.17, 1.29)	**<.001**
Sex		
Female	REF	
Male	0.92 (0.81,1.05)	.218
ECI (per 1-point increase)	1.21 (1.19, 1.23)	**<.001**
Region		
Northeast	REF	
West	1.07 (0.85, 1.35)	.545
South	1.16 (0.97, 1.38)	.110
Midwest	1.42 (1.19, 1.71)	**<.001**
Insurance		
Commercial	REF	
Medicare	0.98 (0.76, 1.24)	.839
Medicaid	1.88 (1.48, 2.39)	**<.001**

OR, odds ratio; *CI*, confidence interval; *ECI*, Elixhauser Comorbidity Index; *REF*, reference.
Bold = statistically significant with $P < .001$.

two postoperative weeks (0.53% and 0.45% of the total number of patients getting elbow arthroscopy, respectively) and gradually diminished toward weekly baseline (0.18%) over the following weeks.

When assessing reason for ED visits, the proportion of patients associated with elbow-related diagnoses decreased over the first 3 postoperative months, from 65% in month one to 37.7% in month two and 26.6% in month 3 (Fig. 3).

In terms of admissions subsequent to elbow arthroscopy, 182 patients (1.1% of all patients receiving elbow arthroscopy) were admitted to a hospital at least once in the 90 postoperative days, including those admitted on the day of surgery. Of these, 135 patients were admitted from a postoperative ED visit, which represents 12.4% of those utilizing the ED.

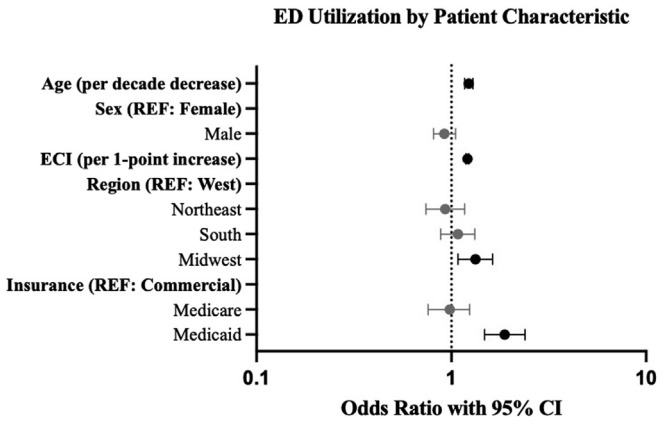

Figure 1 Forest plot demonstrating multivariable logistic regression characterizing patient factor predictors of ED utilization. Bold = statistically significant with $P < .001$. *CI*, confidence interval; *ECI*, Elixhauser Comorbidity Index; *ED*, emergency department; *REF*, reference.

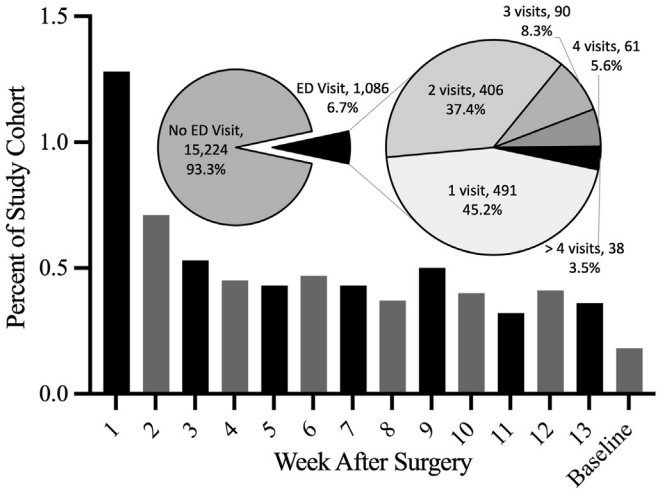

Figure 2 Bar graph demonstrating the percent of elbow arthroscopy patients who visit the ED in each postoperative week. Expanded pie charts demonstrating the proportion of elbow arthroscopy patients who visited the ED and the frequency of ED visits by those patients in the postoperative 90-day window. *ED*, emergency department.

Discussion

As elbow arthroscopy increases in incidence over the years,[20] postoperative metrics[11,22,24] such as ED visits are of interest to optimize care, improve patient experience, and minimize costs. Due to the relatively low incidence of this procedure, large national databases are ideal for such analyses due to the potential for statistical power not afforded by smaller cohort studies.[26]

A large cohort of patients undergoing elbow arthroscopy was identified for the current study, with over 16 thousand patients. The characteristics of these patients aligned with those reported in the literature. This included a mean patient age in the forties with a male predominance.[20,21] These similarities help substantiate the validity of the study population.

Of the overall elbow arthroscopy study population identified for the current study, 6.7% presented to the ED in the 90 days following

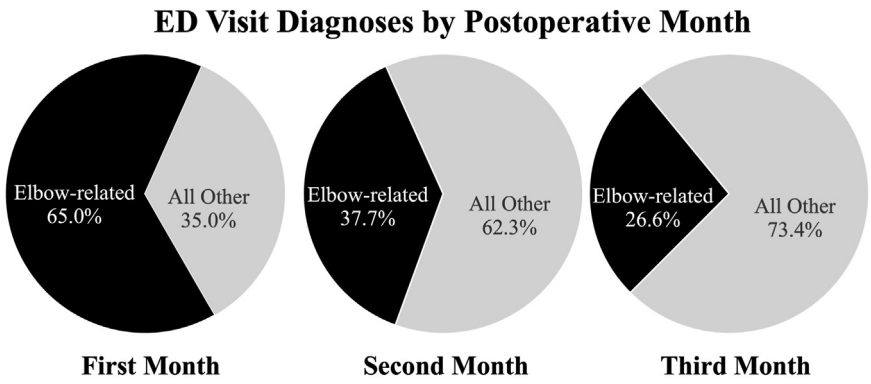

Figure 3 Breakdown of type of emergency department visit diagnosis by postoperative month. *ED*, emergency department.

surgery. This number is comparable to the rate of ED visits previously reported following hip arthroscopy (6.6%).[27] However, while only 4% of patients were admitted to the hospital from the ED after hip arthroscopy, the current study found a considerably higher rate of admissions from the ED after elbow arthroscopy at 12.4%. This difference may partially be attributed to the difference in baseline rates of overall postoperative complications between the surgeries. While it is estimated to be around 4% for hip arthroscopy,[17] for elbow arthroscopy, it ranges from 1.5% to 11%[28] and may still be underreported.[5] This difference highlights the importance of the ED as a health-care safety net for postoperative complications of elbow arthroscopy.

Based on multivariate analysis, those who did and those who did not present to the ED were distinct in their characteristics. Compared to those who did not visit the ED, those who did were found to have differences in clinical characteristics including younger age (OR 1.23 per decade decrease), and higher comorbidity (OR 1.21 per ECI point increase). These predictors are supported by the current literature. Young adults are more likely to rely on the ED due to a combination of limited preventive care, inadequate transition of care between providers, and a lack of usual source of primary care.[8] A scoping review found higher comorbidity burden as an individual predictor of more frequent ED use.[18] Those who presented to the ED differed based on nonclinical characteristics as well, including geographic region (OR 1.42 for Midwest compared to West) and insurance (OR 1.88 for Medicaid compared to Commercial). These are also supported by the current literature.[3,23] Medicaid patients may visit the ED more due to a combination of having relatively little to no copayment required, having more socioeconomic burden, and the impossibility of care refusal by ED providers under the Emergency Medical Treatment and Active Labor Act.[16] The Midwest may have higher ED utilization due to a combination of fewer health-care resources, increased social/geographic isolation, older age, and greater burden of comorbidities.[9]

While 93.3% of patients did not visit the ED in the 90-day period following elbow arthroscopy, among those who did, most visited more than once. ED utilization by postoperative week was highest in the first two weeks, and remained elevated above baseline by the end of the study period. The first two postoperative weeks have been shown to have elevated numbers of ED visits in prior studies of other orthopedic surgeries.[13,15,26] Elbow-related concerns associated with patients in ED visits declined from postoperative month 1 to postoperative month 3; while most surgical site-related postoperative complications were skewed earlier, elbow-related concerns were still noticeably represented in the third postoperative month. These observations may be because most complications associated with elbow arthroscopy are more likely to present in the acute postoperative time frame. Further investigation into the association of various described complications of elbow arthroscopy in the literature with these ED visits may be warranted.

There are limitations to the current study. As with other studies based on administrative claims databases, the accuracy of the study is limited by its retrospective design and coding accuracy. Further, the study was not able to separate based on the surgical indications for elbow arthroscopy or elbow-specific outcome metrics. While ICD-9 and 10 codes were used to determine primary indications for ED visits, multiple factors may have been of concern and those that were elbow-related or not could have been incompletely separated. Finally, shared laterality was unable to be confirmed between surgery and subsequent elbow-related ED visit diagnoses.

Conclusion

The current study furthers understanding into patient predictors of ED utilization, timing of ED visits, reasons for ED visits, and admission rates following elective elbow arthroscopy. In combination with growing evidence in the literature on indications, surgical techniques, outcomes, and complications of elbow arthroscopy, the findings of the current study aids in the development of care pathways for this patient population with a notable postoperative ED utilization rate.

Disclaimers:

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Conflicts of interest: Jonathan N. Grauer discloses that he is the Editor-in-Chief of the North American Spine Society Journal and that he holds a position on the North American Spine Society Board. These potential conflicts of interest are not directly related to the current work. All the other authors, their immediate families, and any research foundations with which they are affiliated have not received any financial payments or other benefits from any commercial entity related to the subject of this article.

References

1. Batko BD, Hakakian D, Norin JL, Tauro JC. Complications in elbow arthroscopy: management and prevention. Sports Med Arthrosc Rev 2022;30:54-62. https://doi.org/10.1097/JSA.0000000000000334.
2. Bennett JM. Elbow arthroscopy: the basics. J Hand Surg Am 2013;38:164-7. https://doi.org/10.1016/j.jhsa.2012.10.023.
3. Cairns C, Ashman JJ, King JM. Emergency department visit rates by selected characteristics: United States, 2020. NCHS Data Brief 2022;452:1-8.
4. Camp CL, Cancienne JM, Degen RM, Dines JS, Altchek DW, Werner BC. Factors that increase the risk of infection after elbow arthroscopy: analysis of patient demographics, medical comorbidities, and steroid injections in 2,704 Medicare

patients. Arthroscopy 2017;33:1175-9. https://doi.org/10.1016/j.arthro.2017.02.004.
5. Desai MJ, Mithani SK, Lodha SJ, Richard MJ, Leversedge FJ, Ruch DS. Major peripheral nerve injuries after elbow arthroscopy. Arthroscopy 2016;32:999-1002.e8. https://doi.org/10.1016/j.arthro.2015.11.023.
6. Dodson CC, Nho SJ, Williams RJ, Altchek DW. Elbow arthroscopy. J Am Acad Orthop Surg 2008;16:574-85. https://doi.org/10.5435/00124635-200810000-00003.
7. Ew K, Bf M, Sw O. Complications of elbow arthroscopy. J Bone Joint Surg Am 2001;83:25-34.
8. Fortuna RJ, Robbins BW, Mani N, Halterman JS. Dependence on emergency care among young adults in the United States. J Gen Intern Med 2010;25:663-9. https://doi.org/10.1007/s11606-010-1313-1.
9. Greenwood-Ericksen MB, Kocher K. Trends in emergency department use by rural and urban populations in the United States. JAMA Netw Open 2019;2, e191919. https://doi.org/10.1001/jamanetworkopen.2019.1919.
10. Haasters F, Helfen T, Böcker W, Mayr HO, Prall WC, Lenich A. The value of elbow arthroscopy in diagnosing and treatment of radial head fractures. BMC Musculoskelet Disord 2019;20:343. https://doi.org/10.1186/s12891-019-2726-6.
11. Intravia J, Acevedo DC, Chung W-LJ, Mirzayan R. Complications of elbow arthroscopy in a community-based practice. Arthroscopy 2020;36:1283-90. https://doi.org/10.1016/j.arthro.2019.11.108.
12. Jhan S-W, Chou W-Y, Wu K-T, Wang C-J, Yang Y-J, Ko J-Y. Outcomes and factors of elbow arthroscopy upon returning to sports for throwing athletes with osteoarthritis. J Orthop Surg Res 2018;13:280. https://doi.org/10.1186/s13018-018-0992-x.
13. Kammien AJ, Galivanche AR, Gouzoulis MJ, Moore HG, Mercier MR, Grauer JN. Emergency department visits within 90 days of single-level anterior cervical discectomy and fusion. N Am Spine Soc J 2022;10:100122. https://doi.org/10.1016/j.xnsj.2022.100122.
14. Kammien AJ, Ratnasamy PP, Joo PY, Grauer JN. Ninety-day emergency department visits after ankle fracture surgery. J Am Acad Orthop Surg 2023;31:e51-7. https://doi.org/10.5435/JAAOS-D-22-00484.
15. Kammien AJ, Zhu JR, Gouzoulis MJ, Moore HG, Galivanche AR, Medvecky MJ, et al. Emergency department visits within 90 days of anterior cruciate ligament reconstruction. Orthop J Sports Med 2022;10:23259671221083586. https://doi.org/10.1177/23259671221083586.
16. Kim H, McConnell KJ, Sun BC. Comparing emergency department use among medicaid and commercial patients using all-payer all-claims data. Popul Health Manag 2017;20:271-7. https://doi.org/10.1089/pop.2016.0075.
17. Kowalczuk M, Bhandari M, Farrokhyar F, Wong I, Chahal M, Neely S, et al. Complications following hip arthroscopy: a systematic review and meta-analysis. Knee Surg Sports Traumatol Arthrosc 2013;21:1669-75. https://doi.org/10.1007/s00167-012-2184-2.
18. Krieg C, Hudon C, Chouinard M-C, Dufour I. Individual predictors of frequent emergency department use: a scoping review. BMC Health Serv Res 2016;16:594. https://doi.org/10.1186/s12913-016-1852-1.
19. Lee SH, Lim KH, Kim JW. Case series of all-arthroscopic treatment for terrible triad of the elbow: indications and clinical outcomes. Arthroscopy 2020;36:431-40. https://doi.org/10.1016/j.arthro.2019.09.014.
20. Leong NL, Cohen JR, Lord E, Wang JC, McAllister DR, Petrigliano FA. Demographic trends and complication rates in arthroscopic elbow surgery. Arthroscopy 2015;31:1928-32. https://doi.org/10.1016/j.arthro.2015.03.036.
21. Longo UG, Papalia R, De Salvatore S, Piccioni V, Tancioni A, Piergentili I, et al. Have elbow arthroscopy hospitalizations decreased over the years? An epidemiological Italian study from 2001 to 2016. Int J Environ Res Public Health 2023;20:3638. https://doi.org/10.3390/ijerph20043638.
22. Marti D, Spross C, Jost B. The first 100 elbow arthroscopies of one surgeon: analysis of complications. J Shoulder Elbow Surg 2013;22:567-73. https://doi.org/10.1016/j.jse.2012.12.001.
23. National Center for Health Statistics. Health, United States, [2020-2021]: Table [EdAd]. Hyattsville, MD. [2020]. Available at: https://www.cdc.gov/nchs/hus/data-finder.htm. Accessed September 17, 2023.
24. Nelson GN, Wu T, Galatz LM, Yamaguchi K, Keener JD. Elbow arthroscopy: early complications and associated risk factors. J Shoulder Elbow Surg 2014;23:273-8. https://doi.org/10.1016/j.jse.2013.09.026.
25. Noticewala MS, Trofa DP, Vance DD, Jobin CM, Levine WN, Ahmad CS. Elbow arthroscopy: 30-day postoperative complication profile and associated risk factors. Arthroscopy 2018;34:414-20. https://doi.org/10.1016/j.arthro.2017.08.286.
26. Ratnasamy PP, Kammien AJ, Gouzoulis MJ, Oh I, Grauer JN. Emergency department visits within 90 days of total ankle replacement. Foot Ankle Orthop 2022;7:24730114221134255. https://doi.org/10.1177/24730114221134255.
27. Sivasundaram L, Trivedi NN, Kim C-Y, Du J, Liu RW, Voos JE, et al. Emergency department utilization after elective hip arthroscopy. Arthroscopy 2020;36:1575-1583.e1. https://doi.org/10.1016/j.arthro.2020.02.008.
28. Tsenkov T, Dimitrov N. A systematic review of elbow arthroscopy complications : complications, risk factors, and safety tips. Int Orthop 2022;46:1073-83. https://doi.org/10.1007/s00264-022-05320-5.
29. van Walraven C, Austin PC, Jennings A, Quan H, Forster AJ. A modification of the Elixhauser comorbidity measures into a point system for hospital death using administrative data. Med Care 2009;47:626-33. https://doi.org/10.1097/MLR.0b013e31819432e5.