PEER REVIEW HISTORY

ARTICLE DETAILS

TITLE (PROVISIONAL)	Changes in the rate of publicly financed knee arthroscopies: an analysis of data from the Norwegian Patient Registry from 2012 to 2016
AUTHORS	Holtedahl, Robin; Brox, Jens; Aune, Arne Kristian; Nguyen, Daniel; Risberg, May Arna; Tjomsland, Ole

VERSION 1 – REVIEW

REVIEWER	Ian Harris UNSW Sydney, Australia
REVIEW RETURNED	08-Feb-2018

GENERAL COMMENTS	This manuscript provides a descriptive information on changes in the rates of knee arthrosocopy in Norway over time, by region. The study mentions administrative changes to decrease rates but does not focus on the causal role of those changes. This is wise, as the study design does not allow for any such conclusions. Therefore, the study mainly provides us with a picture of the changing rates in Norway from 2012 to 2016 by health care region and sector. The decrease is interesting to note, particularly because this finding is not consistent based on other regions / publications but there is little else to be gained from the study. The study is well written and I only have one concern that may be easily addressed. The abstract states that the rate of knee arthroscopy nationally fell by 146 per 100,000 (from 357 to 211), a fall of 41%. These figures are from the peak in 2013 to 2016. It then states that the fall in one region was 154 per 100,000 (similar to the overall decline) but that it barely fell at all in the other regions. This could only make sense if the region of interest (south east) contained most of the population, which it does not. It is likely that the confusion lies in different denominators and time periods. The overall fall is not defined – is it public only or does it include private sector? Is the time period for southeast similar, or is it 2012-2016 instead of 2013-2016? Similarly, the regional fall is not defined. I found the numbers confusing because of differences in public vs private vs overall, regional vs national and different time periods 2012-2016 vs 2013-2016. I feel the manuscript would benefit from uniformity in reporting rates and perhaps relying more on directing readers to the figures (or a table) where the data is much clearer.

REVIEWER	Teppo Järvinen University of Helsinki
REVIEW RETURNED	12-Feb-2018

GENERAL COMMENTS	Knee arthroscopy in Norway: changes in rates from 2012 to 2016

	Thank you for this opportunity to review the manuscript referred above, submitted to the BMJ Open. The submitted paper is an interesting study from a very well-known and prestigious group of scientists on a topic that has stirred significant interest in the orthopaedic community in the very recent history. Before getting into more detailed review of the paper, I need to disclose that I don't feel completely impartial/unbiased, as I have had a pleasure to collaborate with prof. Brox on another topic (tennis elbow trial, in preparation). Acknowledging this potential conflict of interest, below please find my comments on the paper. This is a very simple and straight-forward paper (which is an asset) that I generally found very well executed and written. Overall, my comments are very minor and mostly can be merely considered suggestions for edits/food for thought. General comments As the authors also honestly point out, this is not the first communication to report nation-wide statistics on the incidence of arthroscopic (meniscal) surgery, but as also highlighted in the paper, there are some indisputably novel findings: 1) Quite a dramatic reversal (disinvestment) of an established medical practice: as we all know painfully well, medical reversals are amazingly difficult to achieve and the one reported by the authors is a tremendous achievement by the system, so there is a true lesson to be learnt from the Norwegian experience. 2) Public vs. private sector: the different dynamics of the two healthcare systems with different incentives. If nothing else, the reporting of this data (difference) could act as a spark for an obviously much needed change (reversal of an established practice) in the private sector. 3) A novel opportunity to compare arthroscopy rates between two or more regions within a single country (South-Eastern Norway Regional Health Authority vs. the rest of the country) with one launching an initiative (a system level intervention) to control for the rates of arthroscopy while the others… have decided not to act on the new evidence. Of course, this comparison is confounded by many factors, which the authors seem to be well aware of (and discuss them properly). All in all, the reported five-fold decrease in the rates in the region where focus was placed on this issue vs. other regions is… quite a remarkable achievement and certainly is encouraging for everyone trying to elicit a medical reversal. Having said all this, below please find my specific comments to the text. Specific comments 1) Introduction, sentence: "Large regional variations of knee arthroscopy have also been described.4". As noted above, this study is not the first to report on the incidence of knee arthroscopies around the world, but there are actually quite a number of previously published papers, many of which the authors have referred to but not all. In fact, one could really benefit from a Table (perhaps in the Discussion) in which all these papers were summarized with their main findings, e.g. - What country/region?

	- What years were studied? - What was the main finding re: total #/incidence of arthroscopies, # of meniscal resections/debridement/meniscal repair? - What about those > 50-years of age vs. those < 5? The last issue, the incidence of knee arthroscopy on those over 50 is of significant value, as one can assume that at least in this patient population, 99% of these surgeries are a complete medical waste (especially all debridement procedures), and accordingly, it would be most revealing to have this data showcased! This last comment applies particularly to the authors' data. Of the studies missing (at least these, I have NOT carried out a comprehensive literature review): Lazic S, Boughton O, Hing C, Bernard J. Arthroscopic washout of the knee: a procedure in decline. Knee 2014; 21(2): 631-4. Mattila V M, Sihvonen R, Paloneva J, Felländer-Tsai L. Changes in rates of arthroscopy due to degenerative knee disease and traumatic meniscal tears in Finland and Sweden. Acta Orthop 2016; 87: 5-11. This latter study reports on the rates of this surgery in two different countries and some of the findings are similar to what the authors report in their data, e.g. stating: "Most recently, Thorlund et al. (2014) from Denmark reported that the incidence of meniscus surgery had doubled from 2000 to 2011 (the annual incidence increased from 164 to 312 per 105 person-years). Furthermore, in their other study the increase in incidence was seen especially in the private sector (Hare et al. 2015). In addition, quite remarkably, the incidence increased 3-fold in patients over 55 years of age (Thorlund et al. 2014)." 2) Results: The authors report that there was a roughly 40% decrease in the rate of knee arthroscopy in the public hospitals, while a corresponding (roughly) 10% increase in private hospitals. One can always speculate that maybe some of these were truly indicated in the private sector (and the authors do discuss this), but given the excessive body of evidence suggesting the opposite, I would urge the authors to strengthen their case by providing data on the incidences "stratified" by age (under 50 vs. over 50). Another "internal control" that could be used is the # of meniscal repairs (again stratified by age), as this procedure can really not be carried out unless there is a true "traumatic" type of a meniscus tear. And those "repairable" tears, by the nature of meniscus degeneration, do not really exist in those 50+. So, please provide the readers with data on the incidence of meniscus resections and repair stratified by age. Overall, I would urge the authors to compile a Table that shows the total number + incidence rates in Norway and then also divided into public and private sectors, as well as different regions.

REVIEWER	Jeffrey Katz Brigham and Women's Hospital, USA
REVIEW RETURNED	09-Mar-2018

GENERAL COMMENTS	This is an excellent paper. Clear analyses and lucid writing on an important topic. The discussion is too long and should be tightened up.

	The figures are not clear: Fig 1: Each box plot contains nine dots. I can imagine that one each is max, min, median, 25% and 75th % ile. What do the other five dots stand for? The legend should be much clearer. Fig 2: The procedure abbreviations (e g NGD11) are inscrutable and should be eliminated. Write out the procedure or an abbreviation of it. Fig 4: having told us that changes in rates differed markedly from 2012 to 2016, why do you average across these years to yield these rates? I'd use data from the later years.

VERSION 1 – AUTHOR RESPONSE

We appreciate the comments from the editors and the three reviewers, and consider the suggestions relevant and constructive.

Reviewer 1:

"…The abstract states that the rate of knee arthroscopy nationally fell by 146 per 100,000 (from 357 to 211), a fall of 41%. These figures are from the peak in 2013 to 2016. It then states that the fall in one region was 154 per 100,000 (similar to the overall decline) but that it barely fell at all in the other regions. This could only make sense if the region of interest (south east) contained most of the population, which it does not. It is likely that the confusion lies in different denominators and time periods. The overall fall is not defined – is it public only or does it include private sector? Is the time period for southeast similar, or is it 2012-2016 instead of 2013-2016? Similarly, the regional fall is not defined.

I found the numbers confusing because of differences in public vs private vs overall, regional vs national and different time periods 2012-2016 vs 2013-2016. I feel the manuscript would benefit from uniformity in reporting rates and perhaps relying more on directing readers to the figures (or a table) where the data is much clearer."

Response to reviewer 1:

To clarify our main findings, we have made some alterations in the Result section, first by comparing South-Eastern Norway Regional Health Authority to the other Regional Health Authorities, then comparing public with private hospitals, first overall and lastly by Regional Health Authority. We have also made some changes in the presentation of rates vs age group.

We agree that the different denominators and time periods easily lead to confusion. Apart from mentioning the peak in 2013 (first paragraph in Results) we have now consistently used 2012 and 2016 as comparators. We also believe our previous statistical analysis of rate reductions per county were misleading (because the counties were given equal weighting, in spite of large population differences). In the revision we provide the median percentage decrease in the counties in South-Eastern Norway Regional Health Authority vs the rest of the country. Also, in the previous version we based the rate analyses of 2012 and 2016 on the population per county in 2014; in the revised version the populations in 2012 and 2016 are used as the denominator, giving slightly altered results. In the revision process we found a few errors in the reported number of procedures in 2012 and have corrected these.

Reviewer 2:

"Specific comments

1) Introduction, sentence: "Large regional variations of knee arthroscopy have also been described.4". As noted above, this study is not the first to report on the incidence of knee arthroscopies around the world, but there are actually quite a number of previously published papers, many of which the

authors have referred to but not all. In fact, one could really benefit from a Table (perhaps in the Discussion) in which all these papers were summarized with their main findings, e.g.
- What country/region?
- What years were studied?
- What was the main finding re: total #/incidence of arthroscopies, # of meniscal resections/debridement/meniscal repair?
- What about those > 50-years of age vs. those < 5? The last issue, the incidence of knee arthroscopy on those over 50 is of significant value, as one can assume that at least in this patient population, 99% of these surgeries are a complete medical waste (especially all debridement procedures), and accordingly, it would be most revealing to have this data showcased! This last comment applies particularly to the authors' data

…. I would urge the authors to strengthen their case by providing data on the incidences "stratified" by age (under 50 vs. over 50). Another "internal control" that could be used is the # of meniscal repairs (again stratified by age), as this procedure can really not be carried out unless there is a true "traumatic" type of a meniscus tear. And those "repairable" tears, by the nature of meniscus degeneration, do not really exist in those 50+. So, please provide the readers with data on the incidence of meniscus resections and repair stratified by age. Overall, I would urge the authors to compile a Table that shows the total number + incidence rates in Norway and then also divided into public and private sectors, as well as different regions.
…Of the studies missing (at least these, I have NOT carried out a comprehensive literature review)"

Lazic S, Boughton O, Hing C, Bernard J. Arthroscopic washout of the knee: a procedure in decline. Knee 2014; 21(2): 631-4.

Mattila V M, Sihvonen R, Paloneva J, Felländer-Tsai L. Changes in rates of arthroscopy due to degenerative knee disease and traumatic meniscal tears in Finland and Sweden. Acta Orthop 2016; 87: 5-11.»
Response to reviewer 2:
We agree that a description of rate changes in both public and private hospitals per Regional Health Authority is warranted (only changes in public hospitals were described in our first version). We have now added rates in private hospitals in South-Eastern Norway Regional Health Authority and in the remaining Regional Health Authorities. We agree with reviewer that showing numbers and rates, overall as well as by region and hospital type, would improve clarity, so we have provided a table with the relevant data (table 1). We also agree that a table showing rates of the three described procedures stratified by age, region and hospital type (private vs public) would be useful. We have therefore provided a table showing distributions of the three selected procedures by sex, age (10-year intervals and proportion >=50) and hospital type (private/ public/ location) - table 2. In our opinion the tables ideally should be presented in the printed version and not as supplements. The comments about meniscus repairs vs age are relevant, and we therefore describe an increase in rates for patients 40 years or older in the text.
The two suggested references (Lazic 2014 and Mattila 2016) have been added.
Reviewer 3:
Fig 1: Each box plot contains nine dots. I can imagine that one each is max, min, median, 25% and 75th % ile. What do the other five dots stand for? The legend should be much clearer.

Fig 2: The procedure abbreviations (e g NGD11) are inscrutable and should be eliminated. Write out the procedure or an abbreviation of it.

Fig 4: having told us that changes in rates differed markedly from 2012 to 2016, why do you average across these years to yield these rates? I'd use data from the later years.

Response to reviewer 3:

Figure 1 has been altered by removing the box plot / quartiles and now showing only medians (with only nine vs ten counties showing quartiles is hardly warranted). We have added “per county” on the y-axis to clarify what the dots represent, as well as explaining this in the accompanying caption.
Figure 3 has been revised, with procedures instead of codes.
Figure 4 has been revised, showing age-adjusted rates for 2016 only.
Other comments:
As table 2 describes the numerical relation between age, procedure type and year, one could consider removing figure 2, at least from the printed version. We have added a figure (perhaps best suited as supplement) connecting the rates for each Regional Health Authority in 2012 and 2016.
We have made some alterations of the Discussion section and shortened it somewhat. Since completing the first version of the manuscript, we have obtained access to the Finnish national patient registry, so that we now have complete information about arthroscopy rates including 2016 in the four Scandinavian countries. We consider these data reliable and have therefore in the Discussion moderated our previous claim of Norwegian decreases as being larger than those of other countries. We have instead focused on the (still) too high Norwegian rates, especially in the >50 age group, as well as on the differences between South-Eastern Norway Regional Health Authority and the other Regional Health Authorities, which we think is the most noteworthy finding in our study.

Response to letter from Editors office 9th April:
We have made the suggested revisions, but have problems with figure 1, exported from MedCalc. However we tweak the DPI settings, we do not obtain at least 90 mm of width. Is the current figure acceptable for publishing?
The order of references should be correct now. Reference list: ref.16 is mentioned twice - both as an example of increase and decrease. This is because the article contrasts England with Scotland.
The tables have been incorporated in the text, but we are unsure if they should be copied as a graphic (as we have done) or in the original format (in the last instance the table does not fit the page).
Fig. 1a does not exist, Supplementary Fig 1b we now name supplementary Fig. 1.

10. April: We have inserted editable tables in the main text.

VERSION 2 – REVIEW

REVIEWER	Ian Harris UNSW Sydney, Australia
REVIEW RETURNED	12-Apr-2018

GENERAL COMMENTS	Comment satisfactorily addressed. Tables now very clear.

REVIEWER	Teppo Järvinen University of Helsinki
REVIEW RETURNED	13-Apr-2018

GENERAL COMMENTS	The authors have done a very good job revising their manuscript. I have no remaining requests/concerns.