Author’s response to reviews

Title: Does the implementation of a care pathway for patients with hip or knee osteoarthritis lead to fewer diagnostic imaging and referrals by general practitioners? A pre-post-implementation study of claims data.

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Author’s response to reviews:

Lingling Tian
Manuscript Editor
BMC Family Practice

Maastricht, the Netherlands, September 5, 2019

Paper title: Does the implementation of a care pathway for patients with osteoarthritis lead to less diagnostics and referrals by general practitioners? A pre-post-implementation study of claims data.

Paper ID: FAMP-D-19-00051

Dear Ms. Tian

Thank you very much that based on the reviewers’ reports and your own assessment as Editor our revised manuscript entitled “Does the implementation of a care pathway for patients with osteoarthritis lead to less diagnostics and referrals by general practitioners? A pre-post-implementation study of claims data” may be considered for publication in BMC Family Practice. We have again carefully considered the reviewers’ comments and editorial requests. Please find below our reaction to the reviewers indicated with symbol ‘&gt;’. The adaptations we
made in the manuscript can be found accordingly below. These are visible in the manuscript by track changes.

Based on the review commentary, we thoroughly examined the manuscript and made adjustments where necessary. The title of the manuscript is also adjusted accordingly to the review commentary. The new title is: “Does the implementation of a care pathway for patients with hip or knee osteoarthritis lead to fewer diagnostic imaging and referrals by general practitioners? A pre-post-implementation study of claims data”.

We really hope you will reconsider our manuscript for publication and are looking forward to your reply.

Yours sincerely,

Also on behalf of all authors,

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Reviewer 1 - Gillian Hawker.

Comment 1

In describing the purpose of the pathway, please indicate which diagnostics you were trying to reduce - perhaps "imaging of the hip/knee" would suffice? Similarly, rather than simply saying consultations, which is vague, perhaps indicate "orthopaedic consultations".

We thank Ms. Gillian Hawker for reviewing our manuscript and for her advice to describe the purpose of the pathway more clearly. Therefore, we have adjusted the description to “diagnostic imaging of the hip/knee” and “orthopaedic consultations” in various places of the manuscript, including the title.

Comment 2
In describing the results, instead of reporting whether or not an interaction was significant, it would be better to describe the actual findings - for example, the rate of imaging tests for knee OA declined post pathway intervention in the intervention group but not in the controls, etc.

We thank Ms. Gillian Hawker for her advice to describe the actual findings in the results section. Therefore, we rewrote this part in order to make it better to understand.

Results, line 1, page 12

As presented in Table 3, there was no statistically significant difference in the decrease of the number of GP-requested hip-related diagnostic imaging during the post-implementation period (OR = 0.903, 95% CI = 0.812–1.004, p = 0.060) in the intervention region compared to the control region. However, during the post-implementation period the number of GP-requested knee-related diagnostic imaging (OR = 0.781, 95% CI = 0.693–0.880, p ≤ 0.001) and GP-requested diagnostic imaging of other joints (OR = 0.931, 95% CI = 0.870–0.997, p = 0.039) declined statistically significantly more in the intervention region.

Results, line 12, page 12

Moreover, there was no statistically significant difference in the increase of the number of initial orthopaedic consultation claims of the hip (OR = 1.002, 95% CI = 0.871–1.152, p = 0.979), knee (OR = 0.894, 95% CI = 0.728–1.097, p = 0.281), or other joints (OR = 1.091, 95% CI = 0.864–1.378, p = 0.464) in the intervention region compared to the control region (Table 4).

Comment 3

I would recommend that after you present the full name of your pathway, you refer to it thereafter as "the pathway" for brevity.

We thank Ms. Gillian Hawker for her advice to refer to “the pathway” instead of the full name of the pathway. We adapted this throughout the manuscript.

Comment 4

Background: I think this could be shortened substantially; in paragraph 2 you appear to be confusing prevalence and incidence - please clarify. Finally, try to make your points succinctly - I think you can reduce the length of the background by half

We thank Ms. Gillian Hawker for her comment on the use of prevalence and incidence. To clarify, we rewrote this sentence.
Recent increases in the number of people with obesity, a major determinant of OA, suggests that the prevalence of OA is likely to rise in future (8-10).

We thank Ms. Gillian Hawker also for her suggestion to shorten the background section of the manuscript. We think that the background must inform the reader sufficiently. That is why we do not wanted to delete too much information. However, we excluded some parts throughout the background section of the manuscript in order to reduce the length of the background without excluding relevant information.

Comment 5

Selection of controls: please clarify what you mean by 'declining' and aging... declining in numbers?

We thank Ms. Gillian Hawker for her advice to clarify ‘declining and ageing’. ‘A declining and ageing population’ is frequently used sentence in literature. With ‘declining’, we mean that the population number declines. We rewrote this part in order to make it better to understand.

Methods, line 18, page 5

These regions are selected because they are located in the same province as the intervention region and are also characterized by a declining and ageing population.

Comment 6

It remains unclear to me whether there was only one education meeting or many - it says in the methods that 20% attended the first meeting, but what was the cumulative proportion of GPs that attended a meeting?

We thank Ms. Gillian Hawker for her question about the number of education meetings. Unfortunately, we have no numbers of GPs attending the other meetings. We rewrote this part to make it better to understand that there was a wide dissemination of information about the pathway through various channels.

Methods, line 30, page 6

Around 20% of the GPs in the intervention region attended the first education meeting. In addition, the expert group assumes that the attended GPs spread the content of the meetings among their colleagues within their general practice and that all GPs, affiliated with MCC Omnes, eventually conform to their initiatives. To further support the dissemination of the
pathway, a visualisation and explanation of the stepped-care approach are placed at the website of MCC Omnes, and in the newsletter and on the mobile application of MCC Omnes to reach all GPs in the region. In addition, to support GPs in applying the pathway in practice, a reminder pops up in the GPs’ referral application (called ZorgDomein) when requesting hip or knee related diagnostic imaging or when referring patients with hip or knee related complaints to orthopaedic care. This reminder forces GPs to indicate which steps of the pathway have been followed prior to the request or referral. Hence, all GPs are informed about the pathway through these different channels.

Comment 7

Outcome measures: as per above, please simplify what your measures were - I understand that the two outcomes were diagnostic imaging and surgeon consultations, but how were these summarized in your analyses? Table 3 i think is the key, but i think the text could be far clearer and more succinct, which would assist the reader - and how did you go from the data in table 3 to a logistic regression?

We thank Ms. Gillian Hawker for her advice to simplify our outcome measures and to clarify and succinct the text related to Table 3 (in the new version of the manuscript, this is Table 2). We rewrote this part to make it better to understand. Moreover, we changed the tense of the methods section as recommend by reviewer 3.

Methods, line 3, page 9

Based on the claims data, it is not possible to determine the total number of GP referrals to orthopaedic care, due to a lack of follow-up of the referral or non-attendance (41). Therefore, the actual claims of initial orthopaedic consultations related to OA of the hip and knee and other joints were used, both in the intervention and control region. Initial consultations were recognized by the so-called Diagnosis Treatment Combination (DTC) (in Dutch: Diagnose Behandel Combinatie, DBC) (42). Every DTC has a unique performance code that includes all information about the type of care (initial or follow-up), the demand for care, the diagnosis and type of treatment.

Characteristics of the entire population insured by CZ in the intervention region and the control region are 1) the number of insured persons, presented with averages per period, 2) gender distribution, presented using the percentages of men, and 3) average age, presented with means and standard deviations (SDs).

Methods, line 2, page 10

Characteristics of the intervention and control region during the pre- and post-implementation period are presented. In addition, the average number of health insurance claims for diagnostic imaging and initial orthopaedic consultations (separately for hip, knee, and other joints) per
1,000 insured persons in the pre- and post-implementation period of both regions are reported. The percentage change in the number of requested diagnostic imaging and initial orthopaedic consultations in the post-implementation period compared to the pre-implementation period is calculated and presented. Furthermore, the proportion of diagnostic imaging and initial orthopaedic consultations claims per 1,000 insured persons per region and per period are dichotomised to a binary variable (yes/no-claimed diagnostic imaging or initial orthopaedic consultation).

Binary logistic regression analyses are used to determine the influence of the implementation of the pathway on the proportion of health insurance claims for diagnostic imaging and initial orthopaedic consultations per 1,000 insured persons in the intervention region compared to the control region. The dependent variable in these models is the binary variable indicating claimed diagnostic imaging (yes/no) or claimed initial orthopaedic consultation (yes/no). The independent variables are region (intervention or control region) and period (pre- or post-implementation period) and the interactions between those variables, using the Enter method (43). In addition, odds ratios (OR), p-values, and 95% confidence intervals (CI) are reported.

Results, line 11, page 11

The number of claims and the percentage change in the intervention and control region are described (Table 2). In both regions, the average number of requested diagnostic imaging procedures decreased during the post-implementation period. Regarding the initial orthopaedic consultations, an increase of claims during the post-implementation period in both regions is visible.

Comment 8

In review of the patient records, again i am unclear what information was abstracted - please clarify.

&gt; We thank Ms. Gillian Hawker for her advice to clarify the information of the patient records. We rewrote this part to make it better to understand.

Methods, line 23, page 9

The collected patient records using the random sampling contain the answers to the questions related to the reminder that pops up in the GPs’ referral application when they refer patients to orthopaedic care (“Did you (the GP) went through the steps of the pathway?”). These answers to this question (yes or no) are used to check whether patients had been referred according to the pathway. Furthermore, the patients’ records contain information about the follow-up orthopaedic care in the hospital. Information about the diagnosis (yes/no OA) and the treatment (yes/no arthroplasty) are collected from these records to check if the referral was appropriate.
The number and percentage of patients referred to orthopaedic care according to the pathway, the number and percentage of patients diagnosed with OA as determined by the orthopaedic surgeon and the number and percentage of arthroplasties performed are presented in flow charts, separately for patients with a suspicion of hip and knee OA. Pearson's chi-square test is used to test the difference in the probability of undergoing arthroplasty between patients who were referred according to the pathway and patients who were not, again separately for patients with hip and knee OA.

Comment 9

I think Table 1 could be excluded - Table 2 is sufficient and the rationale for selection of control practices can be stated in text.

We thank Ms. Gillian Hawker for her advice to exclude Table 1. We agree that Table 2 is sufficient. Therefore, we excluded Table 1 and stated the rational for selection of control practices in the text. Because this Table is removed, we also adapted Table 2 (which is Table 1 in the new version of the manuscript).

Methods, line 18, page 5

These regions are selected because they are located in the same province as the intervention region and are also characterized by a declining and ageing population. Together, these control regions have a population of about 690,000 people.

Results, line 3, page 11

Table 1 shows that the number of insured persons decreased over time in the intervention region. In the control region, the number of insured persons increased. However, the proportions of men and the mean age remained stable over time in both regions. Therefore, it is assumed that the effect of the decrease in the intervention region is limited.

Table 1 Characteristics of intervention and control region

<table>
<thead>
<tr>
<th>Region and period</th>
<th>Average number of insured persons</th>
</tr>
</thead>
<tbody>
<tr>
<td>(N)</td>
<td>Gender – male</td>
</tr>
<tr>
<td>(%)</td>
<td>Age in years</td>
</tr>
<tr>
<td>(mean ± SD)</td>
<td></td>
</tr>
</tbody>
</table>
Intervention region

<table>
<thead>
<tr>
<th></th>
<th>Pre</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>85,749</td>
<td>48.3</td>
<td>45.92 ± 23.26</td>
<td></td>
</tr>
<tr>
<td></td>
<td>80,078</td>
<td>48.4</td>
<td>46.36 ± 23.40</td>
<td></td>
</tr>
</tbody>
</table>

Control region

<table>
<thead>
<tr>
<th></th>
<th>Pre</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>295,796</td>
<td>48.9</td>
<td>45.32 ± 23.26</td>
<td></td>
</tr>
<tr>
<td></td>
<td>299,306</td>
<td>48.8</td>
<td>45.78 ± 23.39</td>
<td></td>
</tr>
</tbody>
</table>

Comment 10

Table 3 is really your main results ...I would assume you calculated the difference in differences pre-post pathway implementation for each of imaging and ortho consults?? if so, it would be good to include the statistical results in this table.

We thank Ms. Gillian Hawker for her advice to include the statistical results of the difference in differences pre-post calculation of Table 3 (in the new version of the manuscript this is Table 2). However, we do not have data on patient level. We received annual numbers of claims per region. Therefore, it is not possible to calculate the difference in differences. Furthermore, there are no statistical results related to the percentage change to show in this table.

Comment 11

Tables 4 and 5 - as per above, i remain confused re how you got to a logistic regression with a binary outcome, especially in the absence of patient-level data - please clarify.

We thank Ms. Gillian Hawker for her advice to clarify the logistic regression with a binary outcome as described in Table 4 and 5 (in the new version of the manuscript these are Table 3 and 4). Based on the feedback from Ms. Gillian Hawker in comment 7 about the outcome measures, we have clarified the description of the logistic regressing with a binary outcome. The relevant rewritten parts are presented here again.

Methods, line 8, page 10

Furthermore, the proportion of diagnostic imaging and initial orthopaedic consultations claims per 1,000 insured persons per region and per period are dichotomised to a binary variable (yes/no-claimed diagnostic imaging or initial orthopaedic consultation).

Methods, line 11, page 10
Binary logistic regression analyses were used to determine the influence of the implementation of the pathway on the proportion of health insurance claims for diagnostic imaging and initial orthopaedic consultations per 1,000 insured persons in the intervention region compared to the control region. The dependent variable in these models is the binary variable indicating claimed diagnostic imaging (yes/no) or claimed initial orthopaedic consultation (yes/no).

Comment 12

There are a number of editorial blips, which likely occurred as a result of revision, but which require attention.

We thank Ms. Gillian Hawker for pointing out the editorial blips. We thoroughly examined the manuscript and made adaptions throughout the manuscript.

Reviewer 2: Isabella Moroz

The revision sufficiently addressed my previous comments. The current version of the manuscript is has improved significantly as a result of the authors addressing the comments of all reviewers. I am pleased to recommend the manuscript for publication. Minor word changes could improve the readability of the manuscript.

We thank Ms. Isabella Moroz for reviewing our manuscript and for her compliments on the current version. We thoroughly examined the manuscript and made word changes where necessary.

Reviewer 3: Helena Britt

Comment 1

Thank you for your extensive response to my earlier comments. This paper has been considerably improved. In particular it is now of readable length, and is far less wordy. The Discussion and Conclusions are far better. However, I again suggest some changes to the conclusion. At present in the Conclusion you are trying to ignore the reverse effect of the intervention on referral rates. You need to add this.

We thank Ms. Helena Britt for her compliments and for her suggestion to improve the conclusion. We rewrote this part.

Abstract, line 24, page 2

The implementation of the pathway had a positive effect on GPs diagnostic behaviour related to the knee, but not to the hip. The referral behaviour of GPs to orthopaedic care needs attention for
future interventions and research, since an increase (instead of a desired decrease) in the number of initial orthopaedic consultations was found. Focusing on the entire width of care for hip and knee OA could be helpful.

Comment 2

There are a number of sections when you use the wrong tense (e.g. when talking about how the results are presented in the paper, use the present tense). When presenting the results themselves all results should be in the past tense.

We thank Ms. Helena Britt for her comment on using the present and past tense. We thoroughly examined the manuscript and made changes where necessary.

Comment 3

Manuscript Title: Sorry I missed this earlier. Less is used as a measure of force, 'fewer" when you are talking about numbers.

We thank Ms. Helena Britt for her suggestion to change the title of the manuscript. We agree with her that “fewer” is the right term to use. Therefore, we changed the title of the manuscript.

Title, line 1, page 1

Does the implementation of a care pathway for patients with hip or knee osteoarthritis lead to fewer diagnostic imaging and referrals by general practitioners? A pre-post-implementation study of claims data.

Comment 4

Abstract/Conclusion: It’s not the GP's knees. How about "In the intervention region, implementation of the pathway had a positive effect on GP diagnostic imaging ordering related to the knee", but not on that related to the hip. However, in parallel, post-intervention referrals to orthopaedic surgeons increased. You can’t just ignore this last result.

We thank Ms. Helena Britt for her advice to change the conclusion part of the abstract. We rewrote this part (see also our reaction on your first comment).

Abstract, line 24, page 2

The implementation of the pathway had a positive effect on GPs diagnostic behaviour related to the knee, but not on that related to the hip. The referral behaviour of GPs to orthopaedic care is a
point of attention for future interventions and research, since an increase (instead of a desired decrease) in the number of initial orthopaedic consultations was found. Focusing on the entire width of care for hip and knee OA could be helpful.

Comment 5

Methods/Setting: 'with the largest market' ...... would be simpler.

&gt; We thank Ms. Helena Britt for her suggestion to simplify this sentence. We rewrote the sentence.

Methods, line 27, page 5

In the Western Mining District, CZ is the health insurance company with the largest market share in the region.

Comment 6

Table 1: Population to GP ratio varies widely:

Intervention region = 1637:1

Control 1: 2,198:1

Control 2: 2609:1

Control 3: 2,083.1

All controls together2291:1

I was just checking. I do wonder if the higher potential workload in the control regions may mean they always order more test and refer more often, than the intervention region where GPs have a lower load. There is research to suggest this happens with busy GPs. Perhaps you should consider adding this as a possible limitation?

&gt; We thank Ms. Helena Britt for checking the workload of the GPs in the intervention and control region. However, the number of GPs working in the region does not reflect upon the amount of full-time equivalents. Therefore, it is not possible to translate this to workload. Besides this, as Ms. Gillian Hawker (reviewer 1) suggests, we excluded Table 1 because it is redundant.

Comment 7
Methods/Setting: what do you mean by a ‘deductible’? also the highlighted section is not clear for an international reader (“This implies that there will be additional costs for the patient if the compulsory deductible has not been met at the time of claim processing.”)

&gt; We thank Ms. Helena Britt for her suggestion to clarify ‘deductible’. We rewrote this part.

Methods, line 2, page 6

For consulting a medical specialist, a yearly compulsory deductible is levied. This implies that there is a certain amount of specialised medical treatment expenses that a patient has to pay out of pocket before the health insurance company will compensate the expenses. The same applies for diagnostic tests (including diagnostic imaging) and pharmaceuticals prescribed by GPs. The amount of the deductible is determined by the Dutch government and changes every year (39). During the study period (2012-2016), the amount increased from €220 to €385.

Comment 8

Methods/Intervention: on every request, for any diagnostic test??? or jsut for OA hip, Knee and other joints?

&gt; We thank Ms. Helena Britt for her question about the pop-up. To clarify this, we rewrote this part.

Methods, line 1, page 7

In addition, to support GPs in applying the pathway in practice, a reminder pops up in the GPs’ referral application (called ZorgDomein) when requesting hip or knee related diagnostic imaging or when referring patients with hip or knee related complaints to orthopaedic care.

Comment 9

Methods/Intervention: A limitation which needs to be considered in the discussion. (“In addition, the expert group assumed that the 20 attended GPs spread the content of the meetings among their colleagues within their general practice and that all GPs, affiliated with MCC Omnes, eventually conform to their initiatives”).

&gt; We thank Ms. Helena Britt for her suggestion to mention this limitation in the discussion. As we described in our answer to comment 6 of reviewer 1, besides the approximately 20% of the GPs in the intervention region who attended the first education meeting, additionally other channels were used to reach all GPs (visualisation and explanation on the website, in the newsletter and on the mobile application and a reminder popping-up in the referral application). To clarify this, we rewrote this in the limitation section of the manuscript.
Limitations, line 30, page 17

Although all GPs were informed about the pathway, information about how many GPs requested diagnostic imaging procedures and referred patients to orthopaedic care according to the guidelines was lacking. This makes it difficult to attribute the implementation results of the pathway and to consider if there is more room for improvement.

Comment 10

Methods/data collection: sentence does not scan (“To compare the number of hip- and knee-related claims with other OA-related care consumption, claims related to other joints (neck, shoulder, upper arm, elbow, forearm, hand, wrist, fingers, ankle, foot, and toes) were used.”).

We thank Ms. Helena Britt for her comment on this sentence. We rewrote this part to make it more readable.

Methods, line 9, page 8

The number of hip- and knee-related claims are compared with claims related to other joints (neck, shoulder, upper arm, elbow, forearm, hand, wrist, fingers, ankle, foot, and toes).

Comment 11

Methods/outcome measures: This section should be in the present tense (“Characteristics of the entire population insured by CZ in the intervention region and the control region during the pre- and post-implementation period were presented. The number of insured persons was presented with averages per period, gender was presented using the percentages of men, and age was presented with means and standard deviations (SDs).”).

We thank Ms. Helena Britt for her advice to write this section in the present tense. We rewrote this part.

Methods, line 11, page 9

The characteristics of the entire population insured by CZ in the intervention region and the control region used are 1) the number of insured persons, presented with averages per period, 2) gender distribution, presented using the percentages of men, and 3) average age, presented with means and standard deviations (SDs).

Comment 12
Methods/outcome measures: If there is a significant delay in processing of claims, shouldn't a longer period have been used, rather than a shorter period?

We thank Ms. Helena Britt for her question about the duration of the post-implementation period. We rewrote this part to clarify why a shorter post-implementation period was selected.

Methods, line 19, page 9

A post-implementation period of two years was selected. It is not possible to select a period of three years due to the delay in the processing of the claims data by the health insurer.

Comment 13

Methods/analysis: This paragraph should be present tense (“Furthermore, binary logistic regression analyses were used to determine the influence of the implementation of the pathway on the proportion of health insurance claims for diagnostics and initial orthopaedic consultations per 1,000 insured persons in the intervention region compared to the control region. The dependent variable in these models was a binary variable indicating diagnostic and initial consultation claims, yes or no. The independent variables were region (intervention or control region) and period (pre- or post-implementation period) and the interactions between those variables. The Enter method was used (41). In addition, odds ratios (OR), p-values, and 95% confidence intervals (CI) were reported.”).

We thank Ms. Helena Britt for her advice to write this section in the present tense. We rewrote this part.

Methods, line 11, page 10

Binary logistic regression analyses are used to determine the influence of the implementation of the pathway on the proportion of health insurance claims for diagnostic imaging and initial orthopaedic consultations per 1,000 insured persons in the intervention region compared to the control region. The dependent variable in these models is the binary variable indicating claimed diagnostic imaging (yes/no) or claimed initial orthopaedic consultation (yes/no). The independent variables are region (intervention or control region) and period (pre- or post-implementation period) and the interactions between those variables, using the Enter method (43). In addition, odds ratios (OR), p-values, and 95% confidence intervals (CI) are reported.

Comment 14

Results: Unnecessary. Just put Table 3 in brackets before the full stop at the end of the para.
We thank Ms. Helena Britt for her advice to shorten this sentence. We rewrote this part (in the new version of the manuscript Table 3 is Table 2).

Results, line 11, page 11

The number of claims and the percentage change in the intervention and control region are described (Table 2).

Comment 15

Results: combine sentence and use "and' as the conjunctive.

We thank Ms. Helena Britt for her advice to combine these sentences. We rewrote this part (see also our answer to comment 2 of reviewer 1).

Results, line 4, page 12

However, during the post-implementation period the number of GP-requested knee-related diagnostic imaging (OR = 0.781, 95% CI = 0.693–0.880, p ≤ 0.001) and GP-requested diagnostic imaging of other joints (OR = 0.931, 95% CI = 0.870–0.997, p = 0.039) declined statistically significantly more in the intervention region.

Comment 16

Results: Looking at Table 5, I assume you mean for claims for initial orthopaedic consultations?

We thank Ms. Helena Britt for this question. In order to clarify this, we rewrote the title of Table 5 (in the new version of the manuscript this is Table 4).

Results, line 1, page 13

Table 4 Results of the logistic regression analysis for initial orthopaedic consultation claims (OR, p-value, and 95% CI).

Comment 17

Results: Should be past tense in results section.

We thank Ms. Helena Britt for her comment on using the past tense. We thoroughly examined this part of the manuscript and made changes where necessary.
Comment 18

Limitations: Just a comment: Yes, it would be good if you could do a pre-post matched GP measure with the data, so that you can identify whether the effect is large for some GPs (possibly those who really tried to follow the pathway- but that isn't measurable either is it?), and not for others who didn't bother? However I realize privacy issues would arise if you tried to do this... so this was just a thought).

We thank Ms. Helena Britt for her comment. It indeed has to do with privacy issues, that we could not receive the data broken down by GP. However, this would have given a lot of insight into the degree of GPs working conform the pathway.

Comment 19

Conclusion: This is much improved, but still wordy, and doesn't mention the failure on the hop OA. How about: Introduction of a care pathway aiming to reduce GP diagnostic imaging requests and GP referrals to orthopaedic surgeons for hip and knee OA, had mixed effects. It resulted in a decrease in diagnostic imaging requests for knee and for other joint related OA but had no impact on those for hip OA. In parallel post-intervention referrals to orthopedic care increased for both hip and knee related OA.

We thank Ms. Helena Britt for her suggestion to rewrite the conclusion section. We rewrote this part to make it more clear.

Conclusion, line 17, page 18

The introduction of a pathway aiming to reduce GP diagnostic imaging requests and GP referrals to orthopaedic surgeons for hip and knee OA, had mixed effects. Results showed a decrease in the number of diagnostic imaging requests for knee and other joint related OA, but no impact was found on those for hip OA. In parallel, referrals to orthopaedic care increased during the post-implementation period, both for hip and knee OA related referrals.