Reviewer’s report

Title: SEAS (Scientific Exercises Approach to Scoliosis): a modern and effective evidence based approach to physiotherapeutic specific scoliosis exercises

Version: 8 Date: 27 November 2014

Reviewer: Eric Parent

Reviewer’s report:

This thematic series article remains a description of a scoliosis specific exercise approach for Scoliosis. The invitation from other reviewers to submit a more detailed review was not followed. This is consistent with other papers in this thematic series but there would be interest for more details.

1. Is the question posed by the authors new and well defined?
   This is a description of the exercise approach and as such the intent is clear. I continue to wish it also included more details on the literature review.

2. Are the methods appropriate and well described, and are sufficient details provided to replicate the work?
   More details have been provided on exercise dosage and prescription strategy. However the evaluation remains insufficiently described.

3. Are the data sound and well controlled?
   --There are no research results presented that are new for this thematic series article.

4. Does the manuscript adhere to the relevant standards for reporting and data deposition?
   -description of approaches don’t match a clear typical reporting format I am familiar with. The flow of the description is good with some redundancy and I suggest that some further details be provided in some sections.
5. Are the discussion and conclusions well balanced and adequately supported by the data?
   - This does not really apply in this case. Authors added a conclusion

6. Do the title and abstract accurately convey what has been found?
   - Yes

7. Is the writing acceptable?
   The paper has been significantly reviewed improved for English language throughout. I make some additional recommendations but English is a second language for me as well.

   • Major Compulsory Revisions (which the author must respond to before a decision on publication can be reached)

   1). I would still like to see a specific description of discharge criteria (of discontinuation of the therapy. (Please specify a therapy duration in terms of months, years or in relation to skeletal maturity; session durations). Your response to my comment in a previous version was: The treatment ends when the situation of the patient is enough stable. (Please specify in the text to be published how this is determined) In this last version you specified that the therapy would end “When the probability of worsening is controlled.” Explain in the text to be published how risk of worsening is appraised by SEAS therapists.

   2. The following comment remains not adequately assessed:

   A clear description of the assessment strategy is very important since it drives the exercise prescription. Without having to detail all tests as in a manual, you could specify further “How does the therapist pick the most relevant elements and list the most commonly used and relevant evaluation tests listed? Does SEAS provide training guidance on which tests to use or is it left at the therapist’s discretion. Please explain, how do the therapist weight the information retrieved: eg flexibility, vs balance vs strength…? The decision on which few exercise is to be prescribed to a given patient is tied directly to evaluation findings. The reader needs to understand how the evaluation is planned and interpreted. Specifically, how do you assess the balance and the coordination of patients? (It seems that these are elements of most SEAS exercises I have come across to date.

   In the article it was explained that one of the purposes of the assessment is to identify the characteristics of the patient less valid (strength, balance, coordination), not only to improve this feature with the exercises, but also to exploit this weakness as a challenge to maintain the correction.

   Yes this is clear but of all the test and impairments that these tests could detect how is a therapist to decide which to test and which to use as introductory exercises in the pursuit of challenging correction.

   I'm sorry, but you realize that without doing a course is difficult to explain in detail. This is not possible for any treatment approach. I am sure that even all your knowledge of the Schroth are definitely not been acquired by reading a
simple article like this.

--I will in this case defer to the editor. I understand that an article is not a training manual. However with SEAS the choice of exercises appears to be extremely varied and closely related to the impairments and functional limitations detected during the evaluation. I suggest at a minimum to clarify if any impairments could be used to challenge stability or would only those that are related to the ability to maintain self-correction of the spine and pelvis be considered in the program. Also I would be interested in a general description of whether neuromotor control deficits are prioritized over flexibility or strength and how in the presence of multiple deficits a therapist would decide where to start. Would one pick a flexibility then control then strength? Would I try to find an impairment providing a challenge to stability where the patients would be able to perform 5-10 minutes with adequate self-correction but no more? This article is an opportunity to inform the therapists and the public about an approach that is not well known around the world. Since this evaluation is central to practicing SEAS, I strongly suggest that it be presented in more details. Thanks for adding details on criteria to undertake progression in difficulty. Can you specify if certain impairment targeted before others? Does SEAS challenge flexibility before strength, before endurance before balance control....

3. Many reviewers initially asked to expand the review of prior publications on SEAS. I leave it to the editor to emphasize whether the additional details provided in the table should be summarized at greater length in the paper. I find the tables very informative. Thank you. However, the text does not go into much details in summarizing the tables. For example, summary statements could be formulated about different outcomes about the levels and consistency of the evidence on various outcomes. Gaps in research for some of the intended use outlined in the abstract could be highlighted.

• Minor Essential Revisions (such as missing labels on figures, or the wrong use of a term, which the author can be trusted to correct)

1. Abstract in rehab program. I suggest adding a sentence about discharge criteria or about when the exercise therapy ends.

2. Abstract: In rehab program. I suggest: “ Other key features include teaching...”

3. Abstract last part of rehab program. I suggest: “ (two/ three times a week for 45 minutes) ... In the last case, expert physiotherapy sessions of 1.5 hours...”

4. In abstract Results: I suggest to specify in the abstract for which outcomes the efficacy of SEAS has been demonstrated (EG reduce Cobb angle progression, reduce need to receive bracing...).

5. in abstract conclusion: The first sentence is unclear. Please rephrase. Maybe separate the bit about the neurophysiological basis from the reduction in time commitments by patients and costs to families.
6. Abstract conclusion: I suggest: “Therefore, SEAS allows treating a large number…”

Main TEXT
1. P1 L4 I suggest: “..since the approach has already evolved since its introduction and will change in the future as new relevant scientific knowledge becomes available.”
2. P1 History L7 I suggest: “… search the international literature to find the best…”
3. P1 History L9 I suggest: “ In particular, the CSN…”
4. P1 History last line: I suggest: “ … by the Lyon School and also included data…”
5. P2 third bullet: Can you explain what is meant by research of an automatic correct reflex response. Are you try to create an auto-correction reflex or teach the patients to automatically (subconsciously ) always maintain auto-correction?
6. P2 Theo principles: Can you explain for the unfamiliar reader what Stokes vicious circle is. Scoliosis creates abnormal loading which create asymmetric growth leading to worsening of curves with leads to further asymmetric growth due to increased asymmetrical loading.
7. P3 Last sentence of the 2nd paragraph. Can you provide a more clinical explanation of what this sentence means. Maybe an examples of what it is?
8. P4 Second paragraph: Diaphragm is the correct English spelling.
9. P4 Last sentence of the second paragraph: I suggest: “ … The aim of this paper to focus on this concept…”
10. P5 Again here you suggest training a reflex answer toward correction. Since it is unlikely that we can train a reflex in the neurophysiological sense I would suggest to suggest that you are training a automated self-correction which does not require intense voluntary control.
11. P5 first main objective. Here or before please clearly state how Seas defines Spinal stability. (Would I be correct in suggesting active self-correction is maintained during challenging tasks?).
12. P5 for the second objective. Could we qualify that not all impairments would be used but only those with a relation to challenging the ability to maintain the self-correction in the spine and pelvis? If yes please specify in the text.
13. P5 under objective 1. The second sentence is awkward. I suggest: “The evolution of a progressive scoliosis always runs towards a worsening condition.”
14. P5 In the last sentence of the Objective 1 paragraph. There is possibly an extra space between “ to perform”.
15. P5 under objective 2 There is an extra space between “measurements for”
Further for this sentence I suggest: “… assessment of the scoliosis (Cobb…)”

16. P6 second bullet: I suggest specifying. Assessment of the neuromotor ability related to the alignment of the spine and pelvis.

17. P6 Under learning… Can you specify translation of what. For example you could say of the apical vertebrae towards the mid-line or of the pelvis …

18. P6 First bullet under learning last sentence: slopes has not been defined. Can an explanation be provided?

19. P6 second bullet under learning: Can you specify what is deemed normal kyphosis and lordosis?. Also the last sentence I suggest: “… since the thoracic spin does not always have to see the kyphosis increased and the lumbar lordosis does not always require an increase.

20. P7 First sentence I suggest: “… these indications to facilitate the performance by the patients and reduce the decompensation;”


22. P7 Last sentence of the paragraph beginning with During the learning stage… Can expand this idea or delete this idea. What is the very important neurophysiological effect and why is it important?”

23. P8 At the end of the paragraph starting with Generally. Could you add a sentence to explain something like: The self-correction intensity or the requested duration should be increased to trigger fatigue? How would fatigue be considered ? self-reported or observed as difficulty to hold the self-correction?

24. P8 First question There seems to be a contradiction between the second sentence and the second last sentence about the desirability or not of the relaxed position. Rephrase to show clearly if you want patients to be in the relaxed position or not.

25. P8 Second questionnaire. I suggest to use Symmetry (better English).

26. P8 last paragraph. Please add a space after the question mark of the second question.

27. P9 Third question: I would suggest: “in fact, if the patient or therapist, replies “no”…

28. P9 after the 4th question. I am still worried about requesting so often that patients adopt a relaxed position after the exercises. I understand now your explanation of why you think it is important. I would suggest adding that ultimately you would hope that patients learn to always maintain corrections throughout daily life to truly fight Stokes vicious circle. I don’t see in the paper that you indeed hope that patients self-correct all the time.
29. P9 For the examples you have used the present tense in describing the patients in the pictures. I suggest the past tense would be more appropriate. Please refer to figure 1 as soon as you mention the patient (presented in figure 1). At the end of the first paragraph I would like to see a description of how many times the patient would repeat the exercise or for how long or until what criteria is met to consider enough has been done of this exercise in this session.

30. P9 last paragraph. First sentence. Can you use right and left so that therapist not used to visualize convex and concave sides from the surface can be correctly oriented to the directions described?

31. P10 First paragraph of the second example second sentence. I suggest: “the patient was asked to perform the exercise for approximately ten second for each cycle from starting position to returning to the start position. In the following sentence change him by her. Please specify what would constituted adequate dose of this exercise in one session. Also how is it more challenging than the previous one: Dynamic faster? More loading to control…


33. P10 Last bullet please explain how the cognitive behavioral approach is implemented in this context. EG goals pursued, methods used…

34. P11 Second paragraph. At the end of that first sentence. Specify why it is used. What is the goal of using CB approach.

35. P11 3rd paragraph. What makes one an expert SEAS therapist? Define the required skills.

36. P11 4th paragraph. I suggest: “In either the outpatient or the home… 45-minute sessions per week consisting of N? to N? exercises repeated for N? to N? cycles of 10-12 seconds?…Specify the dose more please.

37. P11 second last sentence of 4th paragraph. I suggest: “… the difficulty of the exercises is based…”

38. P11 I would add the following to the last sentence of the 4th paragraph. “… maintain the correction throughout daily life”.

39. P11 at the end of the 4th paragraph may be a good place to announce what are the discharge / weaning criteria from supervised therapy.

40. P12 end of second paragraph. Explain what you mean by typology of the postural challenges?

41. P12 the 3rd paragraph (the exercise are chosen) seems redundant with material provided before and does not provide more details.

42. P12 4th paragraph. Should we say: Should elicit a isometric or isotonic contraction? Please explain.
43. P12 end of 6th paragraph. How are patient’s daily life needs assessed. If they are common to all teens maybe list activities you recommend training for most commonly.

44. P12 last paragraph. I suggest for the 2nd sentence: “this is because a portion of the body is hidden…” to ensure a full sentence structure is used.

45. P13 End of the second paragraph. You mention mobility and plasticity. This is different from all the stability focus so far. Could you expend on how this difference in focus is implemented in SEAS. (how does SEAS do stretching? Active assisted only or do you use PNF or any other passive techniques.

46. P13 all the bullets seem redundant with prior sections. This could be a good place to specify as requested in major revisions and the add to content rather than just repeat.

47. P13-14. The section on scoliosismanager does not seem to connect to the SEAS description and make me wonder if this is a bit of promotion for this general PT practice tool. The figure related to this description if too general and not in sufficiently high definition. I recommend deleting the whole scoliosis manager section or providing a SEAS specific example of its use.

48. P14 Learning SEAS second paragraph. I suggest. “The regular SEAS course consists of two theoretical…”. In the second sentence. I suggest: “ …to be carried out no less than…”. Last word of the paragraph should be practice.

49. P15 end of first paragraph. I suggest: “… has shown the characteristics…. The content of the text summarizing the tables is too simple and I would like to read a description summarizing the different effects observed of therapy using SEAS in different context. The tables are great but a summary would add to the value of the paper.

50. A discussion or a rationale section nearby should be added to justify why you propose the instructions (caudal first, sagittal first)

51. Please explain how it was chosen to perform the self-correction only in the horizontal and sagittal planes for this patient? You replied to me but did not add to the text something along the following:

The choice depend on the measurable deviations (°Cobb or °Raimondi or Sagittal index) and on the ability of the patient to perform the correction

52. Consider adding as paragraph or a few sentence to explain the topics covered in the CB counseling and how it is done. I understand this may vary but I would suspect that there are dominant topics addressed. Since this counseling is fairly unique to SEAS. It would be valuable to introduce it in more details in this paper.

56. Figures:
For all figures where the patient is presented in a relaxed not corrected posture, I would like the figure legend to clearly state: Uncorrected relaxed posture.

58. For the pictures where the patients are executing some self-correction please specify and describe the translations, derotations, elongations… present in the correction executed as part of the figure legend. Please use both right /left directions and convex / concave directions in the descriptions.

59. Tables. For the Cobb angle outcomes you only reported whether changes were statistically significant or not but not the actual Cobb angle changes measured. This would be necessary in the tables to judge the clinical significance of the effects. Please add or specify that they are added whenever data was available.

60. In the titles of tables. Please replace the term researches by studies or research.

**Level of interest:** An article of outstanding merit and interest in its field

**Quality of written English:** Needs some language corrections before being published

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**

I declare that I have no competing interests