Author’s response to reviews

Title: Characterisation of sucking dynamics of breastfeeding preterm infants: a cross sectional study

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Author’s response to reviews:

Thank you very much for the opportunity to respond to reviewers comments to improve the manuscript.

Reviewer 1

General comments:

1. Suggestion to change the aim to include nipple shields.

Response: the aim has been changed from The aims of this study were to measure and describe the sucking dynamics of the preterm breastfeeding infant (tongue movement and intra-oral vacuum) and explore relationships with milk intake to The aims of this study were to measure and describe the sucking dynamics of the preterm breastfeeding infant feeding with a nipple shield (tongue movement and intra-oral vacuum) and explore relationships with milk intake.

2. Reduction in discussion and tightening of message with removal of repetition

Response: the discussion has been reduced and merged as suggested.
Title Page

1. Suggestion to include the study design in the title of the paper

Response: Sucking dynamics of breastfeeding preterm infants has been changed to: Characterisation of sucking dynamics of breastfeeding preterm infants: a cross sectional study

2. Missing abbreviations on the title page

Response: N-HSPJ – nipple hard-soft palate junction, IOD – intra-oral depth, HMO – human milk oligosaccharide have been added. NEC was already present.

3. The reviewer has requested in the main text the Introduction title be changed to Background and the aim be shifted to the beginning of the Methods section.

Response: this has been corrected

4. Addition of more recent references. References were originally focused more on the preterm infant however I have added the following references for benefits of breastfeeding

Response:

[1] [2] [3-5] [6, 7]


P3 lines 24-48 request for references
Response: references inserted:
[8-13]
P3 line 50 this reference has been deleted as the reviewer is correct that is not the right reference.

The sentence on page 4 starting on line 7 on milk volume differences make me a bit thoughtful and needs to be considered by the authors. The references do not take into account the timing of initiation of stimulation/pumping which has shown to be highly relevant for milk production, see Parker et al. 2015. Maybe you should consider to wright together the sentence above where you have mentioned the initiation of lactation.

Response: I have added more detail including frequency of pumping as this is a strong predictor of milk volume which was not accounted for in Parker et al.

Achieving and maintaining a plentiful milk supply is hampered by a tendency for the initiation of lactation to be delayed and less milk to be expressed compared to mothers of term infants [14, 15]. Recent evidence has suggested that expressing milk within an hour of delivery has a significant impact on milk volumes produced at 6 weeks post partum[16]. However, there is also a strong relationship between the frequency of pumping and milk volume[17, 18].

Discussion

Page 14, paragraph about nipple shield use in preterm infants. I think the authors also needs to consider/discuss more about the risks and potential problems around breastfeeding using nipple shields. To my knowledge, it is not entirely clear that nipple shields are beneficial for breastfeeding preterm infants. In a study by Maastrup, 2014 nipple shields were associated with less exclusive breastfeeding at discharge from the neonatal unit. The study covered almost 1500 preterm infants.

Response: The primary aim of our paper is to investigate the sucking mechanism of the breastfeeding infant I am a little reluctant to add a substantial discussion about the pros and cons nipple shields particularly since the analyses have not investigated interactions between gestational age and frequency of use for example and further I have no data in this study that could add to the discussion of risks and potential problems. However I have acknowledged the issue briefly in the discussion.
“Nipple shields are often used to facilitate breastfeeding in preterm infants by enabling attachment to the breast and facilitating milk removal [19] however, there are conflicting reports as to whether they impact long term breastfeeding outcomes. A recent large cohort study found no relationship between nipple shield use and age at exclusive breastfeeding in one analysis [20] and an increased risk of not achieving exclusive breastfeeding (49% exclusively feeding with nipple shield use and 66% without) in another analysis [21]. It is not clear whether all factors known to influence exclusive breastfeeding were accounted for and frequency of use was not reported. A within infant study has shown that infants receive more milk from the breast when using nipple shields [19] therefore there is clear need to understand how nipple shields function in the preterm infant.”

Page 14 line 47-50. Could you see any similarity between the children who had relatively high or low vacuum e.g. birth week, age, more close to full sucks?

[22]

You describe later in the discussion that you did not see any differences in vacuum strength depending on infant age or weight. I understand that eight infants had achieved a full breastfeed at some time, however, did any of the infants' breastfeed the full prescribed volume during the examination?

That you did not find any differences between the infants in vacuum strength and milk intake could it be because the infants in your study were not "mature" enough to exclusively/fully breastfed at the breast. I am curious about to see what differ in vacuum strength between exclusively at breast-feeding and infants not quite there yet. However, you may not have that data in this study.

Response: unfortunately I did not have enough numbers to look at this. We have just completed a longitudinal study in which we will be explore this question.

The discussion about sucking rates and single sucks on page 16 are interesting and clinically relevant. This also connects with the comment above, do an exclusively/fully at the breast feed preterm infants differ in sucking rate/less single sucks during a feed compared to infants in your study. It may be difficult to answer in your study but interesting for future research.

Response: Yes you are so right. We were quite fascinated with this finding and wonder if it would be another nice marker of maturity and progression of feeding. Again we look forward to analyzing our longitudinal data to see if we can shed more light on this issue.
Xiaoxue Chen, MPH (Reviewer 2): This study investigates the sucking dynamics and factors associated with milk intake among preterm infants.

This is an interesting topic, but the study would be stronger if the author can improve in the following areas:

1. Explain more clearly how the authors comes to the final sample? It could be better worded than just saying "technical issues" for all 4 of them. Were the 4 infants excluded all due to oral-facial anomaly,... or failure to attach to the breast?

Response: “4 were excluded due to technical issues recording intra-oral vacuum and ultrasound images,”

2. The method section is quite comprehensive, but needs some extra work to improve the clarity. E.g. list the variables right after "all other variables were analyzed.... ";

Response: the full list of variables (also detailed later) has been added as requested “NHSPJ, IOD, nipple diameter, measurement location (nipple diameter), time elapsed since beginning of feed; mean, baseline and peak vacuums; burst duration; sucking rate; use of nipple shield during the feed, current weight, CGA, postnatal age, birth gestational age and weight, age at introduction of suck feeds and achievement of full suck feeds, and the timing of the monitored feeds”

Add the explanation for choosing certain method--simultaneous linear regression model; Explain what's the difference between "analysis specific fixed effect" and "covariate of interest"?
Response: Analysis specific fixed effects is the fixed effects included in the model because they relate to the research question (eg. when we are looking at nipple diameters, it matters whether this is at tongue up or tongue down, and how far from the nipple the measurement is made), and the covariates of interest are those variables which are included in one or more models to test whether they affect the relationship(s) between the response variables(s) and the fixed effects, because there is either a theoretical reason, or some evidence from previous studies, that they are associated with the response.

The following changes have been made to the manuscript “Analysis specific fixed effects related to the research question included measures that changed for example when the tongue was either up or down and included tongue position (NHSPJ, IOD, nipple diameter), measurement location (nipple diameter), time elapsed since beginning of feed, either as linear or 2nd order polynomial (mean, baseline and peak vacuums; burst duration; sucking rate). Covariates of interest that were considered to potentially affect the relationship/s between the response variable/s and the fixed effects were use of nipple shield during the feed, current weight, CGA, postnatal age, birth gestational age and weight, age at introduction of suck feeds and achievement of full suck feeds, and the timing of the monitored feeds relative to these last two”

3. In the result section, the author didn't provide adequate data table/figure for the adjusted result. The author also failed to report the effect size along with the p values.

Response: Due to the transformation of the some variables parameter estimates were not included for all p values as they are difficult to interpret. This has been stated in the methods section. “Parameter estimates are presented as estimate [95% confidence interval (CI)] and included where relevant due to transformation of some of the variables

4. In the result section, the author focused a lot on the outliers instead of describing the general trend/descriptives.

Response: the outliers have been removed from the discussion

5. The author may consider elaborate a bit more about what has been done in the term infants.

Response: extra information has been provided in the background and more clarity added to the discussion.