

PEER REVIEW HISTORY

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ARTICLE DETAILS

TITLE (PROVISIONAL)	Term admissions to neonatal units in England- a role for transitional care? A retrospective cohort study
AUTHORS	Battersby, Cheryl; Michaelides, Stephanie; Upton, Michele; Rennie, Janet

VERSION 1 - REVIEW

REVIEWER	Dag Bratliid, prof em, MD, PhD, MHA Department of Health Management and Health Economics Faculty of Medicine, University of Oslo, Norway
REVIEW RETURNED	14-Feb-2017

GENERAL COMMENTS	<p>Jaundice is a significant and common problem in the newborn infant and sometimes causes unwanted separation between mother and infant. The present study analyses national data on hospital admission of term infants during the first weeks of life, with special focus to determine risk factors for admission for jaundice management and to determine the proportion of term admissions that could have been potentially cared for in a transitional setting without separation of mother and the baby.</p> <p>General comments.</p> <p>Title</p> <p>This is an interesting study on hospital admissions of term infants, and the data is probably representative for other countries as well. The amount of data is huge, and the authors state that one of the study's strengths is that it is the first study undertaken to investigate the reasons for term admissions to the neonatal unit in England. This is also the impression when reading the manuscript, where results are equally specified for all admissions, except for in tables 3 and 4. The title is therefore, in my opinion, not reflecting the content of the manuscript. The authors should consider a more "open" title like "Term admissions to neonatal units in England – could transitional settings be an alternative for some?" or similar. By looking at the data in Table 2a and b, it could thus seem that several other diagnoses than jaundice for hospital admissions could be included in such a discussion, such as weight loss, infection and poorer feeding, probably representing more infants than jaundiced infants.</p> <p>Tables</p> <p>The amount of data is huge and interesting. If the focus on the study is on the reasons for admission of term infants, the tables 1 and 2a and b are OK. The data should, however, be given with only one decimal. If the focus is on better care for the jaundiced infant and mother, many tables are too detailed. Table 1 is OK as a background, tables 2a and b should be simplified, for instance by</p>
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	<p>reducing the tables to the data summarized in the text describing the tables. The information in table 3 is well described in the text on page 9 preceding the table. The table should be deleted, also since some of the data are missing. Tables 4 is relevant for a focus on jaundice but not for a general discussion on term admissions, where Table 5 has interesting data. However, in a discussion of treatment level of the jaundiced infant, the table would be much more informative if separate data for admission from hospital or from home were included, similar to in table 4. In the present table 5, “days” are also lacking in Length of stay in the first row.</p> <p>Figures The flow sheet in figure 1 is not considered important and can be deleted. Relevant information can be given in the text.</p> <p>Discussion The discussion is now mainly focused on the need to improve the management of the jaundiced newborn. As mentioned above and below, the data is not suitable for such a focus. The discussion could better centered on unnecessary admissions as such, with jaundice as an example. A discussion on admissions in general with particular focus on admissions from home, would in my view be equally or even more interesting.</p> <p>Major comments (in relation to a focus on the jaundiced infant)</p> <p>Bilirubin levels To discuss better management of the jaundiced newborn, information on bilirubin levels should be included both for infants admitted from hospital or from home and discussed in relation the national treatment criteria. This is a major weakness of the study. In Table 4, infants admitted from home and at an older age were more often given phototherapy than infants admitted from hospital, but needed fewer days of treatment, which is surprising. It is also somewhat surprising that only 80% of infants admitted for jaundice needed treatment. This is difficult to understand without any information of bilirubin levels in relation to treatment. In a discussion of term admissions in general this is not needed.</p> <p>Age at discharge after delivery Since hyperbilirubinemia in term infants usually develops after 2-3 days, information on routine age at discharge should be given. It would also be interesting to know (in relation to the discussion) if routine screening for jaundice by transcutaneous bilirubinometry or blood in relation to the blood screening for inborn errors of metabolism, has been discussed or implemented in some areas.</p> <p>Minor comments</p> <p>Text In the paragraph Resource use..... on page 11, it is written Special Care (SC), High Dependency care (HDC) and Intensive care (IC) with a mixture of capital letters in the word Care. In table 5 capital letters in care is not used. This should be the same both in table and text, probably a capital C. As also mentioned above, “days” are lacking in Length of stay in the first row of table 5.</p> <p>References The reference list is limited. In relation to some of the comments above, the authors should consider to include some more references.</p>
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REVIEWER	Helen Mactier Neonatal Unit, Princess Royal Maternity,
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	8-16, Alexandra Parade, Glasgow G31 2ER
REVIEW RETURNED	14-Feb-2017

GENERAL COMMENTS	<p>This is an interesting study, using national data to assess the impact of jaundice on term admissions to English neonatal units. There are, however, some limitations, and I do not believe that this paper yields much in the way of important new information.</p> <p>The authors acknowledge some of the limitations, including most notably the fact that the database only records the primary reason for admission – perhaps other term babies admitted with reasons additional to jaundice could have been managed in a transitional care facility. I am aware that practice varies greatly across the country with regard to admission of term babies for phototherapy – I suggest that a useful additional analysis would have been to look at variation between units. It is likely that many other term babies are already being cared for in transitional care settings within UK maternity services.</p> <p>I was interested to note that only 80% of babies readmitted for jaundice received phototherapy – this begs for me the question as to why they were admitted, if not for specific treatment for jaundice.</p> <p>Similarly, the authors describe one third of babies requiring intravenous fluids – I am not convinced that “received” necessarily equates to “required”</p> <p>The increased likelihood of being admitted for treatment of jaundice at 37 weeks gestation almost certainly a reflection of the different NICE cut off for phototherapy at this gestation. This has not been mentioned in the paper.</p> <p>Most importantly, if only one third of babies received IV fluids, how is the conclusion reached that admission was potentially avoidable in one third – was admission not potentially avoidable in two thirds?</p> <p>Care should be taken in drawing conclusions about the risk of kernicterus with such small numbers, but I think that the recommendation for assessment at home around day 3 of babies with risk factors is justified. I hope that the cases of kernicterus are being examined separately to allow lessons to be learned (did all of these babies actually have potentially identifiable risk factors?)</p>
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REVIEWER	Dr Aung Soe Medway NHS Trust UK
REVIEW RETURNED	17-Feb-2017

GENERAL COMMENTS	<p>Very interesting paper on a current topical national issue. The abstract is balanced and complete, however, the reason for the conclusion of 'around a third of term admissions for jaundice can be managed in a transnational care setting' is not clear in the paper. In Table 4 on home vs hospital admissions, should statistical analysis be done?</p> <p>A clear statement on 'admissions to Paediatric wards are excluded' would be helpful.</p>
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VERSION 1 – AUTHOR RESPONSE

Reviewer: 1

Dag Bratlid, prof em, MD, PhD, MHA

Department of Health Management and Health Economics, Faculty of Medicine, University of Oslo, Norway

Please state any competing interests or state 'None declared': None declared

Please leave your comments for the authors below

Jaundice is a significant and common problem in the newborn infant and sometimes causes unwanted separation between mother and infant. The present study analyses national data on hospital admission of term infants during the first weeks of life, with special focus to determine risk factors for admission for jaundice management and to determine the proportion of term admissions that could have been potentially cared for in a transitional setting without separation of mother and the baby.

General comments.

Title

This is an interesting study on hospital admissions of term infants, and the data is probably representative for other countries as well. The amount of data is huge, and the authors state that one of the study's strengths is that it this is the first study undertaken to investigate the reasons for term admissions to the neonatal unit in England. This is also the impression when reading the manuscript, where results are equally specified for all admissions, except for in tables 3 and 4. The title is therefore, in my opinion, not reflecting the content of the manuscript. The authors should consider a more "open" title like "Term admissions to neonatal units in England – could transitional settings be an alternative for some?" or similar. By looking at the data in Table 2a and b, it could thus seem that several other diagnoses than jaundice for hospital admissions could be included in such a discussion, such as weight loss, infection and poorer feeding, probably representing more infants than jaundiced infants.

Response: Thank you for your positive and helpful comments and suggestions. We have changed the title to "Term admissions to neonatal units in England- a role for transitional care?"

We agree that other diagnoses other than jaundice contribute to the need of admission. We have tracked the amendments in the discussion under "limitations". It now reads:

"We acknowledge the limitations. Due to the retrospective nature of this study and utilisation of an established database, we were limited to the variables available on the EPR and NNRD. One major limitation was the EPR permits only one primary reason for admission, determined by the clinician entering data. As it is common for babies to present with jaundice, poor feeding, weight loss and hypoglycaemia at the same time, jaundice may well be a reason for admission, but not recorded as such. This may under-or over-estimate the rates of admission primarily for jaundice management."

Tables

The amount of data is huge and interesting. If the focus on the study is on the reasons for admission of term infants, the tables 1 and 2a and b are OK. The data should, however, be given with only one decimal. If the focus is on better care for the jaundiced infant and mother, many tables are too detailed. Table 1 is OK as a background, tables 2a and b should be simplified, for instance by reducing the tables to the data summarized in the text describing the tables. The information in table 3 is well described in the text on page 9 preceding the table. The table should be deleted, also since some of the data are missing. Tables 4 is relevant for a focus on jaundice but not for a general discussion on term admissions, where Table 5 has interesting data. However, in a discussion of treatment level of the jaundiced infant, the table would be much more informative if separate data for admission from hospital or from home were included, similar to in table 4. In the present table 5, "days" are also lacking in Length of stay in the first row.

Response: Thank you for your suggestion and we agree that the paper should have an overarching focus on unnecessary term admissions, with jaundice as an example. We also agree that a particular focus on admissions from home, would be equally interesting.

In response to these suggestions, we have amended the introduction to read:

“Jaundice is an example of a common condition which can be appropriately managed in a transitional care setting for the majority of babies if detected early. Delay in identification and treatment can result in kernicterus, a devastating lifelong disability arising from bilirubin damage to the brain; this should be an extremely rare event in a managed healthcare system.”

We have also amended the last few paragraphs of the introduction: “Furthermore, depending on postnatal age, local referral pathways, available resources and the need for exchange transfusion, babies from the community may be admitted either to the postnatal, paediatric ward or neonatal unit; the latter results in separation of mother and baby.”

We also clarified the aims of the study: “In this study, we aimed to quantify and determine the most common reasons for term admissions to neonatal units in England in 2011-2013. With a focus on jaundice, we determine risk factors for admission, explore whether these differ between babies admitted from home or hospital; and estimate the proportion of term admissions which could have been potentially cared for in a transitional care setting without separation of mother and baby.”

We have also changed the order of the paragraphs in results to focus first on the reasons for term admissions overall, then specifically for jaundice. We have placed all results relating to kernicterus together

We have also amended the abstract:

Objective now reads “To identify primary reasons for term admissions to neonatal units in England; determine.....”

We have added “primary reasons for admission” into the outcomes so the focus is not solely on jaundice.

In the results in the abstract we have added “Respiratory disease was the most common reason for admission overall, although

We agree tables 2a and b can be simplified. We have rounded the decimals to one place. We have also limited this to also describing the data summarised in the text, and have aggregated the other reasons of admission into ‘other’.

We have moved table 3 to the supplementary rather than remove it, and agree that the text describes this well. Table 4- only relevant for a focus on jaundice but not for general discussion on term admissions. As suggested by the reviewer, we have amended table 5 to describe this by admission from hospital vs home.

Table 5- We have added in “days” to the unit for length of stay.

We have renumbered the tables and referenced these accordingly in the main text.

Figures

The flow sheet in figure 1 is not considered important and can be deleted. Relevant information can be given in the text.

Response: We have moved figure 1 into the supplementary materials

Discussion

The discussion is now mainly focused on the need to improve the management of the jaundiced newborn. As mentioned above and below, the data is not suitable for such a focus. The discussion could better centered on unnecessary admissions as such, with jaundice as an example. A discussion on admissions in general with particular focus on admissions from home, would in my view be equally or even more interesting.

Response: We have amended the discussion to focus on term admissions in general, with a focus on jaundice. The first paragraph of discussion now reads:

“In this large retrospective national study on term admissions, we found that the most common

primary reason for admission was respiratory disease, accounting for a quarter of admissions, followed by infection, hypoglycaemia, jaundice and asphyxia.”

Major comments (in relation to a focus on the jaundiced infant)

Bilirubin levels

To discuss better management of the jaundiced newborn, information on bilirubin levels should be included both for infants admitted from hospital or from home and discussed in relation the national treatment criteria. This is a major weakness of the study. In Table 4, infants admitted from home and at an older age were more often given phototherapy than infants admitted from hospital, but needed fewer days of treatment, which is surprising. It is also somewhat surprising that only 80% of infants admitted for jaundice needed treatment. This is difficult to understand without any information of bilirubin levels in relation to treatment. In a discussion of term admissions in general this is not needed.

Response: We have amended the discussion to focus on term admissions in general, using jaundice as an example.

Age at discharge after delivery

Since hyperbilirubinemia in term infants usually develops after 2-3 days, information on routine age at discharge should be given. It would also be interesting to know (in relation to the discussion) if routine screening for jaundice by transcutaneous bilirubinometry or blood in relation to the blood screening for inborn errors of metabolism, has been discussed or implemented in some areas.

Response: We are not aware of any healthcare settings in England in which routine screening for bilirubin levels with transcutaneous bilirubinometry is in use, and the National Screening Committee has not endorsed such screening. Routine screening for PKU, cystic fibrosis maple syrup urine disease, etc is done by blood testing in the whole of the UK.

We have added in the discussion: “Anecdotal evidence suggests that there is patchy implementation of transcutaneous bilirubinometers in the community and variation in the frequency of postnatal visits nationally, but formal evaluation is needed.”

Minor comments

Text

In the paragraph Resource use..... on page 11, it is written Special Care (SC), High Dependency care (HDC) and Intensive care (IC) with a mixture of capital letters in the word Care. In table 5 capital letters in care is not used. This should be the same both in table and text, probably a capital C. As also mentioned above, “days” are lacking in Length of stay in the first row of table 5.

Response: The word “Care” for levels of care has been unified as upper case “Care” on page 11 and in table 5. These have been corrected

References

The reference list is limited. In relation to some of the comments above, the authors should consider to include some more references.

Response: We have added in the following references:

NDAU. Neonatal Data Analysis Unit Secondary Neonatal Data Analysis Unit
<https://www1.imperial.ac.uk/neonataldataanalysis/>.

Shapiro SM. Definition of the clinical spectrum of kernicterus and bilirubin-induced neurologic dysfunction (BIND). *J Perinatol* 2005;25(1):54-9

Rennie J, Burman-Roy S, Murphy MS. Neonatal jaundice: summary of NICE guidance. *BMJ* 2010;340:c2409

Reviewer: 2

Helen Mactier

Neonatal Unit, Princess Royal Maternity, Alexandra Parade, Glasgow

Please state any competing interests or state 'None declared': none declared

Please leave your comments for the authors below

This is an interesting study, using national data to assess the impact of jaundice on term admissions to English neonatal units. There are, however, some limitations, and I do not believe that this paper yields much in the way of important new information.

The authors acknowledge some of the limitations, including most notably the fact that the database only records the primary reason for admission – perhaps other term babies admitted with reasons additional to jaundice could have been managed in a transitional care facility. I am aware that practice varies greatly across the country with regard to admission of term babies for phototherapy – I suggest that a useful additional analysis would have been to look at variation between units. It is likely that many other term babies are already being cared for in transitional care settings within UK maternity services.

Response: We agree this would have been useful and we had considered this but permission from clinical leads were specifically for aggregated national and not by network.

I was interested to note that only 80% of babies readmitted for jaundice received phototherapy – this begs for me the question as to why they were admitted, if not for specific treatment for jaundice.

Response: We agree this is interesting and it may be to do with the fact that jaundice co-exists with poor feeding, weight loss, but clinicians may have selected 'jaundice as the primary reason for admission'. We have emphasised this in limitations:

"One major limitation was the EPR permits only one primary reason for admission, determined by the clinician entering data. As it is common for babies to present with jaundice, poor feeding, weight loss and hypoglycaemia at the same time, jaundice may well be a reason for admission, but not recorded as such"

Similarly, the authors describe one third of babies requiring intravenous fluids – I am not convinced that "received" necessarily equates to "required"

Response: We agree and have changed "required" to "received" and "administered" in the discussion.

The increased likelihood of being admitted for treatment of jaundice at 37 weeks gestation almost certainly a reflection of the different NICE cut off for phototherapy at this gestation. This has not been mentioned in the paper.

Response: We accept that this is a possibility, but in view of the increased risk of kernicterus in moderately preterm infants the NICE guidelines chose a lower threshold limit for 37 week gestation babies compared to those born at 38 weeks or later. Clearly our observational study reflected this, and we have included the following in the discussion:

"We note that the NICE recommended treatment threshold for babies born at 37 weeks is lower than that for babies born at 38 weeks and above, which may have contributed to the relative excess of babies of 37 weeks gestation requiring admission."

Most importantly, if only one third of babies received IV fluids, how is the conclusion reached that admission was potentially avoidable in one third – was admission not potentially avoidable in two thirds?

Response: We have amended the abstract and conclusion to read that "Two-thirds" maybe avoidable. Abstract conclusion now reads "Around two thirds of term admissions for jaundice can probably be appropriately managed in a transitional care setting, avoiding separation of mother and baby."

The discussion now reads "These findings suggest that around two-thirds of infants may be appropriately cared for in a transitional care setting where they remain with mother, with maternity and

neonatal support.”

The conclusion of the paper now reads “Around two-thirds of infants admitted to neonatal care for the management of jaundice may be appropriately managed in a transitional care setting, avoiding separation of mother and baby.”

Care should be taken in drawing conclusions about the risk of kernicterus with such small numbers, but I think that the recommendation for assessment at home around day 3 of babies with risk factors is justified. I hope that the cases of kernicterus are being examined separately to allow lessons to be learned (did all of these babies actually have potentially identifiable risk factors?)

Response: We agree and have emphasised this in the discussion by adding the underlined:

“Although the absolute numbers of kernicterus are small, and cautious interpretation is necessary, the rate of kernicterus among those admitted from home was almost five times higher than those admitted from hospital. We speculate this may be due to higher bilirubin levels at later presentation as a result of the lack of recognition by parents as midwives usually....”

We have also added to the discussion why this is important:

“Given the severity of the disability associated with kernicterus, and the lifetime costs to the NHS, any intervention which can reduce the prevalence of this devastating condition needs to be carefully evaluated.”

In addition, we have removed the following paragraph from results in the abstract “The rate of kernicterus was five times higher among those admitted from home compared to hospital although numbers were small”.

Reviewer: 3

Dr Aung Soe

Institution and Country, Medway NHS Trust, UK

Please state any competing interests or state ‘None declared’: None

Please leave your comments for the authors below

Very interesting paper on a current topical national issue.

The abstract is balanced and complete, however, the reason for the conclusion of 'around a third of term admissions for jaundice can be managed in a transnational care setting' is not clear in the paper. In Table 4 on home vs hospital admissions, should statistical analysis be done?

A clear statement on 'admissions to Paediatric wards are excluded' would be helpful

Response: See responses to reviewer 2 Helen Mactier

We have added to the methods “Admission to paediatric wards were not available” rather than “excluded” as this information was not actually available to the authors and not part of the NNRD. The Badger System is not available on paediatric wards.

VERSION 2 – REVIEW

REVIEWER	Dag Bratlid Department of Health administration and health economics, Faculty of medicine, University of Oslo, Norway
REVIEW RETURNED	29-Mar-2017

GENERAL COMMENTS	This manuscript has been significantly improved by the revision. I still think that "Supplementary Table 1 is unnecessary, the data in the table is "common knowledge" and is sufficiently described in the text in the paragraph "Risk factors for admission for jaundice" on page 10. Also, the "Supplementar figure 1" does not give any
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	significant information in addition to what is written in the paragraph "Study population" on page 5.
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REVIEWER	Aung Soe Medway NHS Trust UK
REVIEW RETURNED	29-Mar-2017

GENERAL COMMENTS	The authors have revised adequately on comments by three reviewers.
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VERSION 2 – AUTHOR RESPONSE

Reviewer: 1
Dag Bratlid
Department of Health administration and health economics, Faculty of medicine, University of Oslo, Norway
Please state any competing interests or state 'None declared': None declared

Please leave your comments for the authors below

This manuscript has been significantly improved by the revision. I still think that "Supplementary Table 1 is unnecessary, the data in the table is "common knowledge" and is sufficiently described in the text in the paragraph "Risk factors for admission for jaundice" on page 10. Also, the "Supplementar figure 1" does not give any significant information in addition to what is written in the paragraph "Study population" on page 5.

Response:
Thank you for your comments. We have removed the supplementary figure 1 and table 1 as suggested by the reviewer. Hence we no longer have a supplementary section.

Reviewer: 3
Aung Soe
Medway NHS Trust, UK
Please state any competing interests or state 'None declared': None declared

Please leave your comments for the authors below
The authors have revised adequately on comments by three reviewers.