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Reintroduction of vacuum extraction in a tertiary referral hospital in Uganda

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Summary

Far too many birth-related maternal and perinatal deaths still occur in low-income countries. Prolonged labour is a common cause of maternal and perinatal morbidity and mortality.¹⁻³ In many hospitals in the world, prolonged second stage of labour results in a (technically difficult) second-stage caesarean section with a high risk of complications, such as haemorrhage, sepsis or complications from anaesthesia. Especially in low-income countries, these complications can be life-threatening.³ Many caesarean sections could be prevented by use of assisted vaginal birth, with vacuum extraction being the method of first choice.⁴

In Mulago hospital, the national referral hospital in Uganda, vacuum extraction was hardly used. Therefore, a programme to increase the use of vacuum extraction in this hospital was developed. The programme consisted of supply of equipment, training of staff and development of a local guideline for the use of vacuum extraction. The studies evaluating the impact of the programme resulted in this thesis.

Chapter 1 presents background information about Uganda, Mulago hospital, vacuum extraction and caesarean section. The six research questions, that form the basis of this thesis are introduced:

- 1 What is the impact of a programme aiming to increase the use of vacuum extraction in Mulago hospital on vacuum extraction incidence and maternal and perinatal outcome?
- 2 Which factors were causing the low utilisation of vacuum extraction in Mulago hospital?
- 3 What are health professionals' perspectives regarding vacuum extraction in Mulago hospital?
- 4 What are maternal and perinatal outcomes of vacuum extraction in this setting, compared to second-stage caesarean section?
- 5 What are women-centred outcomes of vacuum extraction, such as birthing experience, quality of life, experience of pain, sexual activity and dyspareunia in this setting, compared to second-stage caesarean section?
- 6 Do women in Mulago hospital consider vacuum extraction an acceptable intervention?

In **chapter 2** the implementation of the programme is described. Measurement of mode of birth, maternal and perinatal outcome before (n=12 143 births) and after (n=34 894 births) implementation was used to answer the first research question:

What is the impact of a programme aiming to increase the use of vacuum extraction in Mulago hospital on vacuum extraction incidence and maternal and perinatal outcome?

Following the training of staff and the introduction of equipment, use of vacuum extraction increased from 0.6% to 2.4% of births and an association with improved maternal and perinatal outcome was strongly suggested. The shorter decision-to-birth interval for vacuum extraction compared to caesarean section probably played an important role.

In **chapter 3**, research questions 2 and 3 are addressed, using a survey that was returned by 83 staff members of Mulago hospitals maternity unit.

Which factors were causing the low utilisation of vacuum extraction in Mulago hospital?

Lack of functioning equipment and vacuum extraction skills, as well as concerns related to neonatal outcome were factors contributing to low utilisation. Indications for use of vacuum extraction were not always recognised and contraindications incorrectly assumed.

What are health professionals' perspectives regarding vacuum extraction in Mulago hospital?

Most health professionals would prefer vacuum extraction over caesarean section for themselves or a relative in case of prolonged labour. This reflects a positive attitude towards vacuum extraction.

Chapter 4 presents the results of a prospective cohort study with six months follow-up that was conducted to answer research question 4:

What are maternal and perinatal outcomes of vacuum extraction in this setting, compared to second-stage caesarean section?

In a prospective cohort study of 783 women who gave birth by vacuum extraction (n=358) or second-stage caesarean section (n=425), substantially fewer severe maternal complications and maternal deaths occurred after vacuum extraction compared to caesarean section. Perinatal outcomes were comparable for both modes of birth.

Chapter 5 answers research question 5 about women-centred outcomes. Women in the cohort of chapter 4 were interviewed on the first day, six weeks and six months after birth.

What are women-centred outcomes of vacuum extraction, such as birthing experience, quality of life, experience of pain, sexual activity and dyspareunia in this setting, compared to second-stage caesarean section?

The majority of women were satisfied with their birthing experience after vacuum extraction. Up to six weeks after birth quality of life was better; experience of pain reduced and resumption to sexual activity occurred earlier after vacuum extraction compared to caesarean section. There was no difference in dyspareunia. At six-month follow-up, no differences between the groups existed anymore.

In **chapter 6** the women from the cohort in chapter 4 give their recommendations, answering research question 6.

Do women in Mulago hospital consider vacuum extraction an acceptable intervention?

The majority of women recommend vacuum extraction over caesarean section in case of prolonged second stage of labour. Based on these findings, and the findings in chapter 5, vacuum extraction seems to be an acceptable intervention to women in this setting.

Chapter 7 consists of a commentary in Lancet Global Health entitled '*Use of assisted vaginal birth to reduce unnecessary caesarean sections and improve maternal and perinatal outcomes*'. It was written by eight international obstetricians and global health specialists. The message of the commentary is: Re-introduction of vacuum extraction in low-income countries can play a major role in the prevention of mortality and morbidity related to prolonged labour and the reduction of unnecessary caesarean section in the second stage of labour. Broad re-introduction of vacuum extraction is recommended.

Chapter 8 is the general discussion of the thesis. The findings of all previous chapters are summarised and put into broader perspective. The chapter ends with the conclusion and recommendations of this thesis.

Conclusion

Our studies showed that (re)implementation of vacuum extraction in a high-volume university hospital in a low-income country was successful. What was mainly needed was skills training and provision of equipment. Health professionals generally had a positive attitude towards vacuum extraction and women preferred the intervention over caesarean section. Maternal outcome of vacuum extraction was substantially better than that of caesarean section. Decision-to-birth interval was shorter for vacuum extraction compared to caesarean section and intrauterine fetal death during waiting time for intervention higher in births by caesarean section. Severe neonatal trauma and brain damage were infrequent regardless to the mode of birth. Overall perinatal outcome was comparable. As vacuum extraction prevents women from having a uterine scar, long-term reproductive outcomes after vacuum extraction are expected to be better compared to caesarean section: less uterine rupture, less abnormal placentation, resulting in less maternal morbidity and mortality from haemorrhage and better perinatal outcome.

Recommendations

For all women in the world, who need an intervention in the second stage of labour with the fetal head at least at station 0, vacuum extraction should be the mode of birth of first choice, unless there is a contra-indication. Adhering to this recommendation will decrease caesarean section use in the second stage of labour and decrease maternal complications including maternal death while no negative effects on neonatal outcome are expected. It is therefore of utmost importance to initiate, promote and support international and institutional efforts to work towards the re-implementation of vacuum extraction.

In **chapter 9**, the epilogue, is described what happened in Mulago hospital after the end of the studies. It presents a rough calculation of how many severe complications might have been prevented since the start of the programme.

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