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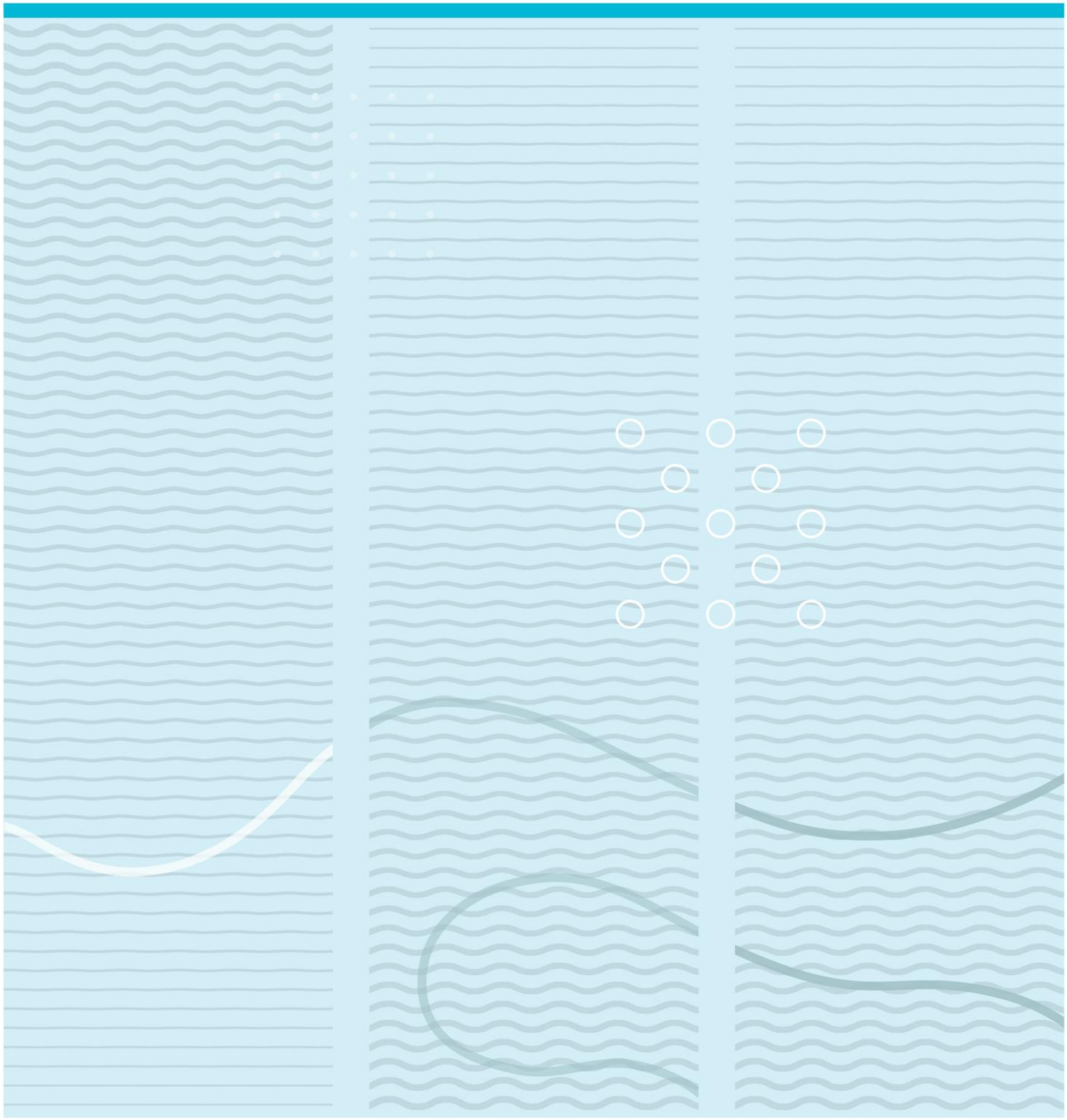
The effects of training skilled birth attendants in newborn resuscitation in Tanzania

A literature review



Foreword

I am very grateful to all of you who contributed in one way or another during my educational program Master in Midwifery. I would like to thank my supervisors SOS and AL for always being supportive and encouraging to me. Without the support from my family and friends during this process, I could never have written this master thesis. Thank you all very much.

It has been a bumpy road to walk, and many stones have been turned upside down along this road. Working side by side by my midwife-colleagues in Tanzania has given me new knowledge about their maternity ward. The deep insight into their challenges has forever changed my mind and become a part of me. I am not the same midwife after these experiences in Tanzania.

To write this master thesis have given me increased knowledge in research in addition to new perspectives in life. If someone opens the door for me doing further research, I will walk into that room with enthusiasm and motivation.

Ever tried. Ever failed. No matter. Try again. Fail again. Fail better.

Samuel Beckett

Tønsberg, 15.03.2017
Linda Wike Ljungblad

Contents

Introduction

This master thesis has the purpose to illuminate and increase knowledge about the effects of training skilled birth attendants in newborn resuscitation in Tanzania. As a part of maternity and newborn care, current challenges, and working environments are described and discussed from maternity wards in Tanzania.

This document contains of two parts. Part one is a literature review, which I want to submit for publishing in Midwifery. The guidelines for this journal are followed (Midwifery, 2016). The reason for choosing Midwifery is to increase knowledge to health care workers in maternity and neonatal intensive care units worldwide about newborn resuscitation in Tanzania.

The two words *newborn* and *neonate* are equally referring to a newborn baby from the interval of birth until 28 days of age according to the World Health Organization. Mostly, I have chosen to use *newborn* in this master thesis to make all readers easily understand who I am referring to. When I am referring to and discussing mortality rates, I chose to use *neonatal*, like my references. I have followed my references terminology, as *newborn* and *neonate* are equally described in the literature. *Skilled birth attendants* are chosen to describe the local midwives because the level of midwifery education in Tanzania differs from the western world. The research done where local midwives are included from developing countries, are additionally often referring to this profession as *skilled birth attendants.* To answer my review question, I found that writing a literature review was the best method. By choosing this method, I had a broader content than I would have had if I was creating my own study in this topic.

Part two is an essay where my review is framed in theories and additional considerations not described in my review. These theoretical frameworks are described and discussed in relation to the results of my review as well as to current challenges in Tanzania.

Part 1

The effects of training skilled birth attendants in newborn resuscitation in Tanzania

A literature review

Number of words:

Highlights: 40

Abstract: 249

Sammendrag: 255

The article: 4482 + 3 Tables + 2 Figures

Abstract

Introduction: Millions of newborns die every year worldwide. Prevention of newborn deaths is a huge challenge in developing countries.

Objective: This literature review reports the effects of training skilled birth attendants in newborn resuscitation in Tanzania by answering the following review question; What effects are reported by training skilled birth attendants in newborn resuscitation in Tanzania?

Design: A literature review. Systematic searches were conducted in the period of January to June 2016.

Participants and settings: 113 807 newborns are included from rural to urban settings in Tanzania. The number of birth attendants are not mentioned.

Findings: The seven included studies indicate reduction in early neonatal deaths and fresh stillbirths after training skilled birth attendants in newborn resuscitation. Overall increased knowledge, skills and performance is reported, and action within "the golden minute" is needed. Additionally, a highly cost-effective training program is documented.

Implications for practice: Training in newborn resuscitation of skilled birth attendants is reported to be beneficial, but not strongly enough in itself to make a difference for newborn resuscitation in Tanzania.

Key conclusions: No training is stronger than its's weakest factor, and extensive challenges in Tanzania are reported at several levels. The reported challenges are lack of human resources, knowledge, supplies, humanization and dignity in maternity wards. Additionally, hospitals often have neither water nor soap. Further training, action and research are needed to improve skilled birth attendant's possibilities to save millions of newborn lives.

Keywords: fresh stillbirths, neonatal deaths, newborn resuscitation, skilled birth attendants, Tanzania and training.

Sammendrag

Innledning: Millioner av nyfødte barn dør hvert år på verdensbasis. Forebygging av nyfødt-dødsfall er en stor utfordring i utviklingsland.

Mål: Denne litteratur gjennomgangen rapporterer effekter av å trene lokale jordmødre i hjerte-lunge-redning til nyfødte i Tanzania ved å svare på dette forskningsspørsmålet; Hvilke effekter er rapportert ved å trene lokale jordmødre i hjerte-lunge-redning til nyfødte i Tanzania?

Design: En litteraturgjennomgang. Systematiske søk ble gjennomført i perioden fra januar til juni 2016.

Deltakere og setting: 113 807 nyfødte er inkludert fra landsbygd til urbane områder i Tanzania. Antallet fødselshjelperne er ikke nevnt.

Funn: De syv inkluderte studiene indikerer reduksjon i tidlige dødsfall blant nyfødte og nylig intrauterine fosterdød (fresh stillbirth) etter trening lokale fødselshjelpere i hjerte-lunge-redning av nyfødte. Totalt er økte kunnskaper, ferdigheter og utførelser rapportert, og tiltak innen "de første 60 sekunder" er nødvendig. I tillegg er det dokumentert et kostnadseffektivt treningsprogram.

Implikasjoner for praksis: Opplæring i hjerte-lunge-redning til nyfødte av lokale jordmødre er rapportert å være fordelaktig, men ikke sterkt nok i seg selv til å gjøre en forskjell for hjerte-lunge-redning nyfødt gjenopplivning i Tanzania.

Konklusjoner: Ingen trening er sterkere enn svakeste faktor, og omfattende utfordringer i Tanzania rapporteres på flere nivåer. De rapporterte utfordringene er mangel på menneskelige ressurser, kunnskap, utstyr, humanisering og verdighet på fødeavdelingene. I tillegg har sykehus ofte verken vann eller såpe. Videre trening, handling og forskning er nødvendig for å forbedre lokale jordmødres muligheter til å redde millioner av nyfødte barns liv.

Nøkkelord: hjerte-lunge-redning til nyfødte, lokale jordmødre, neonatale dødsfall, nylig intrauterin fosterdød (fresh stillbirth), Tanzania og trening.

Highlights

- 113 807 newborns included.
- Overall increased knowledge, skills and performance of skilled birth attendants in newborn resuscitation after training
- Reduced neonatal deaths and fresh stillbirths.
- Action is needed within “the golden minute”.
- Highly cost-effective training program in newborn resuscitation.

Background

Globally, 136 million babies are born every year, and there are an estimated 3,7 million neonatal deaths yearly (Steele, 2013; Lee et al., 2011). 98% of these deaths are reported from developing countries (Steele, 2013). World Health Organization (WHO) reports that one fourth to one half of these neonates die within the first 24 hours after birth (World Health Organization, 2012). The neonatal mortality rate has declined in all world regions from 1990 to 2009 (Oestergaard et al., 2011). Among countries with high neonatal mortality, those within sub-Saharan Africa have had the slowest progress in saving newborn lives (Oestergaard et al., 2011). In addition to the neonatal deaths, there are an estimated three million stillbirths yearly (Carlo et al., 2010). Analysis indicates that available interventions can reduce the three most common cause of neonatal mortality; preterm deaths by 58%, intrapartum deaths by 79%, and infection-related deaths by 84% (Bhutta et al., 2014). The United Nations Millennium Development Goal number 4 (MDG4) hopes to decrease child mortality and prevent of neonatal deaths by appropriate resuscitation, and progress has already been made (United Nations, 2013). In Africa, the newborn mortality rates have decreased much more slowly than maternal mortality rates during the last three decades (Lassi et al., 2010). If no further improvement is made, sub-Saharan Africa will account for 33% of the births and 60% of the deaths worldwide in 2030, compared with 25% and 50% in 2013. In other words; 4,4 million children below 5 years old will still die in sub-Saharan Africa in 2030 (Liu et al., 2015). Unfortunately, subnational data on neonatal mortality in Tanzania from 2015 was of poor quality with no observable trends across several regions (Armstrong et al., 2015). World Health Organization (WHO) advocates for "skilled care at every birth". "Skilled birth attendants" include midwives, doctors or nurses working in maternity with deliveries, who have been trained to manage normal childbirths and perform immediate newborn care (World Health Organization, 2004). Several different professions are managing deliveries in developing countries, which are different from in the western world. About 60 million annual births globally occur outside of health facilities, mostly without skilled birth attendants (Wall et al., 2010). In Zanzibar, only 50 % of deliveries are reported from health facilities, which means that another half are conducted at home most likely without a skilled birth attendant present (Fakih et al., 2016).

Intrapartum-related neonatal deaths and birth asphyxia, are the leading causes of child mortality globally (Lawn et al., 2009a). WHO defined birth asphyxia as failure to initiate and sustain breathing at birth (World Health Organization, 2012). Birth asphyxia accounts for about 23%

of the approximately four million neonatal deaths each year (Black et al., 2010). Most stillbirths occur in developing countries, and are associated with obstetric emergencies, infections and fetal growth restriction (Lawn et al., 2011). Interventions like clean delivery practices, immediate warming of the newborn, umbilical cord care, and neonatal resuscitation is reported to prevent 40 to 70% of newborn deaths (St Clair et al., 2014). Newborn infants generally require little assistance in order to undergo the physiological transition at birth to adapt to extra uterine life, and only 10% need immediate help to breathe (Vali et al., 2015). Very few newborns require advanced resuscitation (Wall et al., 2009). A scientifically based education program called Helping Babies Breathe (HBB) was created by the American Academy of Pediatrics in 2010 to equip birth attendants working in developing countries with skills for neonatal resuscitation and newborn care by using train-the -trainer model (Steele, 2013). The focus is "the golden minute", which is described as the first 60 seconds after the birth of the baby (Steele, 2013). The course is hands-on simulation training, and focuses on simple techniques like keeping the baby warm, rubbing the baby dry, and suctioning the baby's mouth and initiated correct face-mask ventilation within 60 seconds if necessary (Little et al., 2011). The purpose of this evidence-based program is reducing global neonatal mortality by educating birth attendants to provide basic neonatal resuscitation (Steele, 2013). This program is directly corresponding to the MDG4 of reducing child mortality (Steele, 2013). Simulation training of midwifery skills has been documented to be beneficial, and provides opportunities to learn from mistakes without risks to patients (Cooper et al., 2012; Ennen and Satin, 2010). Effective simulation training is reported to improve perinatal care and outcome, and enhances practical skills which may reduce the time it takes to achieve competence (Smith et al., 2013; Cooper et al., 2012). Several training courses worldwide promote improvement in the quality of care and resuscitation provided to newborns in developing countries (Opiyo and English, 2015). Neonatal resuscitation is a skill, and health workers need to be properly trained (Opiyo and English, 2015). Mastering the skills of newborn resuscitation is difficult, both in high and low resource settings (Thallinger et al., 2015). Health workers in poor countries often do not have these skills, and these babies are therefore more likely to die (Opiyo and English, 2015). Lack of evidence from sub-Saharan Africa related to promotion of newborn care and newborn survival is remarkable (Penfold et al., 2013).

This review reports the effect of training skilled birth attendants in newborn resuscitation in Tanzania found in literature published within the last 5 years. Among developing countries, the progress of African countries has been slowest in reducing neonatal mortality, even if there has been increased focus on education and training (Steele, 2013; Oestergaard et al.,

2011). Lack of human resources is reported from Sub-Saharan Africa, and the region has even the lowest number of health care workers per capita in the whole world (Soucat et al., 2012). Limited availability of human resources, supplies and primary needs like soap and water in the hospitals, makes it challenging to provide essential newborn care and clean births (Soucat et al., 2012).

Objective

The objective of this study was to report the effects of training skilled birth attendants in newborn resuscitation in Tanzania.

Review Question

What effects are reported by training skilled birth attendants in newborn resuscitation in Tanzania?

Methods

A review method was used to investigate the review question (Aveyard, 2014).

The inclusion and exclusion criteria

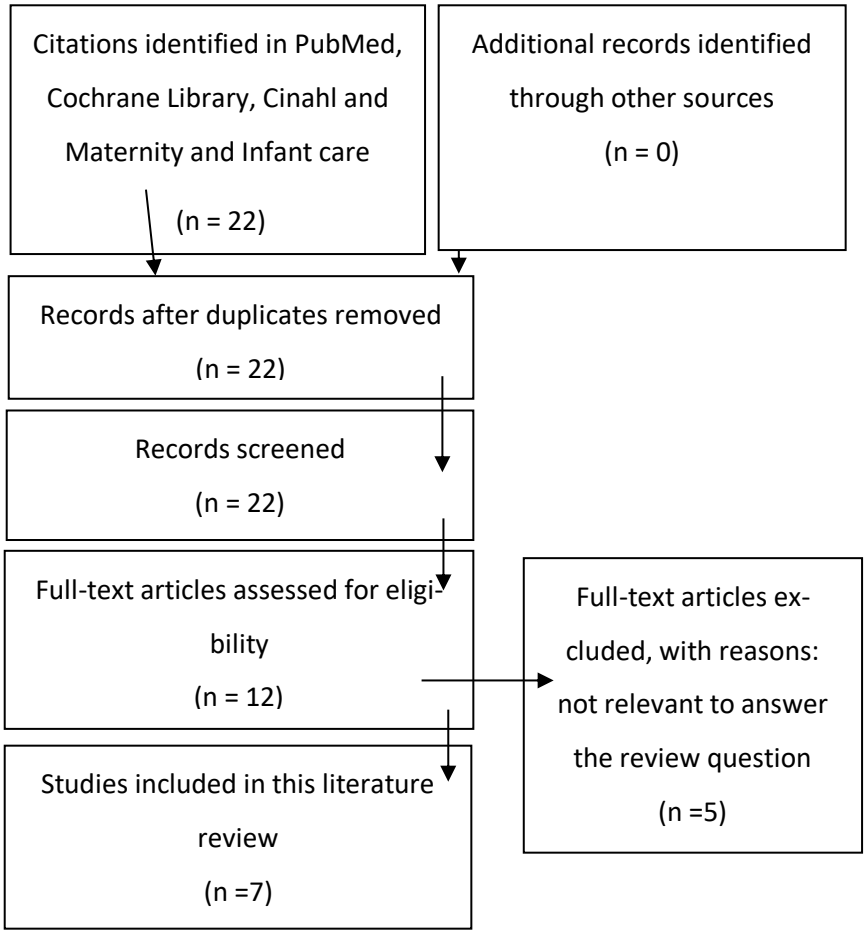
The inclusion criteria were: full text studies from peer-reviewed journals published on training of skilled birth attendants in newborn resuscitation in Tanzania, published in English the last five years. The exclusion criteria were: studies from other countries than Tanzania, expert statements, theoretical and review studies. Studies older than five years and studies on other professions than skilled birth attendants were also excluded.

Search and selection strategy

Searches were done in PubMed, Cochrane Library, Cinahl and Maternity and Infant care in the period from January to June 2016. Figure 1 documents the searching process and selection

of included studies. Reference lists of identified studies were searched for relevant studies, but none were found matching the inclusion criteria. Searches including "training" or “education” were frequently done, resulting in fewer studies matching the inclusion criteria. Therefore “training” was manually added to the search before including the studies in this review. After repetitive searches, 7 studies could answer the review question and were included. All included studies were found in the database of PubMed. The searching log are documented in Appendix 1.

Figure 1. *Flow chart of the search process and selection.*



Only quantitative studies were found, even though the search was open for all kind of studies. Qualitative studies would also have been of interest. Searches have additionally been done with an experienced librarian. Searching on web pages was done regularly as well, defined as grey literature, resulting in no included studies. The following search string was conducted: “newborn OR infant OR neonate” AND “resuscitation OR mask OR ventilation” AND “Tanzania”, limited to the last 5 years.

Methodological quality assessment

Examination of the methodologies of the primary studies were assessed by the 12-point checklist from Critical Appraisal Skills Program (CASP) (Critical Appraisal Skills Programme, 2013). Methodological information of all included studies about design, sample and measurements has systematically been criticized and evaluated and described in CASP table, Appendix 2. The risk of bias and Bradford hills criteria were considered in each article individually (Critical Appraisal Skills Programme, 2013). Risk of bias due to confounding factors is frequently seen in observational studies. The Hawthorne effect; by being observed you might perform better, will always affect observational studies (Critical Appraisal Skills Programme, 2013). It is therefore important to review methodological procedures such as validity, reliability, generalization and rigour. Table 1 report the quality assessment of all included studies. 4 studies are described as strong and 3 as moderate according to the quality assessment.

Table 1. *Quality assessment of included studies.*

Quality assessment of included studies Included studies	S =strong M =moderate W =weak
Msemo et al., (2013)	S
Ersdal et al., (2013)	S
Mduma et al., (2015)	S
Ersdal et al., (2012b)	M
Ersdal et al., (2012a)	M
Makene et al., (2014)	M
Vossius et al., (2014)	S

Thematic analyzes

Both content analyzes and thematic analyzes was inspiring the author during analyzing process (Graneheim and Lundman, 2004; Holopainen et al., 2008). The author made a puzzle of all components from the results of included studies. These components were summarized into four themes, which is reported as results in this review documented in Table 3. Content analyses describes manifest content as the visible, obvious component what a text says, in contrast to interpret the underlying meaning of a text, which refers to as latent content (Graneheim and

Lundman, 2004). Interpretation as well as "unit of analyzes" are basic decisions when using content analyzes (Graneheim and Lundman, 2004). The seven studies, were read several times, to get a broader understanding of the content. The thematic synthesis emerged by reading and re-reading the studies in order to synthesize the findings (Holopainen et al., 2008). Different patterns and concepts were identified across the data, leading to common meanings and concepts that were considered descriptions of the effects of training skilled birth attendants in newborn resuscitation in Tanzania. By analyzing the meaning unit into themes matching each other, the author re-wrote the names repeatedly to avoid losing some aspects of the results into these four themes. There was limited amount of material from the seven included studies, therefore was this part of analyzing process even more important. The process has gone back and forth between different steps from beginning to the end (Graneheim and Lundman, 2004). Most themes emerged naturally during the process, but adjustments for naming the themes was a longer process. During this process, changes of how to interpret the meaning, and new ideas were frequently discovered. The final categories were condensed and formed as themes documented in Table 3 (page 13). Finally, the process of relating these themes to the research question is illustrated in Figure 2 (page 13) as results in relation to each other.

Results

113 807 newborns are included in total, but the number of skilled birth attendants is not mentioned. No studies were identified written in non-English languages. The seven included studies indicate reduction in early neonatal deaths and fresh stillbirths after training of skilled birth attendants in newborn resuscitation. Overall increased knowledge, skills and performance in newborn resuscitation was reported, and action within "the golden minute" is needed. Additionally, a highly cost-effective training program has been documented. Characteristics of each included study is summarized in Table 2.

4 studies included the organization Helping Babies Breathe (HBB) training programs, and 3 studies did not include HBB. There were variations in length and repetition in the training programs. HBB had both one-day and two-days training programs, and some with re-trainings. Observation in delivery room and video-taping have been used for practical evaluations.

Table 2. *Characteristics of the included studies.*

	Author/ Year/ Country/ Magazine	Aim of the study	Type of study	Main findings/ conclusions	Strengths and limitations
1.	H.L.Ersdal, E.Mduma, E.Svensen and J.M.Perlman (2012a). Tanzania Published in Pediatrics	To determine the presumed causes of neonatal death within 24 hours in a rural hospital in Tanzania.	Prospective descriptive observation study.	256 infants were moved to neonatal area. 49 infants died secondary to birth asphyxia (BA). 5-minute Apgar was ≤ 7 in 50% of those who died. Early neonatal mortality mostly relates to BA. 5-min Apgar is a poor surrogate of BA.	Strengths: 4720 infants were born and evaluated over 1 year. Research assistants were present 24-hours a day in labor ward for observations. Limitations: infants were likely misclassified or not reported as fresh stillbirths. Gestational age is based on self-report.
2.	H.E.Ersdal, E.Mduma, E.Svensen and J.M.Perlman (2012b). Tanzania Published in Resuscitation	To define normal transitional respiratory adaption. To describe interventions performed by skilled birth attendants. To assess importance of "the golden minute".	Observational study.	The risk for death or prolonged admission increases 16% for every 30 seconds' delay in initiating FMV up to six minutes and 6% for every minute of applied FMV.	Strengths: 5845 infants included. Study period of 14 months. Limitation: Definition of birth asphyxia is imprecise.
3.	H.E.Ersdal, C.Vossius, E.Bayo, E.Mduma, J.Perlman, A.Lippert, E.Soreide (2013). Tanzania Published in Resuscitation	To determine effects on practical skills and management strategies. To describe neonatal management in delivery room.	Observational study. Before and after study design.	The providers who "passed" the simulated "routine care" and "neonatal resuscitation" increased from 41% to 74%. The number of babies being suctioned and/ or ventilated did not change, and the use of stimulation decreased after HBB training.	Strengths: Included newborns 2745 before and 3116 after. Limitations: before and after design. Increased deliveries without increasing staff. High staff turnover.
4.	C.L.Makene, M.Plotkin, S.Currie, D.Bishanga, P. Ugwi, H.Louis, K.Winani, B.D.Nelson (2014). Tanzania BMC Pregnancy and Childbirth	To observe the skilled birth attendant's skills in essential newborn care in region hospitals, health care centers and dispensaries.	Cross-sectional surveys pre- and post-intervention. Observation of essential newborn care.	Significant overall improvement from 39% to 73%. Statistically increased knowledge, but no increase in skills for newborn resuscitation using a mannequin. The knowledge of the skilled birth attendants increased. Skills in resuscitation using a newborn mannequin were persistently low. Only 77% were skin-to skin, increasing with 35%. Delayed cord clamping increased 12%.	Strengths: 489 infants in 2010 and 560 in 2012. 52 facilities included. Study period of 2 years. Limitations: the Hawthorne effect.
5.	Mduma E, Ersdal H, Svensen E, Kidanto H, Auestad B, Perlman J (2015). Tanzania Published in Resuscitation	To assess the impact of frequent brief on-site simulation training on newborn resuscitation of skilled birth attendants. To assess the potential impact on 24-h neonatal mortality.	Educational interventional study. Before and after study design.	Deliveries attended by skilled birth attendants increased, and resuscitations performed by midwives increased significant. The number of stimulated neonates increased, suctioning babies increased and neonates receiving bag mask ventilation decreased. Mortality at 24-h decreased from 11,1% to 7,2%.	Strengths: 4894 deliveries before and 4814 after FBOS- training. Limitations: Before and after study design. Mask leak, obstruction and performance are confounding factors.
6.	Msemo G, Massawe A, Mmbando D, Rusibamayila N, Manji K, Kidanto HL, Mwizamuholya D, Ringia P, Ersdal HL, Perlman J (2013). Tanzania Published in Pediatrics	To document newborn mortality and fresh stillbirths in Tanzania after helping babies breathe training of skilled birth attendants.	Observational study. Before and after study design.	Significant reduction by 47%, in early neonatal mortality within 24 hours, and 24% reduction in fresh stillbirths was reported after 2 years. The use of stimulation increased, suctioning increased and face-mask ventilation decreased.	Strengths: 86624 newborns included. Limitations: before and after study design. English language in education material. Only 2-month baseline time before study start.
7.	Vossius C, Lotto E, Lyanga S, Mduma E, Msemo G, Perlman J, Ersdal HL (2014). Tanzania Published i PLoS one	To analyze the cost-effectiveness after HBB program of skilled birth attendants at Haydom Lutheran Hospital in Tanzania.	Data linked to an observational study. Before and after study design.	Costs per life saved USD 233. Cost per life gained USD 4,21. HBB is a low-cost intervention program. Implementation has been highly cost-effective. The cost will be lower for re-trainings, as the equipment is present and the instructors have already been trained.	Strengths: a study in Zambia reported similar results for cost-effectiveness of a "essential newborn care course». 4876 deliveries observed for 12 months before education implementation. Limitations: single center design. 4734 births per year might not be enough statistical power. Rural setting might not be transferrable to other sites.

All included studies are observational studies, and most studies have before and after design. Makene et al., (2014) additionally used cross-sectional surveys as study design. All training

was conducted on mannequins, and cannot be transferred directly into clinical skills and performance. Ersdal et al., (2013) reported that the increased number of providers passing the training on a mannequin were not reported as an improvement for clinical practice. Some included studies even reported sustained same level of ventilation skills, stimulation and resuscitation, although improvements in these skills were generally documented. All included studies documented effect of training in newborn resuscitation in different ways, documented as themes after the thematic analyses in Table 3.

Table 3. *The themes after the thematic analysis of the included studies.*

Reduction in early neonatal deaths and fresh stillbirths	Mduma et al., (2015) Msemo et al., (2013)
Overall increased knowledge, skills and performance in newborn resuscitation after training	Makene et al., (2014), Ersdal et al., (2013), Msemo et al., (2013), Mduma et al., (2015)
Action needed within "the golden minute"	Ersdal et al., (2012a) Ersdal et al., (2012b)
Highly cost-effective training program	Vossius et al., (2014)

These four themes answer the review question, and can be seen both in relation to each other as well as single results, illustrated in Figure 2.

Figure 2. *Results in relation to each other after the thematic analysis.*

Reduction in early neonatal deaths and fresh stillbirths.

Msemo et al., (2013) observed 86 624 newborns, and documented a sustained 47% reduction in early neonatal mortality within 24 hours, and a 24% reduction in fresh stillbirths. The authors concluded that implementation of Helping Babies Breathe education program for skilled birth attendants was associated with significant reduction in both early neonatal deaths within 24 hours and rates of fresh stillbirths. Similar findings were documented by Mduma et al., (2015) observing 4894 deliveries pre- and 4814 post-implementations of frequent brief on-site simulation training for skilled birth attendants, and reported that mortality at 24 hours decreased to 7,2%. The authors concluded that frequent brief on-site simulation training appears to facilitate transfer of new knowledge and skills into clinical practice and to be accompanied by a decrease in neonatal mortality.

Overall increased knowledge, skills and performance in newborn resuscitation after training

Msemo et al., (2013) reported that the use of stimulation and suction increased, while face-mask-ventilation decreased. Mduma et al., (2015) documented that the number of stimulated newborns increased, those suctioned increased and newborns receiving face-mask-ventilation decreased. Practicing in ”routine care” and ”neonatal resuscitation” increased the number of providers who ”passed” on the training on a mannequin (Ersdal et al., 2013). The number of newborns being suctioned/ventilated at birth did not change and the use of stimulation in the delivery room decreased after HBB training of skilled birth attendants (Ersdal et al., 2013). Ersdal et al., (2013) concluded that skilled birth attendants performed significantly better in simulated neonatal care and resuscitation seven months after one day HBB training. Because the results were completed on a mannequin, the improvements were not transferred into clinical practice (Ersdal et al., 2013). Makene et al., (2014) observed newborn care and documented significant overall improvement. Skilled birth attendant’s knowledge improved, but skills in resuscitation using a newborn mannequin were persistently low (Makene et al., 2014). Makene et al., (2014) reported that only 77% of the newborns were placed skin-to-skin with their mother, increasing by 35%, and delayed cord clamping increased significantly by 12%. Makene et al., (2014) concluded that the program was successful in raising the quality of essential newborn care performed by skilled birth attendants.

Action needed within "the golden minute"

Ersdal et al., (2012b) reported that the risk for death increases rapidly the first minutes after birth. The authors concluded that most lifeless babies were in primary apnea and responded to stimulation/ suctioning and/ or face-mask-ventilation from skilled birth attendants, and infants who required face-mask-ventilation were more likely to die when ventilation was delayed or prolonged (Ersdal et al., 2012b). Ersdal et al., (2012a) observed skilled birth attendants routine care in labor ward and evaluated 4720 infants, where 49 infants died secondary to birth asphyxia, prematurity, low birth weight, congenital abnormalities and infections. The authors concluded that most deaths were related to birth asphyxia and that 5-minute Apgar score is a poor surrogate for birth asphyxia.

Highly cost-effective training program

Vossius et al., (2014) measured the actual cost, and concluded in their study that implementation of the HBB program in rural Tanzania is highly cost-effective. Observation and evaluation of the cost for one year before and one year after implementation of the HBB program were conducted. Once implemented, re-trainings gave no direct costs as practicing was done during working hours and with the existing training material and equipment (Vossius et al., 2014).

Discussion

The objective of the study was to report effects of training skilled birth attendants in newborn resuscitation in Tanzania.

Tanzania, as a part of Sub-Saharan Africa, still has one of the highest neonatal mortality rate and most fresh stillbirths in the region even after several newborn resuscitation training programs (Oestergaard et al., 2011). Early newborn deaths are likely underreported and misclassified as fresh stillbirths (Ersdal et al., 2012a; Lawn et al., 2009a; Thukral et al., 2015). Africa has been slowest among developing countries in reducing neonatal mortality, and the high rate of fresh stillbirths is a strong indicator of the quality of care (Oestergaard et al., 2011; Maaløe et al., 2016). Poor quality of care in the poorest part of the world, doesn't provide care according to human rights (Solnes Miltenburg et al., 2016). Too little, too late describes care with inadequate resources where care is unavailable until it is too late to help (Miller et al.,

2016). A wider understanding of how knowledge and skills are learned and maintained are needed (Reisman et al., 2016). Too little, too late is described as an underlying problem in developing countries leading to sustainable high mortality and morbidity (Miller et al., 2016). This is the most unfair situation in the world; the poorest women and newborn babies are additionally given the poorest quality of care. Multiple factors discussed below may help explain why there still are challenges to improve quality of care after training programs in newborn resuscitation in Tanzania.

Training programs

Flexible, interactive management and empowerment is essential to encourage and motivate skilled birth attendants to do their best (Tibandebage et al., 2016). When skilled birth attendants feel engaged to a task, their knowledge and achievements can be implemented in maternity wards (Tibandebage et al., 2016). This review report overall increased knowledge, skills and performance of skilled birth attendants in newborn resuscitation. Improvement on training conducted on mannequins, cannot directly be transferred into clinical practice. Knowledge and reciprocal relationship are both pillars in the theory of woman-centred care, and can likely be helpful factors to succeed with training programs if the cultural context also is taken into account (Berg et al., 2012).

This review also report a highly cost-effective training program, with similar findings reported in two other studies (Manasyan et al., 2011; Vossius et al., 2014; Opiyo and English, 2015). Cost-effective training programs are huge benefits in developing countries, as further training and education is at low-cost. Knowledge and skill falloff is unfortunately reported as barriers to success in training programs (Reisman et al., 2016). On the other side, refresher training, frequent re-testing and skills practice is reported promising (Reisman et al., 2016). A critical view to training programs in newborn resuscitation is when programs are developed and tested in western countries, unknown whether they will work or not in developing countries (Opiyo and English, 2015).

Local trained trainers can motivate and inspire colleagues at their maternity wards (Tibandebage et al., 2016). Train-the-trainer-model by HBB, are using the local language in their ordinary context as a natural part of the programs (Steele, 2013). When skilled birth attendants work beside trained trainers, practical training and clinical understanding of newborn resuscitation within “the golden minute” may likely be achieved. This result is also reported

from this review. A positive view is reported from skilled birth attendants that training programs helped them to increase their knowledge, skills and confidence, and that provided equipment simplified newborn resuscitation (Isangula et al., 2016).
Long-term effects more than 2 years after a training program are not measured in any of the included studies. The lack of long-term effects is obvious as Tanzania's neonatal mortality is still one of the highest of developing countries, which needs to be addressed to MDG4 (Oestergaard et al., 2011; United Nations, 2013).

Neonatal mortality

Two included studies reported reduction in early neonatal deaths and fresh stillbirths (Msemo et al., 2013; Mduma et al., 2015). Correlation between reduction in neonatal deaths and increased knowledge, skills and performance of skilled birth attendants are reported in one included study (Makene et al., 2014). Stillbirths are described as a devastating burden of avoidable lost lives, which is easy to assess (Maaløe et al., 2016). By describing that these situations are easy to asses, are doing the training programs even more essential. It is suggested that a reduction in underreporting and misclassification is achieved by increasing knowledge in an included study (Ersdal et al., 2012a). 52% of stillbirths were reported with a positive fetal heart rate on admission at maternity ward, but more than half were not even classified as "fresh" or "macerated" stillbirths (Maaløe et al., 2016). Fresh stillbirths were often documented as macerated stillbirths, and inadequate documentation in the delivery record book is suggested to be a reason for misclassification (Fakih et al., 2016). Failure to document stillbirths is reported as another explanation (Maaløe et al., 2016). Inadequate identification of stillbirths and lack of systematic data on the numbers are suggested globally as reasons for hidden numbers of stillbirths (Lawn et al., 2009b). The real numbers of stillbirths are therefore unknown. However, the fact that these lost lives can be avoided by proper resuscitation and by improved quality of care, makes newborn resuscitation training programs even more essential in this context in Tanzania.

Challenges at maternity wards

In order to understand the context of training programs in Tanzania, current challenges must be discussed. Context is important surrounding factor in all relations (Berg et al., 2012). Experiences from maternity wards in Tanzania report challenges like intermittent electricity, no running water, few beds, lack of midwifery or obstetric education, insufficient monitoring, that time limits are not applied and that teaching is difficult (Main, 2016). Additionally,

women are sharing beds with one or two other patients, without their partner present. Beds are located in an open room with many women in labor, being cared for by few skilled birth attendants who often do not communicate with the patients (Meguid, 2016). Lack of human resources, supplies and primary needs like soap and water in the hospitals, makes clean births and the quality of newborn care challenging (Soucat et al., 2012). Essential newborn care, hygienic birth and newborn resuscitation are related with reduced newborn mortality at low-cost (Penfold et al., 2013). Managing births and performing newborn resuscitation in this environment is challenging. Woman-centred care describes basic essential care for every woman in labor, including a bithning atmosphere with safe, calm, trusting and strengthening environment (Berg et al., 2012). Maternal and newborn care are often of poor quality due to lack of human resources, but also lack of insufficient knowledge and motivation (Soucat et al., 2012). Enough staffing to have one skilled birth attendant per woman in active labor is not described from developing countries illustrating a large gap in services provided (Soucat et al., 2012). The presence of a midwife during labor is important for early risk identification and to prevent situations leading to newborn resuscitation or fresh stillbirths (Berg et al., 2012; Kidanto et al., 2015; Langli Ersdal et al., 2012; Mmbaga et al., 2012). A need to strengthen human resource to improve emergency situations is reported from all sub-Saharan Africa, which has the lowest number of health care workers per capita in the whole world (Soucat et al., 2012; Fakih et al., 2016). A paradox in Tanzania with its large population, is that the lack of human resources still is a huge challenge in health care. The low number of skilled birth attendants in Tanzania is attributed to shortages in nursing training as well as challenges in sustaining motivations for the career (Tanaka et al., 2015). Additionally, there are described skill mix imbalance, uneven distribution, negative work environments in addition to poor knowledge from developing countries (Chen et al., 2004). As many as up to 85% of midwives are reported burnout and giving up their hope after years of task overloading. Burnout is a threat to reach the MDG4, which may influence emergency obstetric and newborn care (Thorsen et al., 2011). Described in other words: too little, too late, will not lead to improved respectful maternity care worldwide (Miller et al., 2016). This is interpreted as a need for the skilled birth attendants as role-models for improving maternity wards with enthusiasm and motivation (Tibandebage et al., 2016).

Human rights

Further challenges described are lack of humanization and dignity for woman giving birth in Zanzibar (Meguid, 2016). Women in labor in sub-Saharan Africa report about disrespect and

abuse, which can be described of a failing health system (Bradley et al., 2016; Maputle and Hiss, 2010; Sando et al., 2016). 70 % of women reported experiences of disrespect and being abusive, and the most frequent form is described as feeling ignored, abandoned or neglected (Rosen et al., 2015; McMahon et al., 2014; Sando et al., 2016). Improvement in quality of care, research, policy-making and adapting to woman-centred care has been attempted to change disrespectful childbirth practice without success (Sadler et al., 2016; Rosen et al., 2015). Humanizing values and woman-centered care into midwifery care is reported beneficial (Way and Scammell, 2016; Berg et al., 2012). A proposed solution is to humanize the health care by treating fellow human beings, born or unborn, with respect (Meguid, 2016). When a newborn baby struggle to breathe, human rights in addition to patient safety require our immediate attention for resuscitation (Meguid, 2008). The goal should be to give the right amount of care at the right time, and to provide this care in a manner that respects, protects, and promotes human rights, because all human beings have the same rights (Miller et al., 2016). Despite these challenges, included studies reported improvements in newborn resuscitation after training programs in Tanzania. Further research, training and action is still needed within "the golden minute" and additionally in the whole maternity care.

Methodological considerations

This review didn't analyze direct impact on mortality rate after training programs even though a result is reporting of reduction in newborn mortality. One included study observed the skilled birth attendant's performance of deliveries (Ersdal et al., 2012a). This study was still included as the Hawthorne-effect; by being observed health care workers perform better, and this effect is a confounding factor in observational studies. A limitation in all studies is that long-term effect after 2 years was not measured. The author found a broad spectrum of content, which made a meta-analysis impossible to create (Aveyard, 2014). No randomizes controlled trials (RCT) were found to be included in this literature review, probably because it is highly unethical to perform RCTs on emergency obstetric and newborn care interventions according to WHO (2011). The majority of included studies in this review are therefore observational studies.

Implications for practice

Training in newborn resuscitation of skilled birth attendants is reported to be beneficial, but not strongly enough in itself to make a difference for newborn resuscitation in Tanzania.

Conclusion

No training is stronger than its's weakest factor, and extensive challenges in Tanzania are reported at several levels. The reported challenges include lack of human resources, knowledge, supplies, humanization and dignity in maternity wards. Additionally, hospitals often have neither water nor soap. Further training, action and research are needed to improve skilled birth attendant's possibilities to save millions of newborn lives.

Conflict of interests

The author declares to have no participation, economical or personal interest or competing interests of the organization HBB, or any other organization related to this review.

Ethical approval

As this review was based on data from previously published literature, ethical approval was not required.

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Appendix 1

Searching log

Date for searching	Database	Searching words in relation to each other	Limitations	How many hits?	How many read abstracts?	Chosen articles
100216	Pubmed, Cinahl, Maternity and Infant care, Cochrane Library	(((((Newborn OR neonate OR fresh stillborn OR primary apnea OR asphyxia)) AND "last 5 years"[PDat])) AND (((Resuscitation OR mask OR ventilation)) AND "last 5 years"[PDat])) AND (((Third world OR developing- low income- less developed- under developed countries OR Africa OR Tanzania)) AND "last 5 years"[PDat])	none	98	34	17
010316	Pubmed, Cinahl and Maternity and Infant care, Cochrane Library	((((newborn OR neonate OR fresh stillborn OR primary apnea OR Asphyxia))) AND ((Resusciatation OR mask OR ventilation))) AND ((third world OR developing- low income- less developed- under developed countries OR Africa OR Tanzania))	Last 5 years	42	15	11 and I additionally from manually search on «similar articles»
110316	Pubmed	(((((newborn OR fresh stillborn OR neonate OR primary apnea))) AND ((resuscitation OR mask OR ventilation))) AND ((low income coutry OR developed country OR Tanzania))) AND Helping babies breathe	Last 5 years	8	8	6 1 excluded because of India, and 1 because: study protocol
120316	Pubmed	(helping babies breathe) AND Tanzania	Last 5 years	6	6	6
150316	Pubmed	((helping babies breathe AND "last 5 years"[PDat])) AND (((africa OR Tanzania)) AND "last 5 years"[PDat])	Last 5 years	9	6	6
290316	Pubmed	((((newborn OR neonate OR fresh stillborn))) AND ((Resuscitation OR mask OR ventilation))) AND Tanzania	Last 5 years	17	17	9, the excluded articles did not meet inclusion criterias or were review articles.
040516	Pubmed	((((newborn OR neonate))) AND ((resuscitation OR mask))) AND Tanzania	Last 5 years	16	16	8 included articles.
170516	Pubmed Maternity and Infant Care Cinahl	((((newborn OR infant OR neonate))) AND ((resuscitation OR mask OR ventilation))) AND Tanzania	Last 5 years	21 8 4	21 8 4	8 included articles. …….. 2. Some were excluded, did not to meet the inclusion criteria. …… 1 article were included in this review.
180516	Pubmed	(((((newborn OR infant OR neonate))) AND ((resiscitation OR mask OR ventilation))) AND (education AND "last 5 years"[PDat])) AND tanzania	Siste 5 år	3	3	2. I assume that adding "education/ training" is decreasing the matches on my search.
010616	Pubmed	((((newborn OR infant OR neonate))) AND ((resuscitation OR mask OR ventilation))) AND Tanzania	Last 5 Years	20	7	7 included articles

Appendix 2

Quality assessment of the included studies, CASP table

	Studies	1	2	3	4	5	6	7	Results?	8	9	10	11	Implication for practice?	Quality assessment
1.	(Ersdal et al., 2012a)	Y	Y	Y	Y	U	Y	Y	256 infants to neonatal area. 49 infants died secondary to BA. 5-minute Apgar was ≤ 7 in 50% of those who died. ENM mostly relates to BA. %-minute Apgar is a poor surrogate for BA.	Y	Y	Y	Y	This study indicates that asphyxia accounts for a much higher percentage (60% of early deaths). Prematurity (18%), low birth weight (8%), and overt infections are less common. The 5-minute Apgar score is an unreliable indicator of birth asphyxia.	Moderate
2.	(Ersdal et al., 2012b)	Y	Y	Y	Y	U	Y	Y	The risk for death or prolonged admission increases 16% every 30 seconds delay in initiating FMV up to six minutes and 6% for every minute of applied FMV.	Y	Y	Y	Y	The authors suggest that documentation of strategies to improve the skills of basic neonatal resuscitative action is needed.	Moderate
3.	(Ersdal et al., 2013)	Y	Y	Y	Y	Y	Y	Y	The providers who "passed" the test increased from 41% to 74%. the number of babies being suctioned and/ or ventilated did not change, and the use of stimulation decreased after HBB training.	Y	Y	Y	Y	Further research is necessary. More focus on early stimulation and discussions around local implementation should be prioritized during HBB training.	Strong
4.	(Makene et al., 2014)	Y	Y	Y	U	Y	Y	Y	Significant overall improvement from 39% to 73%. Knowledge of the health care workers increased significantly from 23% to 41%. Skills in resuscitation using a newborn mannequin were persistently low. Only 77% were skin-to-skin, which increased 35%. Delayed cord clamping increased 12%. The authors conclude that there are areas for persistent gaps, including newborn resuscitation and proper skin-to-skin care.	Y	Y	Y	Y	The authors feel that attributing changes in the health facilities in the study to the maternal and newborn quality improvement intervention. There were no other documented improvement measures occurring at the same time.	Moderate
5.	(Mduma et al., 2015)	Y	Y	Y	Y	Y	Y	Y	Mortality at 24-h decreased from 11,1% to 7,2%. The number of stimulated neonates increased from 14,5% to 16,3%, suctioning babies increased from 13% to 15,8%, and neonates receiving bag mask ventilation decreased from 7,3% to 5,9%.	Y	Y	Y	Y	The implication of this study put the focus on brief, on-site simulation practice to increase the knowledge of birth attendants.	Strong
6.	(Msemo et al., 2013)	Y	Y	Y	Y	U	Y	Y	Significant reduction, 47%, in early neonatal mortality within 24 hours, and a 24% reduction in fresh stillbirths, is reported after 2 years.	Y	Y	Y	Y	Several studies conclude that by educating local staff they will be able to perform newborn resuscitation.	Strong
7.	(Vossius et al., 2014)	Y	Y	Y	Y	Y	Y	Y	HBB is a low-cost intervention program. Implementation has been highly cost-effective. The cost will be lower for re-trainings, as the equipment are present and the instructors are already being educated how to train the birth attendants. Costs per life saved USD 233. Cost per life gained USD 4,21.	Y	Y	Y	Y	The authors suggest that to facilitate further global implantation of the program an analysis of the cost-effectiveness in a multi-center setting including urban and government owned hospitals, is necessary.	Strong

Critical Appraisal Skills Program, CASP. Y=Yes, N=No, U=Unclear. 1. *Did the study address a clearly focused issue? 2. Was the cohort recruited in an acceptable way? 3. Was the exposure accurately measured to minimize bias? 4. Was the outcome accurately measured to minimize bias? 5. Have the authors identified all important confounding factors? 6. Was the follow up of subjects complete enough? 7. What are the results of this study? 8. How precise are the results? 9. Do you believe the results? 10. Can the results be applied to the local population? 11. Do the results of this study for other available evidence? 12. What are the implications of this study for practice?*

Part 2

The Essay

"*Two newborn babies are born at the same time, none of them are breathing. One of them were born in Norway, the other one in Tanzania. When the baby from Norway were resuscitated by midwives and pediatricians, the mother from Tanzania briefly saw her newborn baby alive. The baby was wrapped in a "kanga" away from its mother. Nobody was paying attention when the baby stopped breathing, nor telling the mother that her baby died. Nobody were there to help the Tanzanian baby.*

It doesn't matter who you are, but **where** *you are born."*

Linda Wike Ljungblad

Number of words:

4075 + 1 Table + 1 Figure

1.0 Introduction

This essay describes and discuss theoretical frameworks in relation to the results in my review to give a broader understanding into this master thesis. I have chosen to frame my review with the following theories and frameworks: patient safety, quality of care, human rights, continuity of care and woman-centred care (Berg, Asta Ólafsdóttir, & Lundgren, 2012; Homer et al., 2008; Jha, Prasopa-Plaizier, Larizgoitia, & Bates, 2010; Renfrew et al., 2014; United Nations, 1948). These theories and frameworks overlap and supplement each other. I cannot remove any of them as they interact and explain an understanding of shortcomings and challenges in maternity wards in Tanzania.

As described in my review there are multiple challenges in maternity wards in Tanzania, and lack of patient safety in addition to poor quality of care are frequently described. I therefore find it important to further discuss my review in relation to these aspects. Framing disrespectful care in the context of human rights is giving a broader perspective and lifting disrespectful care to a higher level. By identifying and describing these situations, there is a hope to improve maternity and newborn care in Tanzania. While fighting for these improvements, woman-centred care and continuity of care are helpful methods to reach for improvements in maternity wards. Framing the review by these theories, add important perspectives, which is further discussed at the end of this essay.

2.0 Background and pre-understanding

2.1 Objective: The objective of the literature review was to report the effects of training skilled birth attendants in newborn resuscitation in Tanzania.

2.2 Review Question: What effects was reported by training skilled birth attendants in newborn resuscitation in Tanzania?

Too many newborns die unnecessary every year (Oestergaard et al., 2011). In my review, I report and discuss factors considering effects of training skilled birth attendants in newborn resuscitation in Tanzania. The results of my review mostly report improvements after training

in newborn resuscitation. Despite of these results, neonatal mortality rate is still on top in sub-Saharan Africa compared to similar developing countries (Oestergaard et al., 2011).

The topic of the literature review was a naturally choice for me, as I previously was a neonatal nurse. Before becoming a midwife, I was often working with critically sick babies and newborn resuscitation. As I am from Norway, where neonatal mortality is low, my interest was to illuminate what effects were reported by training skilled birth attendants in newborn resuscitation in Tanzania. I have been working in a Tanzanian hospital from August 2016 to February 2017. In this period, I conducted two courses in newborn resuscitation for the skilled birth attendants from four different hospitals in Tanzania including practical and theoretical training. I was also participating at a three-days-course in newborn resuscitation for skilled birth attendants from the organization Helping Babies Breathe (HBB). The possibility to observe this course conducted by HBB, was opening my eyes for how the theoretical knowledge in a positive way was implemented among the skilled birth attendants. The practical training was done on mannequins. By using train-the-trainer model, all education and training were successfully given in local language. I am aware that my perspectives have changed during my time working in Tanzania. When I participated at the training programs, I was positive to see the motivation and enthusiasm among the skilled birth attendants. When returning to Norway, my perspectives were adjusted even more.

I was mostly writing this review in Tanzania, with frequently video-and telephone contact with my supervisors. Working as a midwife in this hospital is not a part of my review, but my experiences are implemented in this essay. Working in maternity was an important experience for me. This experience gave me a broader understanding of cultural context and pre-understanding to write this master thesis. Getting to know local staff of different professions and working side-by-side in maternity ward with them, has changed me as midwife. My new knowledge has even affected my ideas for further improvements in newborn resuscitation in Tanzania.

3.0 Methodological considerations

3.1 Literature review

A meta-analysis is described as a way of comparing quantitative research including statistical analysis of the results of systematic literature reviews (Walsh & Downe, 2005). This method identifies and critically analyses several research studies answering a review question, by minimizing bias and to increase reliability. Systematic literature review is the main key in practice of evidence-based medicine based on systematic literature reviews of randomized controlled trials (Walsh & Downe, 2005). A meta-analysis of included studies results would be preferred, but were not possible to create because of few included studies and their different ways of presenting the content. This review can be referred as a literature review; like telling a story by framing the research question in relation to previous studies (Aveyard, 2014). Aveyard (2014) has been used as a guideline throughout the writing process. Literature reviews can be described as preliminary reviews for larger studies or as smaller projects providing comprehensive surveys of the works over a specific period (Aveyard, 2014). Aveyard (2014) recommend ten studies of good quality for doing a literature review, but as few as five are acceptable. In this literature review seven studies of medium to strong quality are included, fulfilling the criteria from Aveyard.

3.2 Results

All included studies were from mainland Tanzania. There may be different attitudes among skilled birth attendants in this region from mainland to the islands. Different aspects in my review report why current challenges in Tanzania may impact training programs in newborn resuscitation. The results were born out of the seven quantitative studies by observation of skilled birth attendants. The results can overlap and complement each other illustrated in Figure 2 page 13 in my review. Included studies were written by physicians from Africa and Europe. Physicians seem to prefer quantitative studies, maybe due to their scientific paradigm. If included studies were written by midwives, using qualitative methods, there might be described more specifically basic and essential aspects like lack of water and soap in the hospitals. It would also be of interest to know what skilled birth attendants themselves implemented into their clinical practice, and what their ideas about further improvements and research are. Anyhow, literature reviews are important by including qualitative and quantitative studies to present new knowledge framing research questions. The authors from Europe and Africa are

cooperating about doing research, and by this cooperation building reciprocal relationships (Berg et al., 2012). Improvements can be made this way, when motivation and improvements are expected from both Europeans and Tanzanians. This theoretical framework of woman-centred care will be further described and discussed in this essay (Berg et al., 2012).
I have thoroughly gone through all parts of this master thesis times and times again, to make the validity and reliability strong. The results in relation to method and analyzing process, are honestly presented in my review. Anyhow, the results of my review may not be transferrable to all developing countries, due to different contexts and challenges.

3.3 Thematic analyzes

Both content analyzes and thematic analysis was inspiring me during analyzing process (Graneheim & Lundman, 2004; Holopainen, Hakulinen-Viitanen, & Tossavainen, 2008). I am aware that my understanding and midwifery constitution may have influenced this process.
All this process was written on pieces of paper and made as a puzzle as followed; writing the different results of each of the included studies, organizing the results into themes, sub-themes, before concluding finally themes.
As an example, from meaning units, condensed meaning units, sub-themes until reaching a theme, I was collecting all results in different boxes, sorted after contents like followed: stimulation, suction, neonatal resuscitation, ventilation, face-mask-ventilation, bag-mask, improvement, knowledge, skills and performance. These pieces of results from included studies were summarized to one of the literature reviews results called "overall increased knowledge, skills and performance in newborn resuscitation". This process from meaning unit to theme is illustrated in Table 1.
In total, four themes were born out of this process. These four themes are reported at the end of Table 1 and in Table 3 in my review (page 13). Giving the right names for each theme was as well a process where I needed several attempts, before reaching the exact formulation in the themes presented in my review.
As an unexperienced researcher, interpreting the results of included studies, a different approach to the result and analyzing process may be found by a more experienced researcher.

Table 1. *The process of thematic analyzes.*

Meaning unit	**Condensed meaning unit description close to the text**	**Condensed meaning unit; underlying meaning**	**Sub-theme**	**Theme**
Reduction in neonatal deaths and fresh stillbirths (Msemo et al., 2013).	Reduction in neonatal deaths and fresh stillbirths	Reduction deaths and fresh stillbirths	Reducing early neonatal mortality and fresh stillbirths	
Mortality at 24-hours decreased from 11.1% to 7,2 % (Mduma et al., 2015).	Mortality decreased	Decreased newborn deaths Reduction in stillbirths.	Decreased deaths	Reduction in newborn mortality and fresh stillbirths.
Use of stimulation increased (47%- 88%) (Msemo et al., 2013).	Use of stimulation increased	Increased stimulation	Increased stimulation	
Use of suction increased (15-22%) (Msemo et al., 2013).	Use of suction increased	Increased suction	Increased Suction	
Face mask ventilation decreased (8,2- 5,2%) (Msemo et al., 2013).	Face mask ventilation increased	Increased ventilation	Increased knowledge	
Providers who "passed" the simulated "routine care" and "neonatal resuscitation" (increased 41-74%) (Ersdal et al., 2013).	Neonatal resuscitation increased	Increased resuscitation	Increased skills	
Use of stimulation decreased after HBB training and number of babies suctioned/ ventilated did not change (Ersdal et al., 2013).	Use of stimulation decreased. Babies suctioned/ ventilated did not change.	Decreased stimulation No changes suctioning No changes ventilation	Decreased stimulation	
The number of stimulated neonates increased 14,5- 16,3%. Suctioning increased 13-15%. Bag mask ventilation decreased 7,3-5,9% (Mduma et al., 2015).	Stimulated neonates increased. Suctioning increased. Bag mask ventilation decreased.	Increased stimulation Increased suctioning Decreased ventilation	Increased performance	Increased knowledge, skills and performance in newborn resuscitation after training.
Overall improvement 39-73%. Knowledge increased 23-41%. Skills in resuscitation sustainable low (Makene et al., 2014).	Overall improvement. Knowledge increased. Skills sustainable low.	Overall improvements Increased knowledge Sustainable low skills	Overall improvements. Increased knowledge. Sustainable low skills.	
Skin-to-skin care increased to 77%. Delayed cord clamping increased to 12% (Makene et al., 2014).	Skin-to-skin increased. Delayed cord clamping increased.	Increased skin-to-skin Increased delayed cord camping	Increased skin-to-skin. Increased delayed cord clamping	
Birth asphyxia (BA): 49 infants died secondary to BA. ENM relates to BA. Apgar score: poor surrogate to BA (H. L. Ersdal, E. Mduma, E. Svensen, & J. Perlman, 2012a).	Risk of death when delayed face-mask-ventilation. Early neonatal mortality related to birth asphyxia.	Delayed ventilation Primary apnea Apgar score poor surrogate to measure BA	Birth asphyxia Primary apnea Apgar score	Action needed within "the golden minute".
Risk of death: Face mask ventilation when admission 30 seconds' delay with 16% (H. L. Ersdal, E. Mduma, E. Svensen, & J. M. Perlman, 2012b).	Face-mask-ventilation delayed.	Delayed ventilation	Delayed ventilation	
Highly cost effectiveness documented after training program (Vossius et al., 2014).	Actual cost	Cost benefit	Cost effective	Highly cost-effective training program.

3.4 Strengths

A major strength in the literature review is that the included studies were population-based studies, which means that both the newborns and the skilled birth attendants were included in the studies, even though only the newborns were counted. Another strength was the large sample size of included newborns (113807). Further strengths are the use of local trainers to train the skilled birth attendants. After training programs, equipment was left behind for further re-trainings and trainers were already trained, which means it's easy to repeat the training at no-cost. Another strength, is observing the skilled birth attendants in their own environment in maternity wards.

3.5 Limitations

No included studies were written by midwives, only by physicians. No studies were identified with qualitative approach to training programs in newborn resuscitation, which I interpret as a gap in current knowledge. The skilled birth attendants were not counted, but they were observed in all included studies. Knowing the long-term-effects for more than 2 years after training programs are not measured (Makene et al., 2014; Msemo et al., 2013). This review was written as a "Master in Midwifery" of only one author, however the supervisors were consulted regularly and the inclusion criteria were strict. Cochrane Collaborations recommend that at least two authors are involved to write reviews (Higgins & Green, 2011).

3.6 Confounding factors

Most of newborn resuscitation training is conducted on mannequins, meaning that gained skills cannot be transferred directly into clinical practice. Newborns being suctioned/ ventilated did not change after a training program (Ersdal et al., 2013). The answer might be addressed to the gap in cultural context discussed in my review. There were increased deliveries without increasing staff as well as high staff turnover during a study period (Ersdal et al., 2013). Hawthorne effect is described that by being observed, skilled birth attendants can be more alert, and by this perform better, which is a confounding factor in all observational studies. Many affected infants were likely not reported or misclassified as fresh stillbirths (Ersdal et al., 2012a). Among all challenges in developing countries, statistics can be difficult to create due to variety in quality of documentation (Maaløe et al., 2016).

4.0 Theoretical framework

4.1 Patient safety and quality

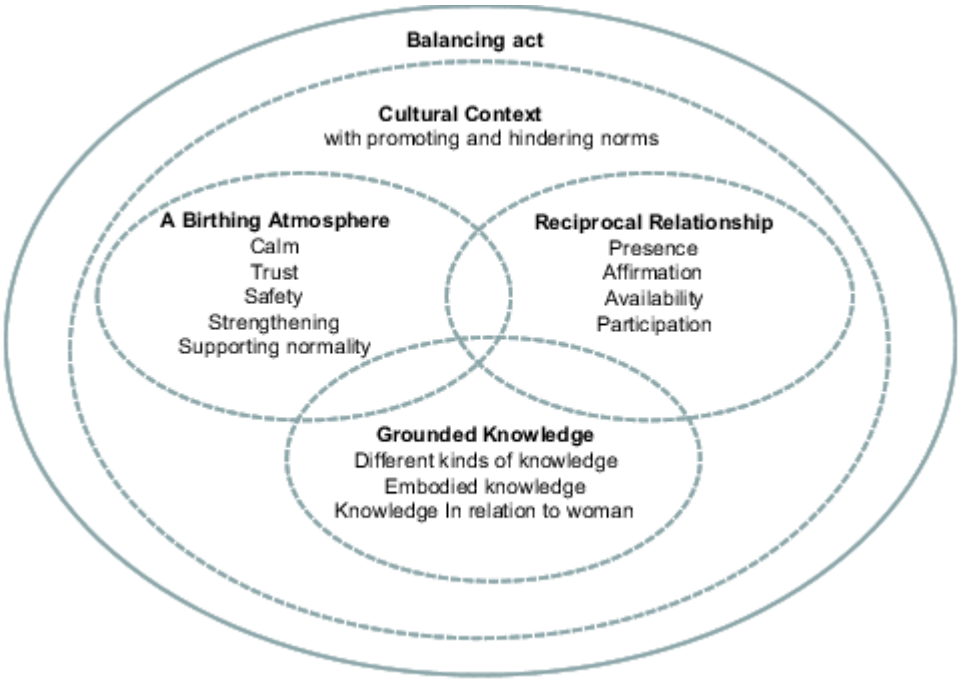
Patient safety is exclusively important in all situations considering health care. The World Health Organizations (WHO) definition of patient safety describes reduction of risk and unnecessary harm associated with healthcare to an acceptable minimum (World Health Organization, 2011). Unsafe medical care may be the reason for substantial and sustainable mortality globally (Vincent & Amalberti, 2015). Despite of imprecise estimates of data and gaps in knowledge, standards in patient safety are constantly improving (Jha et al., 2010). These knowledge-gaps make it difficult to identify solutions, especially in developing countries like Tanzania. An example from healthcare describes harm from medical care as a substantial burden to the world's population (Jha et al., 2010).

All human beings are born free and equal in dignity and rights (United Nations, 1948). This means all human beings have the same rights to receive patient safety and quality. A framework for quality maternal and newborn care has been developed from women's experiences, effective practices, and maternal and newborn care providers (Renfrew et al., 2014). This framework is providing differentially quality of care to women and newborns. This supportive care will strengthen women's possibilities of respectful relationships specifically adjusted to their needs. Midwives are pivotal to provide this quality of care, but it even requires teamwork and integration across facility and community settings (Renfrew et al., 2014). This way of providing quality of care is beneficial to Tanzanian conditions. In addition, continuity of care (COC) is essential in maternity and child care (Homer et al., 2008). COC starting in early pregnancy, continuing through the pregnancy, labor and birth until the end of the postnatal period (Homer et al., 2008). COC is an important principle in the way of providing patient safe care. Even if COC is essential, it is unfortunately not likely to perform in Tanzania due to the previously described challenges.

4.2 Woman-centred care (WCC)

"Reciprocal relationship", "grounded knowledge" and "birthing atmosphere" are the three main pillars in the midwifery model of WCC. Two surrounding themes are described as cultural context and balancing act (Berg et al., 2012). This model is presented in Figure 1.

Figure 1. *A midwifery model of woman-centred childbirth care (Berg et al., 2012)*



An understanding and appreciation of skilled birth attendants can be achieved by developing a reciprocal relationship (Berg et al., 2012). All relationships are unique (Pairman, 2010). In addition to the importance of the reciprocal relationship, working together with the woman is essential (Berg et al., 2012; Leap, 2010). These theories describe not only giving empowerment to woman, but focusing on the opportunity for woman themselves to achieve empowerment. Empowerment is important to all human beings to be motivated and doing their best (Tibandebage, Kida, Mackintosh, & Ikingura, 2016). Leap (2009) is framing woman-centred care as fundamental to midwifery philosophy. A critical focus in woman-centred care is the patient's autonomy. The patient may not feel equal in this relationship, although midwives to woman relationship is based on mutual learning (Leap, 2010; Pairman, 2010). Both Leap (2010) and Pairman (2010) state that midwives shouldn't see themselves as experts, with the patients dependent of the midwives, but rather promote patients to be self-determining. This will strengthen the woman's self-confidence, autonomy and her empowerment. WCC promotes this reciprocal relationship through presence, affirmation, availability and participation described in Figure 1 above (Berg et al., 2012). By encircling the main themes of the midwifery model with the cultural context and balancing act, these themes are interpreted to be

infiltrated in all patient safety and quality care (Berg et al., 2012). The cultural context in addition to the balancing act were additionally surrounding factors to all my experiences at maternity ward in Tanzania.

5.0 Discussion

"It doesn't matter in which country you are born, if the world were idealistic with equal justice for all human beings. The world today cannot be described as idealistic, and all human beings are not treated according to the human rights. The Tanzanian baby died even if only 30 seconds of face-mask-ventilation could have saved the life. No eyes were watching. No hands were available. No one was there to take care of the baby.
Survival of the fittest."
Linda Wike Ljungblad

Woman and newborns are at high risk in Tanzania. Lack of patient safety and lack of quality of care in combination with lack of human rights are factors describing current situations (Jha et al., 2010; Renfrew et al., 2014; United Nations, 1948). In addition, there would be beneficial to implement COC and WCC in maternal and newborn care in Tanzania. Overall increased knowledge, skills and performance in newborn resuscitation after training programs are reported from my review, and action within "the golden minute" is needed. These improvements are not reported sustainable due to gaps in the quality of newborn resuscative care (Berkelhamer, Kamath-Rayne, & Niermeyer, 2016). This situation was obvious when I worked in a maternity ward in Tanzania. Reasons for not providing safe and good quality of care are suggested because of inadequate equipment, ineffective training programs, and lack of political will to improve the newborn care (Berkelhamer et al., 2016). Lack of supplies in developing countries explains the situation of inadequate equipment (Soucat, Scheffler, & Ghebreyesus, 2012). Even if Helping Babies Breathe report significantly improved newborn resuscitation knowledge and skills, re-trainings are required to maintain these skills (Bellad et al., 2016; Steele, 2013). Suggested solutions to maintain these skills are additionally frequent re-testing and skills practice (Bang et al., 2016; Bellad et al., 2016). It is unlikely that gained knowledge in this context will sustain if re-trainings not are performed frequently on a routine basis (Bang et al., 2016; Bellad et al., 2016). Motivation and feeling engaged to a task are factors to help maintaining knowledge and skills in newborn resuscitation (Tibandebage et al.,

2016). Skills in newborn resuscitation were reported to decline more than knowledge over time (Bang et al., 2016). There were also challenges to give all newborns the needed care at birth (Berkelhamer et al., 2016). I interpret this as lack in quality of care and patient safety, in addition to lack of human resources.
My literature review report a highly cost-effective training program, which is positive for conducting re-trainings at no-cost, as described above. Re-trainings are additionally a way of increasing both quality of care and patient safety for women and newborns in Tanzania.
It's a sad that lack of political will for improvements are occurring. Increased information to the politicians could maybe give more attention and knowledge for improvements in maternal and newborn quality care. On the other side, the political will is unfortunately reported as a challenging factor for not providing quality and safety in health care in developing countries (Meguid, 2009).

The Human Rights fight for all human beings to be treated equally, which is far from today's situations in Tanzania (United Nations, 1948). It's not acceptable that newborns are dying because no eyes were watching, neither according to quality of care nor from a patient safety view (Jha et al., 2010; Renfrew et al., 2014). "Inshallah" were often heard after emergency situations in maternity ward. Inshallah can be described as Allahs willing. With equal right for all human beings, emergency situations require immediate action, which also my review reports. I interpret this cultural context as a huge gap to the western world (Berg et al., 2012). All maternal and newborn care was affected by the cultural context of being born in Tanzania.

My review report reduction of newborn deaths and fresh stillbirths. Too many children and their mothers are still dying every month at the maternity ward. Experiencing these tragedies for years, affect the skilled birth attendants working conditions. They were fighting in despair and poverty to feed their families out of poor salaries, and they often had to work another place in addition to the hospital. It may be that burnout and giving up hope for any sustainable improvements in maternity wards are reasons for the attitudes in maternity ward (Thorsen, Tharp, & Meguid, 2011). Following example illustrate current situation at maternity. One skilled birth attendant was previously teaching colleges in newborn resuscitation, but she quit after realizing that her colleges didn't start ventilating when babies stopped breathing. In the view of quality of care its essential that local staff are engaged in training their own colleagues. But it's not an easy task to struggle and fight for improvements alone. It may be they have had enough, and can't handle their negative working environment any longer (Thorsen et al., 2011). This might as well be an answer to the lack of motivation (Tibandebage et al.,

2016). They have had too little, too late, for a too long time (Miller et al., 2016). Tanzanian women are in need to strengthen their empowerment and autonomy to be more self-confident (Tibandebage et al., 2016).

Providing health care in described conditions, often lead to unsafe medical care (Vincent & Amalberti, 2015). My review report that action within "the golden minute" is needed. There is a need for the skilled birth attendants to act, and this act must start immediately. To act, hands are needed. Even if lack of human resources is reported, my experiences was that skilled birth attendants were working mostly in one big room (Fakih et al., 2016). Describing this location, they have the possibility to prioritize emergency situations. With lack of human resources, making a birthning atmosphere were not provided, like described in WCC (Berg et al., 2012). Presence of the midwife is discussed in my review and is an important factor to identify risk factors, and to prevent emergency situations in all maternity wards (Mmbaga et al., 2012). Presence of the midwife described as a part of building a reciprocal relationship in the midwifery model (Berg et al., 2012). Aspects of patient safety and quality of care are included in this midwifery model, and are therefore essential as a goal to keep in mind when providing maternal and newborn care.

Skilled birth attendants from sub-Saharan Africa are reported to treat woman with disrespect in addition to neglect patients (Bradley, McCourt, Rayment, & Parmar, 2016; Meguid, 2016; Sadler et al., 2016; Sando et al., 2016; Solnes Miltenburg, Lambermon, Hamelink, & Meguid, 2016). Disrespectful behavior isn't correct according the human rights, neither to patient safety, nor to quality of care (Jha et al., 2010; Renfrew et al., 2014; United Nations, 1948). Disrespectful care is reported as a critical component to improve maternal health in developing countries (McMahon et al., 2014). I interpret disrespectful care as opposite of WCC. Action is urgently needed to ensure quality of care for all women and newborns (Sando et al., 2016). Similar findings are additionally reported from my review. Quality of care and patient safety are important aspects of providing all health care (Jha et al., 2010; Renfrew et al., 2014). Following example explains a possible solution to increase good quality of care in addition to save newborn babies lives. By placing all newborns skin-to-skin with their mothers, the mothers observe their babies constantly. Increased skin-to-skin care is even reported from one included study (Makene et al., 2014). Placing newborns skin-to-skin can save lives with no cost at all. Adding the fact that by placing newborns skin-to-skin with their mother the newborn quality of care will increase, makes it likely that this care is easy to implement

(Renfrew et al., 2014). Even if the skilled birth attendants were close to the woman in maternity all the time, implementing skin-to-skin care was not achieved. Adding the fact that women after delivery didn't seem to want to have their babies skin-to skin either, can be addressed to these women's expectations. My experience to answer this situation, must be addressed to the cultural context.

The aid from western world and their overriding objective must be prioritized properly to reach the United Nations Millennium Development Goal 4 (United Nations, 2013). There is no need to buy expensive ventilators, when the need in Tanzania is reported as lack of human resources, soap and water, disrespectful care, failure in documentation, underreporting and misclassification of stillbirths (Fakih et al., 2016; Maaløe et al., 2016; Penfold, Willey, & Schellenberg, 2013; Soucat et al., 2012). By describing these challenges, the importance of easy conducted training programs focusing on essential newborn care without a lot of equipment, is needed. If no motivation is present, no improvements will be seen (Tibandebage et al., 2016). In the future, when skilled birth attendants identify their own needs, training programs can give improvements and increased quality of care in maternity wards. It is likely important to keep focus simple, easy and at low-cost when conducting training programs in Tanzania.

6.0 Conclusion

Newborn resuscitation is a complex skill. These skills need to be maintained, and re-trainings are reported essential. A paradox is that training programs are documented beneficial as sub-Saharan Africa is still at the top of neonatal mortality. Including patient safety, quality of care and human rights on the way to achieving MDG4, is likely to provide improvements in maternal and newborn care along the way.

We can never stop fighting for equal care and human rights, even if challenges are blocking the roads to reach our goals. These goals must be the same for all human beings, born or unborn, breathing or non-breathing newborns. We can never stop fighting for improvements. All newborns have the right to breathe.

Research with qualitative approaches are preferred as additionally perspectives to further illuminate the effects of training skilled birth attendants in newborn resuscitation in Tanzania.

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