

# **Action Research as sustainable healthcare quality improvement: advances in Neonatal Care emphasising collaboration, communication and empowerment**

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## **Abstract**

Neonatal resuscitation can save newborn lives when performed by competent staff in a setting that is adequately equipped and organised. To develop strategies to sustain quality improvement in neonatal resuscitation, an initiative was launched in a maternity section of a district hospital in Gauteng, South Africa, using Piggot-Irvine's Problem Resolving Action Research (PRAR) model. The application of the PRAR model using multiple data collection and analysis techniques in three cycles, facilitated improvement and transformation towards sustainable changes related to neonatal resuscitation in the specific context. The changes included development of policies, improved infrastructure, enhanced teamwork and collaboration, empowerment and professional development of staff, and integrating theory in neonatal practice. The outcomes resulted in improved staff competency and reduced neonatal mortality and morbidity in the particular setting.

## **Key words**

Action research; sustainability; quality improvement; neonatal resuscitation and care; collaboration, communication and empowerment

## **Introduction**

Globally, many neonates die unnecessarily and many can be saved through effective resuscitation (Bradshaw, et al., 2008). Competent resuscitation is a critical intervention for the survival of infants in need of respiratory or cardiac support in the neonatal period (Gardner, Carter, Enzman-Hines, & Hernandez, 2011). Competency in neonatal resuscitation skills should be sustained to bring about change in decreasing neonatal mortality in healthcare settings in South Africa (Duran, Aladag, Vatansever, Süt, & Acunas, 2008; Meaney, et al., 2010; Pattinson, 2011; Pattinson, 2013). Therefore, it was important to implement a quality improvement initiative to improve neonatal resuscitation in practice. More importantly, this quality improvement initiative needed to be sustainable, and action research deemed appropriate to address this problem.

According to Maher, Gustafson and Evans (2007), quality improvement initiatives have a 70% chance to fail due to the lack of sustainability. For quality improvement initiatives to be sustainable, a holistic approach should be followed and the focus should be on factors regarding the process, staff and organisation, which are captured by the Sustainability Model.

Action research lends itself towards doing research while changing practice. According to Loewenson, et al. (2010) action research is a method to solve problems with the participation from stakeholders for collective validation rather than only describing the

problems in practice. Action research enhances trust in health systems through collaboration, communication and respect. The report on the Global Symposium on Health Systems Research (2010) indicated that ownership is facilitated by involvement in decision making. The study on which this article was based, used action research to enhance ownership. A steering group and stakeholders were involved in the decision-making process for sustainability of change in neonatal resuscitation practice.

Maree et al. (2010) describe the characteristics of action research as being practical and aimed at developing solutions to change practice. Action research is therefore focused on change and is aimed at the empowerment and transformation of participants. Furthermore, action research is a cyclical process of planning, implementation and reflection of which the findings can be used to inform practice. Finally, it is an interactive form of knowledge development. These principles and characteristics of action research suited the aim and objectives of the study of which the focus was to develop strategies to sustain a quality improvement initiative in neonatal resuscitation.

The quality improvement initiative centred on prevention, early identification of risk factors, neonatal resuscitation, and post-resuscitation care. This entailed a holistic approach towards sustainable improvement of neonatal outcomes (Van Heerden, Maree, & Janse van Rensburg, 2016). Therefore, the focus was not only on the practice of neonatal resuscitation as a competency and skill, but also on the challenges related to processes, staff and organisation through action research.

This paper discusses the use of the PRAR model (Piggot-Irvine, 2009) to develop strategies to sustain a quality improvement initiative in neonatal resuscitation in a maternity section of a district hospital in Gauteng, South Africa.

## **Background**

To make the physiological transition from intrauterine to extra-uterine life, it is critical for a newborn to start breathing (Lee et al., 2011). When a newborn does not breathe at birth, it is a life-threatening situation. Healthcare providers competent in neonatal resuscitation are needed to prevent adverse outcomes (Kattwinkel et al., 2011; WHO/UNICEF, 2010; Wall et al., 2009). Neonatal resuscitation is defined as a sequence of interventions to establish breathing and circulation of a neonate (Lee et al., 2011).

Worldwide neonatal mortality (death within the first 28 days of life) constitute 44% of the mortality rate for children younger than five (WHO/UNICEF, 2014; Darmstadt et al., 2014). The neonatal mortality rate in South Africa was estimated to be between 19-21/1000 live births in 2011, while the Millennium Development Goal (MDG 4) at that time was to reduce the rate to 7/1000 live births by 2015 (Lloyd & de Witt, 2013; Velaphi & Rhoda, 2012; UN Inter-agency Group, [S.a]).

Since then the Millennium Development Goals have been followed by the Sustainable Development Goals (SDGs) (WHO, 2016). SDG 3 aims to ensure healthy lives and promote well-being for all at all ages. One of the targets is to reduce neonatal mortality to less than 12/1000 live births (WHO, 2016). The South African neonatal mortality rate was indicated to be 11/1000 live births in 2015 (UNICEF, 2016; World Bank, 2015), but with wide variations in different settings. In this particular district hospital,

the neonatal mortality rate was 52/1000 live births in 2012 prior to the commencement of this study.

The health system in South Africa provides dual services: private health services for patients with medical aid membership, and public health services for all people on national, provincial, regional, district and primary healthcare levels. The levels of hospitals in South Africa's public health system include tertiary hospitals (level 3), regional hospitals (level 2) and district hospitals (level 1) (Cullinan, 2006). At district level (as in the case of this study), hospitals and healthcare clinics render healthcare services mainly to communities in rural areas, by supporting primary healthcare while serving as gateways to specialised care (Department of Health [DoH], 2002).

The neonatal mortality rate in district hospitals has been identified as being problematic and related to modifiable and avoidable causes (Pattinson, 2011, 2013, 2014). Examples pertaining to administrative and healthcare worker avoidable factors, include inadequate facilities, equipment and lack of staff who are sufficiently trained to resuscitate and monitor the patients. Effective resuscitation, a critical intervention for the survival of neonatal infants in need of respiratory or cardiac support (Velaphi & Rhoda, 2012; Pattinson, 2014), was identified as a factor that could be addressed as part of a quality improvement initiative to transform practice.

The context of this study was the maternity section of a district hospital in Gauteng, one of the nine provinces in South Africa. The district hospital is situated in a rural area and patients from 32 rural primary healthcare clinics are referred to this hospital. At the time of study, the maternity section consisted of three units: the labour ward, the postnatal ward and the neonatal intensive care unit (NICU), which also had Kangaroo Mother Care facilities. Seventy nurses worked in the maternity section, including

professional nurses, enrolled nurses and enrolled nursing auxiliaries. Approximately 5000 babies are delivered per year and approximately 1 200 to 1 300 babies are admitted in the NICU per year (The Hospital Statistics, 2013).

This study aimed to develop and implement strategies to sustain a neonatal resuscitation quality improvement initiative in an effort to decrease neonatal mortality in the particular district hospital by using action research. The objectives were:

- to explore and describe the existing practices and factors influencing neonatal resuscitation and mortality in Cycle 1;
- to develop and implement strategies to sustain the quality improvement initiative in neonatal resuscitation in Cycle 2;
- to determine what changes occurred as a result of the neonatal resuscitation strategies that were implemented in Cycle 3; and
- to determine the sustainability of these strategies in Cycle 3.

(Van Heerden, Maree & Janse van Rensburg, 2016).

The principles of sustainability were based on the National Health Services Institute for Innovation and Improvement in the United Kingdom (UK) Sustainability Model and Guide. The Sustainability Model is a validated tool that is used to predict the likelihood of the sustainability for a quality improvement project with the focus on factors concerned with the process, staff and organisation to sustain change. Factors related to the process include the monitoring of progress, adaptability of the improved process, credibility of the evidence and benefits beyond helping patients. Staff-related factors involve training and involvement, attitudes and senior and clinical leaders. Factors related to organisation entail fitting with the goals and culture, and the infrastructure of the organisation (Maher et al., 2007).

The research problem, questions and aim of the study, as well as the context in which it occurred, lent itself towards action research. The purpose of action research is to transform the praxis and environment in a specific context to improve quality of care

(Koshy, Koshy & Waterman, 2011). Action research can be used to improve health system functioning and monitor the quality of healthcare (Loewenson et al., 2011). Piggot-Irvine's PRAR model (2009) was used as the underpinning methodology of the study. Approval was obtained from the relevant ethics committees of the University of Pretoria, provincial Department of Health and the district hospital prior to conducting the study (Van Heerden, 2015).

### **The Problem Resolving Action Research Model**

The PRAR model is based on a cyclical process, consisting of cycles of planning, acting, observing and reflecting, that takes place in a specific context. The arrows spiralling in an upward direction signify a continuously improving process. It is experiential as knowledge is gained from observation and reflection in a specific context. The PRAR model facilitates understanding, empowerment and transformation and it focuses on facilitating change within a specific environment. Due to its participatory nature, this model contributes to the collaboration and ownership of the participants in bringing about change in their own practice and enhance teamwork within the organisation (Piggot-Irvine, 2009).

In the context of this study, the practice of neonatal resuscitation needed to be improved, therefore the continuous improvement characteristic was an important consideration. Furthermore, the PRAR model supports narrowing the theory-practice gap (Piggott-Irvine, 2009).

The PRAR model, with its focus on problem resolving (Piggot-Irvine, 2009), suited this study to explore and describe the existing situation in the specific context (maternity section of a district hospital) and to develop strategies to sustain a quality improvement

initiative in neonatal resuscitation. In addition to this, the changes that occurred as a result of the implementation of strategies could be evaluated and reflected on.

In the PRAR model there can be spin-off cycles that facilitate the possibility for unexpected challenges to occur at any time during the action research process. The same process of *plan, act, observe* and *reflect* can then be followed to address them independently or as part of the groundwork for the next cycle (Piggott-Irvine, 2009).

### **Application of the Problem Resolving Action Research Model**

The participatory nature of the PRAR model (Piggott-Irvine, 2009) contributed to the collaboration between the researcher (an academic) as facilitator and staff as well as the management of the setting. This collaboration established a platform for ownership of the initiative and facilitated transformation within the maternity section. Empowerment and ownership of the staff as steering group or participants were therefore a strong focus point throughout the research process and might have had an influence on the sustainability of the strategies and the transformation.

This action research study consisted of three cycles over a two-year period (Cycle 1 over three months; Cycle 2 over one year and Cycle 3 over nine months). Figure 1 illustrates the application of the PRAR model.



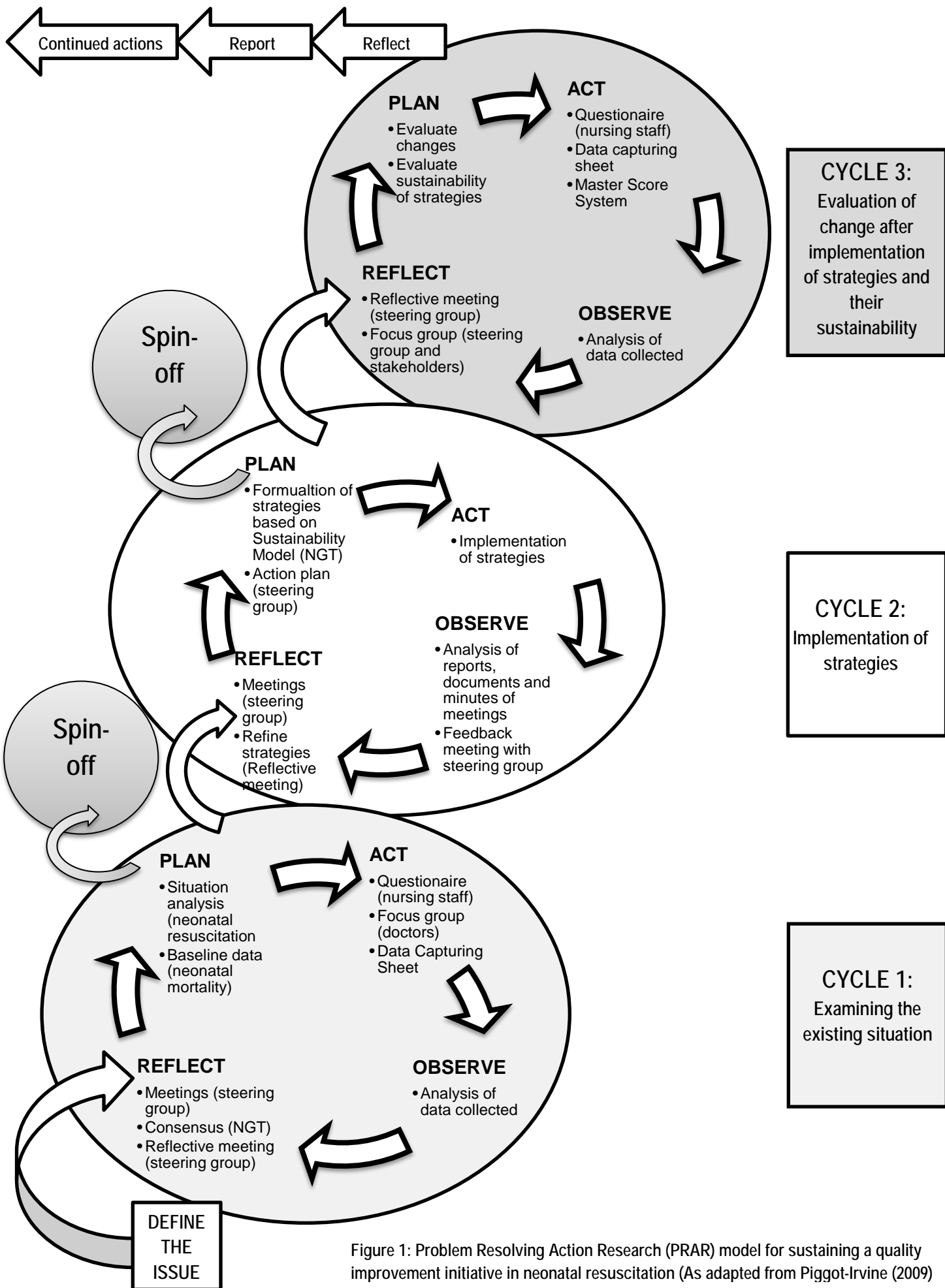


Figure 1: Problem Resolving Action Research (PRAR) model for sustaining a quality improvement initiative in neonatal resuscitation (As adapted from Piggot-Irvine (2009))

Multiple perspectives are acknowledged through the triangulation of data and the use of various data collection methods in the PRAR model (Piggot-Irvine, 2009).

The PRAR model starts by identifying and defining the challenges through literature review and exploring the research setting. The steering group was initiated to empower stakeholders, consisting of the researcher (facilitator of the research process), management, doctors and nursing staff from the hospital.

Each cycle then consisted of four steps, namely: *plan*, *act*, *observe* and *reflect* (Van Heerden et al., 2016). In Cycle 1, the existing situation in the maternity section was explored to obtain baseline data with regards to neonatal resuscitation practices, influencing factors and neonatal mortality. Cycle 2 focused on the development and implementation of change strategies to sustain the quality improvement initiative in neonatal resuscitation. Cycle 3 evaluated the implementation of change (strategies and the changes that occurred as a result of the strategies) and the sustainability of the strategies.

*Cycle 1: Explore and describe the existing practices and factors influencing neonatal resuscitation and mortality in the maternity section of the district hospital*

The situational analysis focused on the practice of neonatal resuscitation and influencing factors related to the process, staff and organisation, as well as neonatal mortality as the indicator of quality of care. The first step (*plan*) referred to the gathering of baseline data. The second step (*act*) dealt with data gathering, including the use of hospital records, a questionnaire and a focus group interview. During the third step (*observe*) quantitative data was analysed through descriptive statistics by a biostatistician. The qualitative data was analysed with open-coding by the researcher

under guidance of her supervisors. In step four (*reflection*) consensus was reached by means of a nominal group discussion based on the findings of Cycle 1.

Hospital records were used to obtain neonatal mortality statistics. The main findings related to neonatal mortality was 52/1000 live births (2012) and 46/1000 live births (2013) before the implementation of the quality improvement initiative, with the leading causes being prematurity, asphyxia and infection (Van Heerden, 2015).

The self-developed questionnaire with open and close-ended questions was used to determine practices and influencing factors related to neonatal resuscitation. The questionnaire included information related to demographic data, challenges experienced regarding process, staff and organisation, as well as knowledge and self-perceived competency in prevention and early identification of risk factors in neonates, resuscitation techniques, post-resuscitation care and reflection after resuscitation. Sixty-nine questionnaires were distributed to nursing staff and 42 were returned. The results demonstrated a lack of knowledge and self-perceived competency. The nursing staff identified challenges pertaining to resources, staff attitude, lack of transport services used to transfer critically ill neonates and the organisational culture.

The questionnaire was followed by a focus group with nine doctors. The primary focus was on the challenges experienced and influencing factors pertaining to neonatal resuscitation.

A nominal group discussion was then held with 10 participants, including the operational managers from each of the three units (neonatal, labour ward and NICU) the nursing services manager for the maternity section as well as the paediatrician, doctors and staff working in these sections, to determine priorities for strategies (Van Heerden, 2015). The focus of the nominal group discussion was to prioritise these

challenges and factors to generate potential solutions. The nominal group discussion was followed by reflective meetings with the steering group members.

*Cycle 2: Develop and implement strategies to sustain a quality improvement initiative in neonatal resuscitation*

The purpose of the implementation phase of the PRAR model is to change, improve and transform practice on a continuous basis (Piggot-Irvine, 2009). The first step (*plan*) was to develop and formulate strategies based on the findings from Cycle 1 and a literature control. In the second step (*act*) strategies were implemented by the operational managers of the maternity section in each of the three units. During the third step (*observe*) the minutes of the monthly meetings of the steering group as well as a once-off feedback meeting regarding the implementation of strategies, were analysed. The fourth step, (*reflect*) included a reflective meeting held with the steering group regarding the implementation and refinement of strategies.

The strategies implemented addressed neonatal resuscitation training, equipment and stock, staff shortages, staff attitude, transport for transfer of high-risk neonates to tertiary institutions and protocols as captured in Table 1.

Table 1: Strategies for the neonatal resuscitation quality improvement initiative (Van Heerden, 2015)

<p><b>Strategies to adress training</b></p>	<ul style="list-style-type: none"> <li>•Creating neonatal resuscitation training opportunities</li> <li>•Placement and orientation of staff</li> <li>•Enforcing and support for training in neonatal resuscitation</li> </ul>
<p><b>Strategy to adress equipment and stock</b></p>	<ul style="list-style-type: none"> <li>•Needs assessment regarding equipment and procurement of equipment</li> <li>•In-service training of staff on the use of equipment</li> <li>•Maintenance plan for servicing of equipment</li> <li>•Stock control</li> </ul>
<p><b>Strategy to adress staff attitude</b></p>	<ul style="list-style-type: none"> <li>•Task team to address staff attitude</li> <li>•Staff support (communication, training and support systems)</li> <li>•Professional conduct</li> </ul>
<p><b>Strategy to adress shortage of staff</b></p>	<ul style="list-style-type: none"> <li>•Ensure optimal functioning of available staff</li> <li>•Retention strategy for staff that want to resign</li> <li>•Budget for recruitment of staff and over-time</li> <li>•Recruitment of new staff</li> </ul>
<p><b>Strategy to adress transport for transfer of critically ill neonates</b></p>	<ul style="list-style-type: none"> <li>•Task team (hospital management and EMS staff) to address concerns regarding transportation</li> <li>•Availability of equipped transport and competent EMS staff</li> <li>•Communication regarding transport</li> </ul>
<p><b>Strategy to adress protocol</b></p>	<ul style="list-style-type: none"> <li>• Task team to address protocols regarding neonatal resuscitation</li> <li>• Awareness of protocols regarding neonatal resuscitation</li> </ul>

Most of the strategies dealt with logistics or managerial aspects and were managed accordingly, while training dealt with evidence-based practice. To address the theory-practice gap, the neonatal resuscitation training was based on the Helping Babies Breathe programme (Little, Keenan, Niermeyer, Singhal & Lawn, 2011), with cardiac

compressions being added to the techniques taught. Training was conducted for all staff involved with neonatal resuscitation in the maternity section of the district hospital.

These strategies were implemented and refined by the steering group and staff as feedback was obtained and discussed at meetings over time. The researcher continued with her role as facilitator and provided support as needed (Van Heerden, 2015; Van Heerden et al., 2016).

### *Cycle 3: Evaluation of change and sustainability after the implementation of the strategies*

In the first step (*plan*) comparison of the changes after implementation of the strategies as well as the sustainability thereof were planned. The second step (*act*) entailed repeating data collection (hospital records and questionnaire) as used in Cycle 1 to describe changes and the use of the Master Score System to determine sustainability. During the third step (*observe*) data was analysed by using descriptive statistics as well as inferential statistics to compare it with the results of the first cycle and to determine sustainability. In step four (*reflection*) a focus group discussion was held with the doctors, steering group and management. Data was analysed with open coding. A reflective meeting was held after all results were available to determine the way forward.

The findings of the third cycle revealed that the neonatal mortality dropped from 46/1000 live births in 2013 to 42/1000 live births in 2014, but it was still much higher than the expected target of the third SDG of less than 12/1000 (WHO, 2016). The admission rate of asphyxiated babies to the NICU and related mortality rate decreased.

The sample for the questionnaire included the nurses working in the maternity section. Seventy-one questionnaires were distributed and 40 returned. The results indicated improvement in knowledge and self-perceived competency related to neonatal resuscitation.

The focus group discussion served a dual purpose of reflecting on and evaluating the strategies. Ten participants participated in this focus group. The findings reflected an overall improvement in neonatal resuscitation (Van Heerden, 2015).

The Master Score System (Maher et al., 2007) served as a tool to evaluate the sustainability of the implemented strategies and was completed by the nursing services manager, operational managers of the maternity section and the researcher.

Based on the results of the Master Score System (illustrated in figure 2) it could be concluded that the strategies implemented had potential to be sustained in terms of process (indicated in green), staff (indicated in red) and organisation (indicated in blue) (see figure 2). A higher score increases the probability of sustainability. In this case, the highest score reflected on senior and clinical leadership engagement. Factors of which sustainability might be threatened were the fit of the initiative with the organisation's strategic aims and culture, and the infrastructure (Van Heerden et al., 2016).

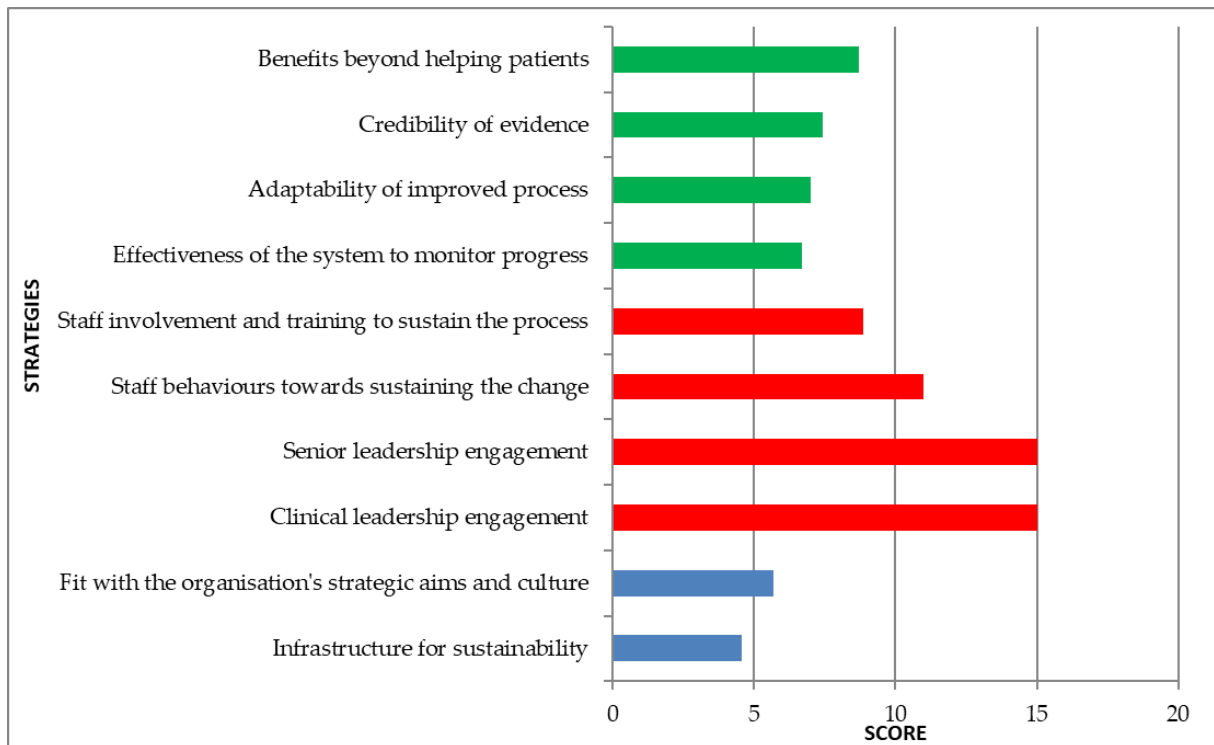


Figure 2: Probability and sustainability of strategies according to the Master Score System (Van Heerden 2015; Van Heerden, et al. 2016)

Reflective meetings were held with the steering group. The overall opinion of the steering group highlighted positive transformation in practice through ownership, collaboration and involvement of all stakeholders involved in neonatal resuscitation. This in turn led to improved neonatal outcomes.

After completion of the three cycles, continuous reflection and continued action might follow. This lends itself towards being a more sustainable approach to problem resolving because it creates an opportunity to measure sustainability over a period of time.

The implementation of the strategies facilitated change and contributed towards improvement and transformation in practice. Although the neonatal mortality rate declined, it was still a concern that the rate remained higher than the expected SDG



target. Further research is recommended to explore the influencing factors related to neonatal mortality in more depth as it was not in the scope of this study.

## **Discussion**

The use of the PRAR model for a neonatal resuscitation quality improvement initiative in a particular district hospital had positive experiences as well as challenges as indicated in the following section.

### *Positive experiences*

The practical application of the PRAR model principles (Piggot-Irvine, 2009) and the cycles made a positive contribution to this study as it guided the researcher during the research process. Practical learning of closing the theory-practice gap through research took place during the course of this study as participants gained understanding from observation in practice as well as from the different data collection techniques used (questionnaires, focus groups, nominal group technique discussion and reflective meetings). This was also found by Dudgeon, Scrine, Cox and Walker (2017) in their study where action research was used to develop a culturally appropriate health promotion and primary prevention intervention strategy to reduce the high rates of psychological distress and suicide among Aboriginal and Torres Strait Islander people in communities in Australia. Mubuke and Leibowitz (2013) reported amongst others learning, empowerment and active engagement of participants, promotion of collaborative inquiry and team-work as outcomes when they used participatory action research in health education.

The PRAR model facilitated a clear aim towards change, improvement and transformation (Piggot-Irvine, 2009). Positive change was created and practice was transformed to sustainable changes related to neonatal resuscitation. Policies were developed, infrastructure was improved and teamwork was enhanced, which all led to improved service delivery and favourable neonatal outcomes.

Another characteristic of the PRAR model is that it is context specific (Piggot-Irvine, 2009). This fitted perfectly with the aim of this study, which were conducted in a healthcare setting with specific demographics and organisational traditions. Furthermore, it created the opportunity for the staff (doctors and nurses) working in the healthcare setting to be involved in the research study as active participants. They developed ownership and were involved with the practical solutions towards challenges they experienced regarding neonatal resuscitation, leading to empowerment in their setting. It contributed to improved teamwork in the maternity section of this district hospital, which was part of the transformation that took place in practice. Tourgeman-Bashkin et al. (2013) used a participatory action research project in Israel to improve patient safety in a radiology department as multidisciplinary research teams identified potential adverse events and developed interventions. These authors acknowledged the value of action research in health settings. Practising participatory learning and action led to substantial reductions in neonatal and maternal mortalities in rural, low-resource settings.

A further characteristic of the PRAR model is collaboration (Piggot-Irvine, 2009). Collaboration contributed towards communication and improved teamwork during the research process.

The PRAR model facilitates professional development (Piggot-Irvine, 2009), which in this case involved all participants. They had the opportunity to learn about action research and neonatal resuscitation. They were empowered to transform practice, contributing further to professional development. Similar results were reported by Josif, Barclay, Bar-Zeey, Kildea and Britten (2012) in a study done to improve postnatal discharge summary systems used in Australia for remote dwelling Aboriginal mothers and infants.

Furthermore, the PRAR model provides the opportunity for spin-off cycles if unforeseen challenges arise (Piggot-Irvine, 2009). During the course of this study there were no unforeseen challenges, but several recommendations could be made. Opportunities for post-doctoral research and further related quality improvement initiatives were identified, using the same PRAR model cycles. An example was to create a platform for professional development and sustainable quality improvement in neonatal practice in Gauteng province, South Africa (van Heerden, Maree, Yazbek, Janse van Rensburg & Leech, 2019).

Narrowing the theory-practice gap is an important characteristic of the PRAR model (Piggot-Irvine, 2009) as theory and practice depend on each other. In this study the latest evidence related to neonatal resuscitation (Little, 2011) as well as the Sustainability Model for quality improvement (Maher et al., 2007) were used to inform practice, thereby narrowing the theory-practice gap.

Problem solving and dialogical interchange are prominent characteristics of the PRAR model (Piggot-Irvine, 2009). In this study, the action research process facilitated opportunities to discuss the challenges experienced in the maternity section pertaining to neonatal resuscitation. Participants came up with practical solutions that fitted with

the goals and structure of their organisation. It led to quality improvement and positive changes in practice regarding neonatal resuscitation and neonatal mortality rates. An example thereof was to create awareness of early identification of risk factors relating to prematurity and prevention of adverse outcomes. Recommendations could be made to apply these principles to create greater vigilance regarding prematurity on primary prevention level.

King and Lonquist (1992) as cited in Piggot-Irvine (2009) further grouped the positive outcomes of action research as professional development and empowerment of individuals; generation of theory in the healthcare setting contributing to improved praxis; improvement in practice; and enhanced social change. This is confirmed by a systematic review done by Prost et al. (2013).

The PRAR model accommodates the use of multiple data collection techniques (Piggot-Irvine, 2009). It created an opportunity for the researcher to explore and describe the existing situation within the maternity section of the district hospital from the perspectives of the doctors, management and nursing staff as well as the development and implementation of strategies, the evaluation of change and sustainability thereof. Furthermore, triangulation of data was possible during the course of this study.

### *Challenges experienced*

Logistical challenges were experienced with the development and implementation of the strategies. However, the underlying process of the PRAR model accommodated the management of these challenges, especially through empowerment of staff members and managerial support (Van Heerden, 2015). Bergold and Thomas (2012)

indicate that characteristically participatory action research needs material and other resources that should be well managed, but it poses challenges to those involved.

One of the challenges experienced was related to the negative attitude of some of the staff members, which possibly influenced some aspects of implementation of the strategies. An example thereof was related to work circumstances as staff felt despondent with regards to resource limitations. This challenge could not be addressed in totality and might reduce the probable sustainability of the quality improvement initiative (Van Heerden, 2015). Bergold and Thomas (2012) indicated that all participants in participatory action research undergo changes on a personal and cognitive level. Personal competencies, motivation, and so forth are seldom addressed, but it influences decisions made and level of participation.

Reflective journaling was experienced as a challenge by the researcher and the steering group as it was time consuming. This was managed by creating opportunities for reflection. A limitation of this study was that the personal development has not been reported on, except that the participants indicated that they experienced professional development (Van Heerden, 2015).

Lessons learned during reflection on this study was the importance of a holistic approach to transform practice. It was important to focus on various aspects including process, staff and organisation. The most crucial aspect that influence transformation was staff attitude towards change, to work towards favourable neonatal outcomes aligned with the expected target of SDG 3.

## *Recommendations*

The use of the PRAR model is strongly recommended for research on quality improvement in healthcare settings. For sustainability of a quality improvement initiative it is imperative to address factors related to process, staff and organisation.

The researcher agrees with the National Health Service (NHS) Institute for Innovation and Improvement (Maher et al., 2007) about the importance of support of managers and healthcare leaders to prioritise quality care to ensure that positive changes become normal practice. There should be a culture of quality improvement, including a positive staff attitude and involvement by all levels of staff. Collaboration of stakeholders, teamwork, empowerment and ownership are crucial for sustainability of quality improvement initiatives, and should be based on the most recent evidence relevant to the context or setting.

This study focused on neonatal resuscitation and influencing factors; however, the same process can be applied for any other quality improvement initiative in healthcare.

## **Conclusion**

In this study there was improvement in neonatal resuscitation skills after training enhanced understanding. Staff members (doctors and nurses) were empowered through active participation resulting in a decrease in admissions of neonates with neonatal asphyxia and awareness of other factors influencing neonatal resuscitation. Practice was transformed as the quality of neonatal resuscitation was improved, which is expected to be sustainable as discussed by Van Heerden et al. (2016).

The aim of this article was to describe the application of the PRAR model for sustaining quality improvement to transform practice. The characteristics of the PRAR model

fitted with the aim and context of this study to develop strategies to sustain a quality improvement initiative in neonatal resuscitation. Positive experiences and challenges were highlighted during the application of the PRAR model. The three cycles of the PRAR model that was implemented lend itself towards being a more sustainable approach to problem resolving. Sustainability is a challenging concept as it can only be measured over a period of time and more research is recommended.

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