

Implementation of A Perinatal Problem Identification Program (PPIP) In Zambia: A Feasibility Study

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Abstract

Background: Zambia is among the African countries with a high perinatal mortality rate. Though programs teaching medical practitioners about advanced neonatal resuscitation have reduced deaths and improved survival, more information is needed to further decrease morbidity and mortality in newborns. The objectives of this study was to implement a Perinatal Problem Identification Program (PPIP) to improve collection of information on early and late neonatal mortalities.

Methods: The Perinatal Problem Identification Program was implemented in the Neonatal intensive Care unit of the Women and Newborn Hospital in Lusaka Zambia. The program started on 1 May 2019 and ended on 31 December 2019. Data entry was conducted and analysis was undertaken using the PPIP computer based software program. The PPIP software calculated neonatal deaths and their causes.

Results: The Neonatal intensive care unit at women and newborn hospital recorded a total of 2640 deaths in 7 months from May 1st 2019 to 31st December 2019. The highest cause of death was prematurity with its complications at 126 (54%) in the sampled 238 recorded deaths. Followed by infection at 46 (19%) and hypoxia at 44 (18%). These deaths ranged from birth weights of less than 1000 grams to more than 2500 grams.

Conclusion: The results reveal that it is possible to implement PPIP in Zambia and its use eases the audit review process, which combined with audit review meetings can improve the quality of care of neonates in the neonatal intensive care unit.

Key Messages

1. The implementation of PPIP in a public hospital in Zambia is feasible.
2. The top cause of death is prematurity and its complications.
3. Infection was among the top three causes of mortality and Asphyxia.

Introduction

Zambia is among the African countries with a high perinatal and maternal mortality rate. Its current maternal mortality rate is at 390 per 100,000 live births, infant mortality rate is 74.2 per 100,000 live births and the neonatal mortality rate is 27 per 1000 live births this is according to the Zambia demographic health survey 2017 -2018. Although programs like teaching midwives, nurses and obstetricians about active management of the third stage of labor and more recently basic and comprehensive neonatal resuscitation have reduced deaths, more information is needed to further reduce the loss of life and decrease morbidity in mothers and newborns. The information can be gathered using the perinatal problem identification program, which is useful with audit review meetings for quality improvement.

The perinatal problem identification program (PPIP), a software that seeks to improve perinatal and maternal health care audits was developed in South Africa in the late 1990s and it is now in the third

edition (1). This program enables timely data analysis that can enable policy makers to make quick decisions in order to improve the health care service delivery. The program is downloaded without cost after agreeing to appropriate use through a licensing agreement (1). PPIP is not an online application therefore, data is not kept anywhere else but on the ward computer. PPIP only needs an internet connection to download the installation file however, it does not need to be connected to the internet to use it. Zambia like many low and middle income countries have been conducting manual audit reviews, which have proven to be time consuming and may miss important information. It is against this background that the feasibility PPIP study was conducted at the Women and new born hospital in the neonatal intensive care unit in order to improve collection of information on numbers of early and late neonatal deaths allowing rates to be easily calculated at any time and to show trends so that perinatal and maternal programs can be implemented in order to reduce the morbidity and mortality rates.

A number of countries have collected perinatal data, which has then been used to improve the quality and quantity of care provided (1–7). Today for example most countries know that pushing the caesarean section (C/S) rate ever higher does not endlessly improve outcomes. While most countries now track C/S births many do not or cannot accurately track stillbirths, premature births, rates of pre-eclampsia and hemorrhage just to mention a few (2). In many developing countries, Zambia inclusive, there has been a lack of good quality and cost effective tools for perinatal data collection, and someone to spearhead a real effort to this effect. This has resulted in many of these countries having little perinatal data. Data is useful in improvement of quality of care to accomplish successful real changes in people, systems and in the approach to care.

PPIP Description

PPIP seeks to improve perinatal and maternal health care audits. It is a computer software tool which was developed in South Africa in the late 1990s and its now in the third edition (1). We have secured the license through our connections in South Africa where we were undertaking our postgraduate studies. The program is downloaded without cost after agreeing to appropriate use through a licensing agreement (1). PPIP is not an online application therefore, data is not kept anywhere else but on the ward computer. PPIP only needs an internet connection to download the installation file however, it does not need to be connected to the internet to use it.

PPIP does not however do data collection without human effort; nurses, midwives, obstetricians, doctors and clerks needs to be trained in the use of PPIP. Non-Randomised trials on the quality-of-care audits, which have been done in South Africa where PPIP has been in use for more than twenty years now, have shown a reduction in perinatal mortality by up to 30% (2, 4, 5).

With PPIP potential problems are identified through the use of audits; focused audits within a wider system can identify contextually specific service deficiencies and provide the impetus for change (3, 6, 7). To use and benefit from PPIP, appropriately trained data entry persons or health care providers must enter the information as prompted. The software compiles the data and can produce analysis, charts and

reports in the hands of someone with basic knowledge on how to generate such documents. As care rendered is measured, and recorded over time the quantity of data collected accrues.

PIPP has a built-in appropriate statistical processing that does the interpretation. PPIP does not require a mathematician to understand results. However, a human being is required to move the easy-to-understand results into the view of the health care providers and administrators who can then lobby for change and make decisions about best use of available funds. Implementation of PPIP included conducting an on the job training of midwives, doctors, nurses and clerks on PPIP. Thereafter, a process evaluation was conducted to ensure that all the trained personnel are able to utilize the program correctly. At quarterly intervals over a six months period meetings were held to determine proper ongoing data collection, evaluate use of the collected information and provide guidance for focused audits and the use of data to improve care. Clinical audit review meetings are important for quality improvement in the care for the next patient.

Methods

This was a descriptive study. After ethics approval (UNZABREC Reference number: 015-03-19), meetings were held with the maternal, neonatal and child health team at the Ministry of Health Zambia. This was followed by training of the target population (nurses, midwives, doctors and clerks) on the use of the software. All the mortality deaths were entered in the computer in a seven months period from May to December 2019.

A. Study site and population/Research materials

The Neonatal Intensive Care Unit at the Women and Newborn Hospital is the biggest referral Unit in Zambia.

B. Selection of participants, sampling methods and sample size

All neonatal deaths in the Neonatal Intensive Care Unit (NICU) of the Women and Newborn Hospital at the University Teaching Hospitals.

C. Data collection plan and tools

Every neonatal death in the NICU were entered in the data base, the activity which lasted for six months from the time of ethics approval. Audit meetings were held bi-weekly and trends in the quality of care of all mortalities were discussed.

D. Data analysis plan

Data was analyzed using the PPIP software which was installed on the computer in the unit. Auditing of the care received, which the neonate received from the time of admission to death was done.

E. Ethics considerations

The ethical consideration in this feasibility study of PPIP was privacy and confidentiality, which were upheld throughout the study. Patients names and file numbers were withheld in the discussions and when disseminating the findings. Authority to conduct the study in a hospital setting was granted by the National Research Authority Zambia.

Results

In a seven months period from May 2019 to December 2019, the neonatal intensive care unit at the women and newborn hospital recorded 2640 deaths. These deaths ranged from birth weights of less than 1000grams to more than 2500 grams. The mortality rate was grouped into early neonatal mortality rate (Figure 1), which is a death of a neonate within the first few days of life or death of a neonate within the first week of life. The highest mortality rate in the category of early neonatal death was in December 2019 in which the NICU recorded a mortality rate of 316/1000 live births. The second category was late neonatal mortality (Figure 2), which is defined as deaths occurring later than the first week of life but within the first month of life.

LATE NEONATAL DEATHS

The NICU had the highest late mortality rate recorded in July 2019 at 208 per 1000 live births. Late neonatal death is the death of a neonate after the seventh day of life and within the first month of life.

CAUSES OF DEATHS

The neonatal intensive care unit at women and newborn hospital recorded 2640 neonatal deaths from 1 May to 31 December 2019 whose sampled causes of mortality in 238 neonates have been listed in Figure 3. The top three highest causes of death were prematurity and its complications at 54%, followed by infection at 19.3% and hypoxia at 18.5% as presented in Pie Chart 1.

Discussion

This feasibility study involved the implementation of a perinatal identification program at a university teaching hospital in Lusaka, Zambia. A total of 1618 early neonatal deaths were recorded in the NICU whose birth weights ranged from less than 1000 grams to more than 2500 grams. As for late neonatal deaths, a total of 1022 neonates died between May 2019 and December 2019. The mortality rates recorded are alarming and calls for urgent attention in reducing deaths from preventable causes. The highest mortality rate in the category of early neonatal death was in December 2019, where mortality rate of 315/1000 live births was recorded. Considering the huge prevalence of neonatal deaths recorded between May and December in our study site, which happens to be the biggest referral unit in the country, much strenuous commitment are required by the management of the hospital and government of Zambia in order for the country to achieve the global targets on neonatal mortality. The country's overall

neonatal mortality rate is 27 per 1,000 live births (8). The neonatal mortality situation in Zambia appears to be similar to that of other Southern African countries such as Tanzania (25 deaths per 1,000 live births) (9) and Malawi (27 deaths per 1,000 live births) (10).

It is worth noting that Zambia lags behind the global neonatal mortality rate targets. For instance, the second target of Sustainable Development Goal 3 urges all countries to end preventable deaths of newborns and work toward reducing neonatal mortality to at least 12 deaths per 1,000 live births by 2030 (11). Subsequently, strategic implementation of PPIP across hospitals in Zambia may be helpful considering the potency of PPIP in aiding to conduct timely data analysis worthy of enhancing policy makers' decisions regarding holistic neonatal and maternal wellbeing through audits (1).

Considering the identified leading causes of neonatal deaths (i.e. prematurity, infection and hypoxia), effective health education programs highlighting lifestyle modification may be useful for women during the antenatal stage. This can be an avenue to motivate the women to reduce/forfeit lifestyles that will increase susceptibility of their fetuses/newborns to the leading causes of neonatal deaths. For instance, behavioral or lifestyle factors such as poor nutrition before and during pregnancy, smoking, and taking too much alcohol during pregnancy are notable predictors of neonatal mortality (12). As such, health education programmes can target some of these factors.

Myriad behavioral communication change interventions such as the use of a wide range of audio-visual aids may be useful to convey health education messages to the women, particularly those in their final trimesters. The findings are consistent with what was reported by a study on avoidable factors and causes of neonatal deaths in South Africa where asphyxia-hypoxia accounted for 32% whilst immaturity made up 35.2% (13).

The highest early neonatal death was in December 2019 was mortality rate of 315 per 1,000 live births, however, late neonatal mortality rate (207.6 per 1000 live births) was highest in July 2019. These findings indicate variability in neonatal mortality at the University Teaching Hospital. The contributory factors leading to this variability in neonatal mortality may be understood through a qualitative design. This notwithstanding, subsequent interventions to avert neonatal mortality in Zambia need to acknowledge possible the irregularities associated with neonatal mortality in order to have much impact.

Limitations Of The Study

Due to the study design (i.e. quantitative), the study was unable to investigate the reasons that account for the neonatal mortality found as well as the variations. Second, our study was limited to descriptive analysis, hence there are no rigorous inferential analysis. In spite of these, the study presents a true reflection and detailed descriptive account of neonatal mortality situation at the NICU studied.

Conclusion

The feasibility study of the implementation of the perinatal problem identification programme at women and newborn hospital neonatal intensive care unit revealed that timely data is captured and analysis is easy and not time consuming. In the seven months period when neonatal deaths were recorded, the results demonstrated that prematurity and its complications were the highest causes of neonatal deaths. This can be attributed to poor maternal antenatal care, maternal conditions were not treated early thereby enhancing preterm labour. The second highest cause was infection, which could have been due to untreated maternal conditions and non-compliance to infection prevention protocols when doing procedures. With the timely identification of the factors that could have led to these mortalities programs like mentorship can be instituted in order to prevent such deaths. PPIP can enhance service delivery by improving the health care service to the clients. PPIP data collection improves collection of information on numbers of early and late neonatal deaths allowing rates to be instantly calculated at any time and easily calculated at intervals to show trends. Major causes of neonatal deaths in the neonatal intensive care unit (NICU) can be identified which can be used for quality improvement in the care of newborns.

Declarations

Ethics approval and consent to participate

Ethics approval was obtained from the UNZABREC and NHRA Zambia for use of health care setting in the project. The study had no participants.

Consent for publication

We had no participants because the study was using data files only. The NHRA Zambia approves dissemination of research, which starts with a local presentation in Zambia. For this study, a preliminary presentation was presented in 2019 before the conclusion of the study and generation of reports.

Availability of data and materials.

Data is available on request.

Competing Interests

All authors have no competing interests.

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Author Contributions

Bupe Mwamba was the Project Investigator and was involved in the writing of the manuscript following the guidelines.

Edward Ameyaw was involved in the preparation of the manuscript

Majory Singogo was involved in the preparation of the manuscript.

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Figures

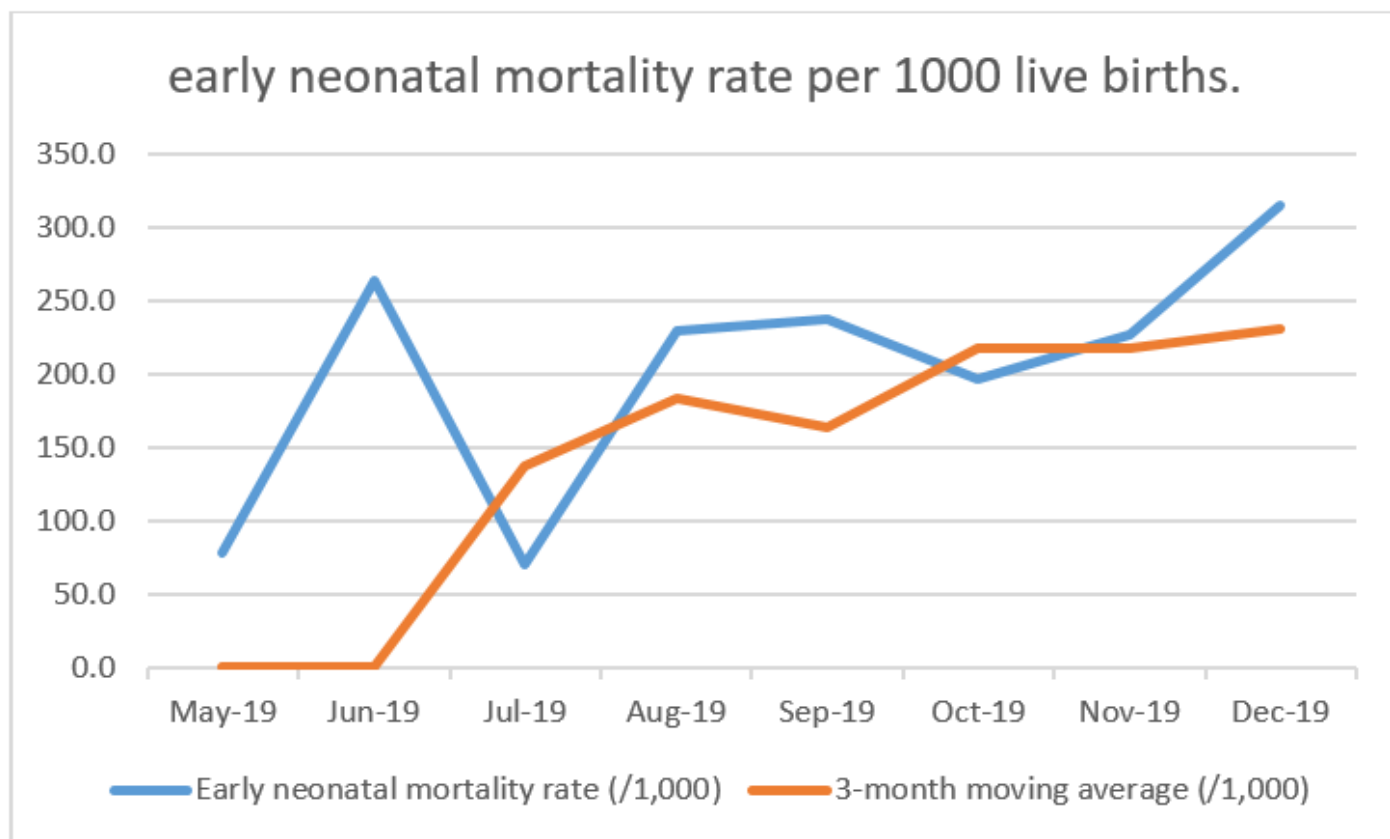


Figure 1

The line graph shows the trend of early neonatal deaths recorded in the NICU from May 2019 to December 2019.

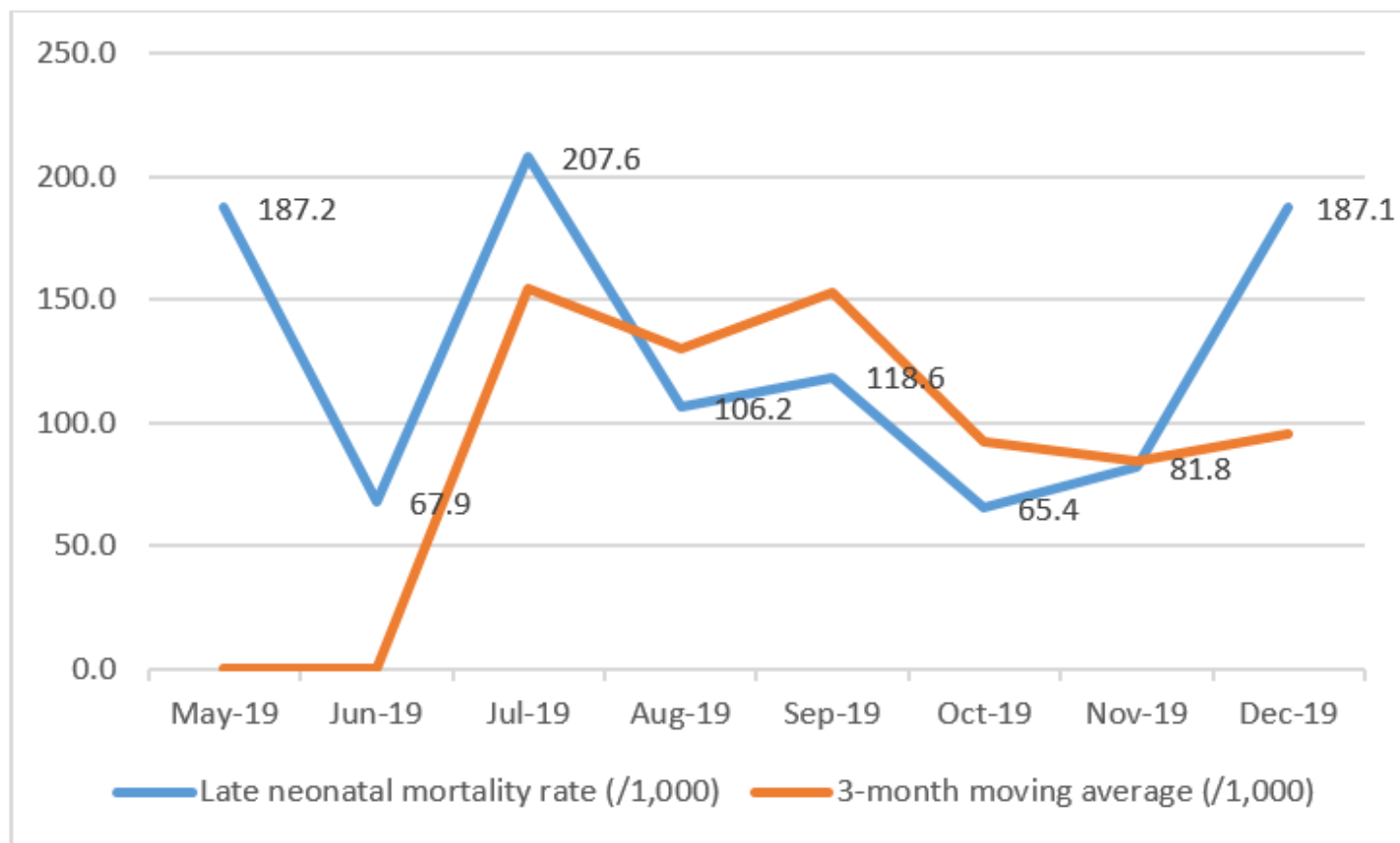


Figure 2

Line graph of the late neonatal deaths recorded and its trend

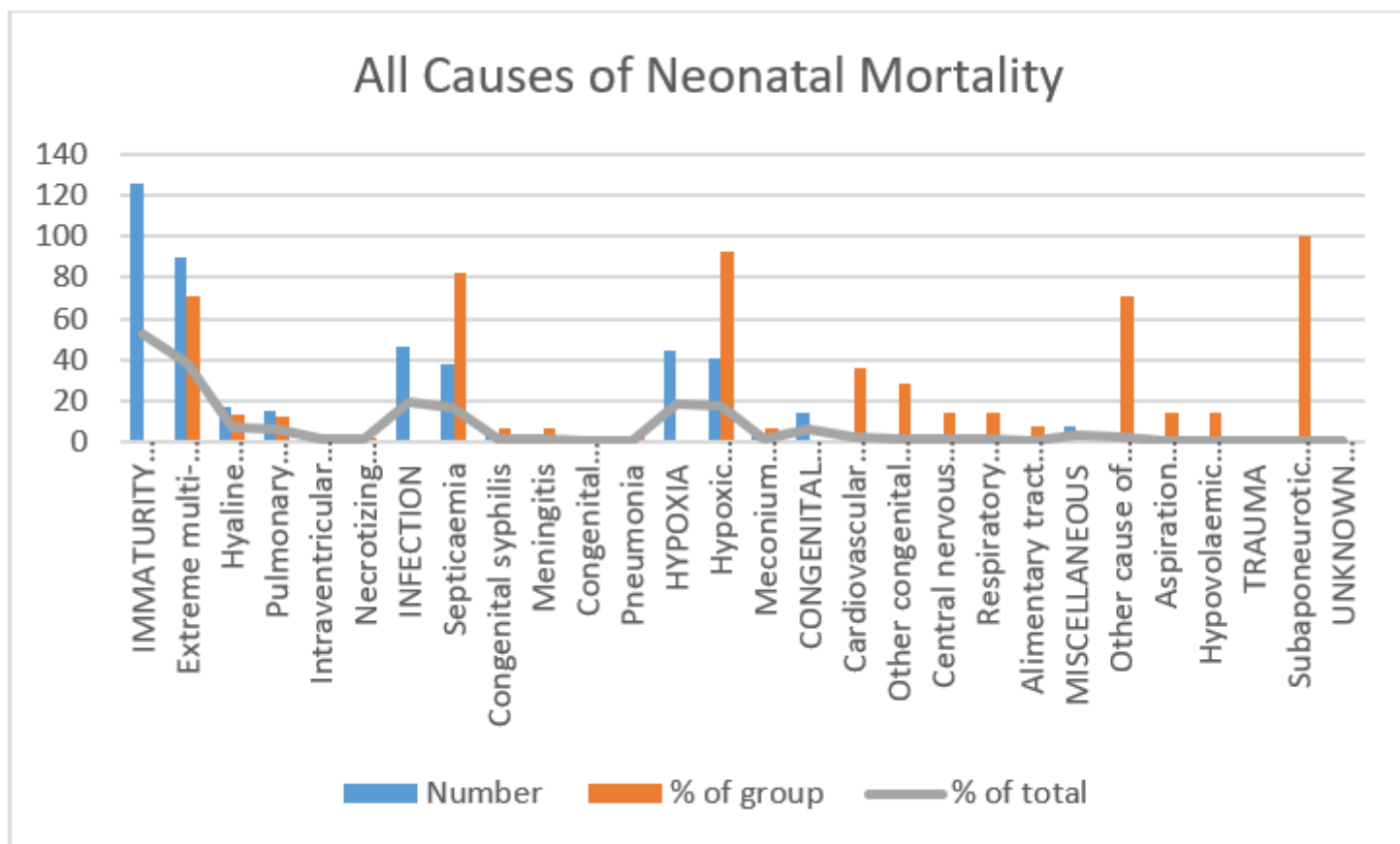


Figure 3

All Causes of Neonatal Mortality

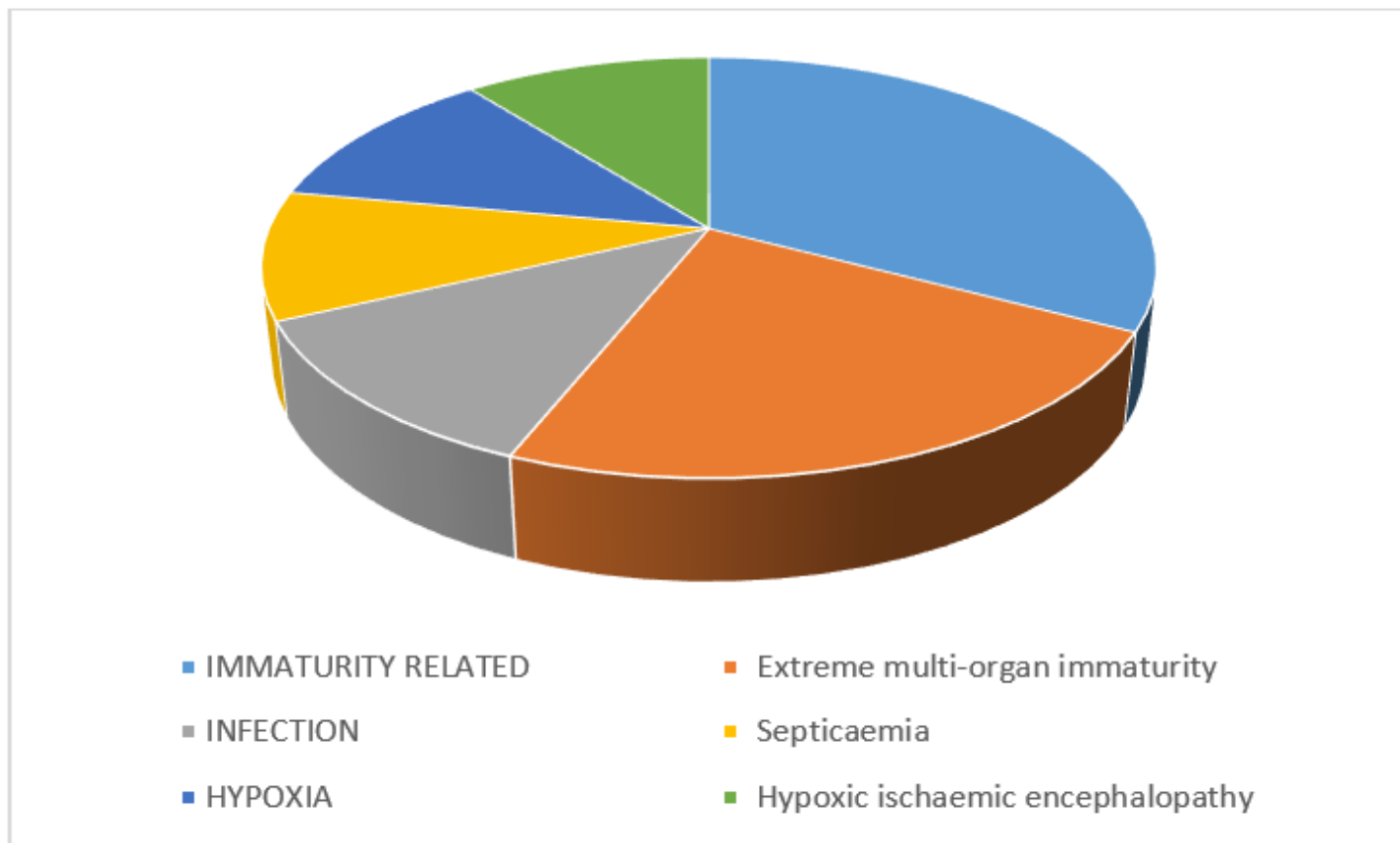


Figure 4

Pie chart 1: Illustrating the major causes of neonatal deaths recorded in NICU between May 2019 and December 2019.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [SPIRITFillablechecklist15Aug2013.doc](#)