COLLABORATIVE NETWORK OF NEONATAL SERVICES TO REDUCE NEONATAL MORTALITY AND IMPROVE OUTCOME: ARMY MEDICAL CORPS COULD LEAD THE WAY

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ABSTRACT

Internationally, collaborative activities between neonatal units at local, regional or national level have shown to improve the standards of neonatal care and reduce neonatal mortality. Such networks not only improve outcome but act as a conduit for quality improvement, bench marking, reducing disparity between units and significantly reducing operating costs. Networks also create an environment for exchange of learning and knowledge, integrated research and international recognition.

This article describes the rationale for the formation of neonatal networks internationally and makes a case for why and how such networks should be developed by Pakistan. Armed Forces Hospitals, as the leading health care provider in the country can provide a role model and benchmark for rest of the country on how a collaborative neonatal network can reduce neonatal mortality and improve neonatal care within Army Medical Corp (AMC) and throughout the country.

INTRODUCTION

Globally 2.5 million neonates die every year (2018). Nearly 44% of these occur in three countries; China, India and Pakistan[1]. Pakistan's share of the global burden of neonatal deaths is around 0.3 million/year. Approximately 298,000 neonatal (44/1000) deaths occur annually in Pakistan[2]. With rapidly developing neonatal services throughout Pakistan it is important that the best evidence based and quality improvement practices are adopted within the available resources. Quality improvement requires constant surveillance and collaboration among the neonatal units. Collaborative networks when implemented have been a 'game changer' through out the developed world. In many developed countries it has now become mandatory for neonatal units to amalgamate with local, national or international networks. Data analysis from these networks forms the basis of advancement in neonatal medicine. These networks share good practices, establish internationally recognised benchmarks and evaluate standards along with integrated research forums[3-5]. Neonatal services within AMC, with its disciplined process and hierarchy of administration can lead the way at national level in reducing neonatal mortality, improving neonatal outcome and care processes by forming a collaborative network of all its neonatal units at various Combined Military Hospitals.

This manuscript discusses the feasibility and advantages of a network, by optimising existing resources and infrastructure[6] and transforming organizational culture and attitude along with reducing operational costs.

History and Background of Networks

Clinical collaborative networks are defined as linked group of health care professionals or a particular health care speciality working in collaboration and harmony to provide equitable and the best quality of clinical services within existing resources. United States was the first to classify perinatal and neonatal units into 3 levels in 1975 (level 4 was added in 2010) and also established regional and national networks in the same year[7]. Similar networks were then established in the UK in 2004[2], Europe 2005 and India[8] in 2017. With the

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sole objective to provide quality perinatal care, reduce neonatal mortality, improve neonatal outcomes, and remove the disparities in neonatal care. European and North American countries have mandated that all neonatal units must belong to one or more neonatal networks. Currently many countries now have local, national and international networks (table-I).

Table-I: Currently established neonatal networks.

International Networks
• Australian and New Zealand Neonatal Network
• European Neonatal Network (Affiliated with European Society of Paediatric)
• Research and European Society of Neonatology.
• Global Network for Women's and Children's Health Research (NICHD)
• International Collaboration of Neonatal Networks (ICONN)
• NEOCSUR (South American Networks)
• Neonatal Research Network (NICHD)
• SIBEN Neonatal Network (Latin American Network)
• Vermont-Oxford Neonatal Netowk (VON)
National Networks
• Belgian Neonatal Network
• Canadian Neonatal Network
• Israel Neonatal Network
• Indian Neonatal Network
• Japanese Neonatal Research Network
• Portugal Neonatal Network
• Spain: SEN-1500 Network
• Swiss Neonatal Network
Regional Networks
• Basque Country and Navarre (GENVN)
• California Collaborative Effort
• Kaiser Foundation
• Northern Ireland Neonatal Network
• NHS Neonatal Network (NHS)

These networks/groups collect a variety of information related to neonatal care over web-based/internet systems. This development alone has made it possible for majority of neonates in these countries to survive and thrive along with reducing disparity in clinical processes, facilities, and resources[9,10]. The history of specialised neonatal care in AMC dates back to 1952 when the first designated nursery was established by Lt Col (later Brigadier) MS. Haque at Combined Military Hospital, Lahore. The newborns till then were looked after by obstetricians. In 1961 he and late. Burki WA, were the first to obtain and inaugurate neonatal incubator (fig-1).

Since then AMC has established many neonatal units in CMHs through out the country. These are managed by neonatologists in provincial capitals and by general paediatricians in other CMHs. AMC is a leading health care provider in the country with highly organised administrative and clinical governance structure thus, it is a natural next step to form collaborative neonatal network of its neonatal units and lead the way towards betterment of neonatal care in Pakistan.

Figure-1: Lt. General W.A. Burki, Minister of Health (in white suit) and Brig. M.S. Haque (Director General Health) inaugurating the first incubator for newborns in 1961.

The intension behind developing neonatal network is to provide access to all newborns to consistent quality of care provided by appropriate level of professional expertise from nurses, doctors or other health care providers. Other drivers for the development of neonatal network

are the concerns of serious inequalities in provision of neonatal care in different neonatal units. Lack of adequately trained personnel, high rate of prematurity, large number of growth restricted babies with complex problems and greater parents' expectations add to the pressure for the development of collaborating networks. Thus, healthcare professionals need to focus not only on the structures where care is provided but towards provision of appropriate evidence-based seamless care for the newborn of ORs JCOs and officers.

Role of Neonatal Networks

The primary aim of neonatal networks is to accelerate quality improvement in health service delivery for the newborn by developing local/ national evidence-based guidelines based on data from collaborating units. Data is used to bridge the gap between the expected and observed outcome using common protocols, equipment, risk adjustment and then bench marking the good practices through out the network. All members of the network share the same specific improvement aims and constantly learn from each other (table-II).

Role of Neonatal Network (table-II)

Coordination of care of units with in the network.

Data Collection and Collation

Delivering the appropriate level of care in the right place as close to home as possible.

Reducing Disparity

Audit and monitoring of processes and outcome. Development of Uniform Guidelines.

Education and Training

Maintaining and improving quality standards.

Benchmarking

Uniform Commissioning.

Developing and Agreeing Strategy

Planning future development.

Presently, there are significant differences between the structure, staffing, equipment and capacity of various neonatal units. One of the first tasks in organising the network is for the participants to agree designation of the units[11], (table-III) and establish a hierarchy of services provided.

The next task is standardization of protocols and equipment in all the units within the network. This is best done by forming an executive committee of senior neonatologists, hospital administrators, nurses and epidemiologist who prioritise and develop a basic data set (available at www.bapm.org) for the network and review

Table-II: Suggested definition and designation of neonatal units.

Pragmatic definitions and designation of Neonatal Units		
Level-1	Special Care Baby Unit	Special care baby unit that provides routine care for babies born at or near term. General paediatrician has a supervisory role.
Level-2	High Dependency Unit	A unit that is able to provide initial stabilization and respiratory support for all babies and short-term care for babies up to 35 weeks of gestation. Staffed by paediatrician with interest in neonatology and 50% of nurses either trained or experienced in neonatology.
Level-3	Neonatal Intensive Care Unit	A unit able to provide all the above plus intensive care e.g. ventilation for vulnerable and preterm infants. Staffed by fully trained neonatologists and nurses trained in neonatal intensive care.
Level-4	Regional Neonatal Intensive Care Unit	A unit able to provide all the above plus have the ability to care for babies requiring surgery (General or Cardiac). Staffed by more than one fully trained neonatologist and nurses trained in neonatal intensive care and the care of post-surgery babies.

the local guidelines (if any) from every unit for developing the network wide guidance to be delivered across the network so that the clinical process becomes seamless. Role of the executive committee and individual units is shown in table-IV. In summary, networks offer a system for standardizing definitions, data collection, benchmarking, reporting outcomes, analysing root causes of disparities in quality of care and potentially collaborative network efforts to improve practices and outcomes.

QualityImprovements (QI)

Quality improvement (QI) is now a central part of work for clinicians throughout healthcare in the developed world. Neonatal networks offer a perfect platform for implementing quality

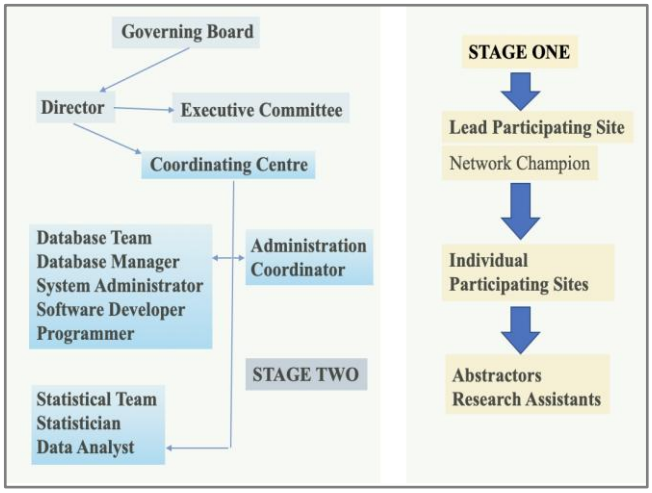

Figure-2: Suggested infrastructure to establish a clinical network.

standards and improvements for the care of vulnerable newborn infants. The concepts of QI in health care is not new, however, many clinicians are not aware of the various strategies required for quality improvement. QI in health care arise from variations in practice such as improper use or disparities in resources. QI analysis in countries like United States, Canada and Japan in the 1990's found considerable variations in practice and outcomes in neonatal care[7,11,12]. Implementation of QI strategies has seen 80-90% reduction in variations and significant improvement in the survival and outcome of neonates. One of the fundamental problems and challenges facing neonatal clinicians in Pakistan including neonatal units of the AMC is variations in available medical equipment, the quality of care and outcome. Doctors all over the world are trained to act on individual judgement and do not necessarily follow guidelines or protocols reliably[13]. The answer to this is standardization of processes wherever possible, so that variability in outcome is minimised. This is done by standardisation of routine processes, creation of checklists and uniformity of care bundles. Whilst quality information is essential, by itself, it is not enough to promote continuous improvement. The Vermont Oxford Network (VON) has summarised continuous improvement in its 4 habits for practice improvement[14].

Table-III: Role of the executive committee and individual units within the network.

Executive Committee	Individual Neonatal Units
Setting, maintaining and improving standards	✓✓
Defining clinical pathways	✓
Data collection, collation	✓✓
Data monitoring	✓
Developing and agreeing strategy	✓✓
Auditing against standards	✓
Education and training	✓✓
Purchasing power	✓
Supporting strategy	✓

The Habit of Evidence-Based Thinking

The habit for change. The habit for systems thinking. The habit for collaborative learning. The Canadian neonatal network has adopted a "Plan-Do-Study-Act (PDSA) model[15], where a small change in practice or process is planned and implemented, the outcome is monitored and evaluated and then further changes/ improvements are made. Nevertheless, the most important aspect is emphasis on motivating change in behaviour and creating a culture of continuous change amongst individuals through collaborative learning.

Clinical Governance

Clinical governance[16] is a system for improving the standards of clinical practice. Develo-

pment of clinical network is the ideal method to fulfil all "seven pillars" of clinical governance highlighted below; Improved communication between participating units. Strategic Development. Better resource utilization. Improved clinical effectiveness (audit). Developing by shared learning. Risk management. Better patient experience.

Efficient Use of Resources and Cost Reduction

Equipment and medications required for neonatal care are very expensive. The average cost of a neonate admitted to neonatal intensive care unit in the US is around 3,000$ per day for term infant and 25,000 $/day for a baby born at or less than 26 weeks gestation[17]. It is estimated that the cost of paediatric intensive care in a tertiary care unit in Karachi is nearly 58,000 rupees per day[18]. The cost of neonatal intensive care is likely to be higher. Currently, most neonatal units have a wide variety of equipment usually bought at the recommendation of the central procurement staff/administrators or neonatologists. The same is true for expensive medications like surfactant etc. Once a particular clinician leaves the institution his or her successor may either not be familiar with the existing equipment therefore either not use it (adding to redundancy cost) or have a long learning phase during which time the care provided may not be adequate. This is more so in AMC as officers are posted every two to three years. Furthermore, the concept of biomedical engineering being part and parcel of each neonatal unit has not yet been realised in Pakistan.

Establishing neonatal networks will involve establishing a clear infrastructure in stages as the concept of networking takes acceptance[19,20]. An administrative and reporting structure is suggested below (fig-2). This will involve finding a clinician in each unit who champions the concept of forming neonatal network followed by creating a task force for reviewing various national and international networks. Learning from them on how they have established benchmarking, data collection and analysis techniques, then adopting them to the locally prevailing conditions then gradually scaling up over years to a level that are comparable to international neonatal networks[21].

With establishment of a collaborative neonatal network the purchasing of both equipment and medication could be centralised, saving not only the initial purchasing costs (due to volume) but also in maintenance costs and avoiding clinicians 'lag time' in learning the new equipment. Training and experience with standardised equipment and use of expensive medication could be simplified and variability in care reduced to minimum. In these times of austerity, the potential savings financially and better utility of equipment are recognised advantages of collaborative networks.

Measuring Success

How will we know whether the network has been successful or not. It would be alluring to think that establishment of a network would reduce neonatal mortality and morbidity but simply establishment of a robust national database would be a noble goal by itself. To summarise, provision of a system that provides equality of care, uniformity of processes (guidelines), equipment and quality of care must be the ultimate objective.

Barriers to Success

To date no group of clinicians or hospital organisations have disagreed with the underlying principles behind formation of networks. This is particularly true in neonatology where units come together in a coordinated and facilitative manner to improve the outcome of newborn babies. These challenges include; Clinicians and / or administrators might not like sharing authority or definition (which has staffing implications) with the executive committee[22].

Commissioning and contracting process as highlighted above is a powerful tool which may lead to tension between local and central purchasing system. Clinicians and/or administrators may fail to realise the benefits of better prices and discounts offered by companies for large volume

purchase. Lastly, clinicians and or administrators may not appreciate the benefits of working and learning together[22-25].

Future

AMC neonatal network has the potential to develop into a world class healthcare system that provides seamless high-quality care no matter in which neonatal unit a baby is admitted to. Once its benefits (improved quality and cost savings) are realised then a logical progression is to incorporate maternity and obstetric services and formulate "Perinatal Network" in AMC.

CONCLUSION

In this manuscript we have proposed the development of a collaborative network of all neonatal units in AMC. Fundamentally, networks offer a system for standardizing definitions, data collection, create benchmarks, improving neonatal outcome and saving costs whilst implementing clinical governance. Collaborative networks also provide the opportunity for research and help the administration to develop evidence-based strategies for the future.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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