Neonatal intensive care

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Description of condition and intervention

Neonatal care is an important tenet to ensure that every baby survives and thrives to reach their full potential for growth and development. Providing timely care to new-born immediately after birth and during postnatal period is critical. Global estimates indicate that new-born deaths account for 47% of deaths among children under the age of five globally, resulting in 2.4 million lives lost each year. About one third of new-born deaths occur on the day of birth and close to three quarters occur within the first week of life. Children who die within the first 28 days of birth suffer from conditions and diseases associated with lack of quality care at birth or skilled care and treatment immediately after birth and in the first days of life. Most new-born deaths take place in low and middle-income countries. Highest neonatal mortality of 27 per 1,000 live births has been reported in Sub-Saharan Africa. (Source: WHO 2021).

Specific health interventions are included as part of neonatal intensive care to address the neonatal morbidity and mortality, especially relevant in resource-constrained settings. We include the below-mentioned interventions as part of neonatal intensive care to assess their effects and costs, being analysed in FairChoices: DCP Analytical tool.

- Early detection and treatment of neonatal sepsis and pneumonia
  - Sepsis IV antibiotics
  - Pneumonia IV antibiotics
  - Meningitis IV antibiotics

EVIDENCE BRIEF

Neonatal intensive care
(DCP4 ID: MNH07)

FairChoices
DCP Analytic Tool

Management of jaundice (phototherapy)

International guidelines

Organization	Indications/recommendations	Applicability in LIC & Lower MIC settings
World Health Organization 2017	WHO recommendations on newborn health	Yes

Intervention attributes

Type of interventions & Delivery platform

Table 1: Type of interventions & delivery platform

Intervention	Type	Delivery platform
1. Early detection and treatment of neonatal sepsis and pneumonia Sepsis IV antibiotics Pneumonia IV antibiotics Meningitis IV antibiotics	Curative	First-level Hospital
2. Management of jaundice (phototherapy)	Curative	Referral and Specialty Hospital

Equity

In addition to considerations like cost-effectiveness and health systems factors, dimensions of equity can be relevant for priority setting. The opportunity for a long and healthy life varies according to the severity of a health condition that individuals might have, so there are inequities in individuals' opportunities for long and healthy lives based on the health conditions they face. Metrics used to estimate the severity of illness at an individual level can be used to help prioritize those with less opportunity for lifetime health. FairChoices: DCP Analytics Tool uses Health adjusted age of death (HAAD), which is a metric that estimates the number of years lived from birth to death, discounting years lived with disability. A high HAAD thus represents a disease less severe in terms of lifetime health loss, while a low HAAD

represents a disease that is severe on average, causing early death or a long period of severe disability. It is also possible to estimate the distribution of HAAD across individuals with a health condition. FairChoices shows for each intervention an average HAAD value of the conditions that are affected by respective interventions that have health effects. Additionally, a plot shows HAAD values for around 290 conditions (Johansson KA et al 2020).

Time dependence

Moderate level of urgency. Treatment outcomes not highly affected by some days of delay.

Population in need of interventions

Table 2: Population in need of interventions

Intervention	**Treated population**		**Affected population**		**Disease state addressed**
	Treated age	Treated fraction	Affected age	Affected fraction	
Early detection and treatment of neonatal sepsis and pneumonia Sepsis IV antibiotics Pneumonia IV antibiotics Meningitis IV antibiotics	0 to 0 years; both genders; incidence based	1	0 to 0 years	1 (Appendix Gutttmacher report 2014)	Neonatal sepsis and other neonatal infections Lower respiratory infections Meningitis
Management of jaundice (phototherapy)	0 to 0 years; both genders; incidence based	-	0 to 0 years	1 (Appendix Gutttmacher report 2014)	Hemolytic disease and other neonatal jaundice

Intervention effect and safety

Table 3: Effect and safety of interventions for neonatal basic care

Effect of intervention		Certainty of evidence
Mortality Early detection and treatment of neonatal sepsis and pneumonia Sepsis IV antibiotics Pneumonia IV antibiotics Meningitis IV antibiotics	0.8 reduction in neonatal mortality due to pneumonia neonatal sepsis (Table 40, Appendix Gutttmacher report 2014)	See appendix

Model assumptions

Table 4: Summary of model parameters and values used in FairChoices – DCP Analytical Tool

Category	Model parameter	Notes
Interventions	Basic neonatal resuscitation care (with bag and mask) Thermal protection for all babies,especially preterms Treatment of local infections (eye, skin) Hygienic cord care (chlorhexidine and tetracycline ointment) Kangaroo mother care	
Cost parameters		
Treated population	See Table 2	Global Burden of Disease Study 2019
Gender		

Age		
Treated fraction		
Effect parameters		
Affected population	Those with condition	
Affected gender	See Table 2	
Affected fraction age		
Affected fraction		
Comparison	No intervention	
Mortality Reduction (RRR) Early detection and treatment of neonatal sepsis and pneumonia	See table 3	
Sepsis IV antibiotics	0.8	
Pneumonia IV antibiotics	0.8	
Meningitis IV antibiotics	0.8	

Intervention cost

We have used the cost for managing Neonatal Bloodstream Infection (BSI) as a proxy to calculate the cost for Neonatal sepsis and pneumonia. The average cost per patient for managing new-born complications resulting from Neonatal sepsis and pneumonia requiring continuous supportive care is estimated to be 749 PPP in 2017 Ghana (Fenny AP et al 2021). The cost was converted from international dollar to local currency in the same year using World Bank exchange rates*. The final coat used was 1321.2 GH₵ in 2017 in Ghana. The cost for managing jaundice via phototherapy is estimated to be 26.2 USD per episode in 2012 in low-income countries (LIC) (Guttmacher report 2014).

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Commented [SA2]: https://data.worldbank.org/indicator/PA.NUS.FCRF

Commented [SA3]: https://www.guttmacher.org/report/adding-it-costs-and-benefits-investing-sexual-and-reproductive-health-2014-methodology

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World Bank exchange rates*: https://data.worldbank.org/indicator/PA.NUS.FCRF accessed on Dec 11 2021

Guttmacher report 2014: Darroch JE, Sully E, Biddlecom A. Adding it up: investing in contraception and maternal and newborn health, 2017—supplementary tables. New York, NY: The Guttmacher Institute. 2017

Appendix

Literature Review for effectiveness & safety

This literature search is an example of Level 1 search for intervention inputs taken from DCP3 or generated in an ad hoc manner (e.g., quick google search found one study of cervical cancer screening cost-effectiveness that was used to create an effectiveness parameter for that intervention).

Level of evidence of efficacy studies:

1. low (expert opinions, case series, reports, low-quality case control studies)
2. moderate (high quality case control studies, low quality cohort studies)
3. high (high quality cohort studies, individual RCTs)
4. very high (multiple RCTs, meta-analysis, systematic review, clinical practice guidelines)