Impact of low-cost bubble CPAP in the care of preterm neonates <1500g in a neonatal unit in eastern Uganda

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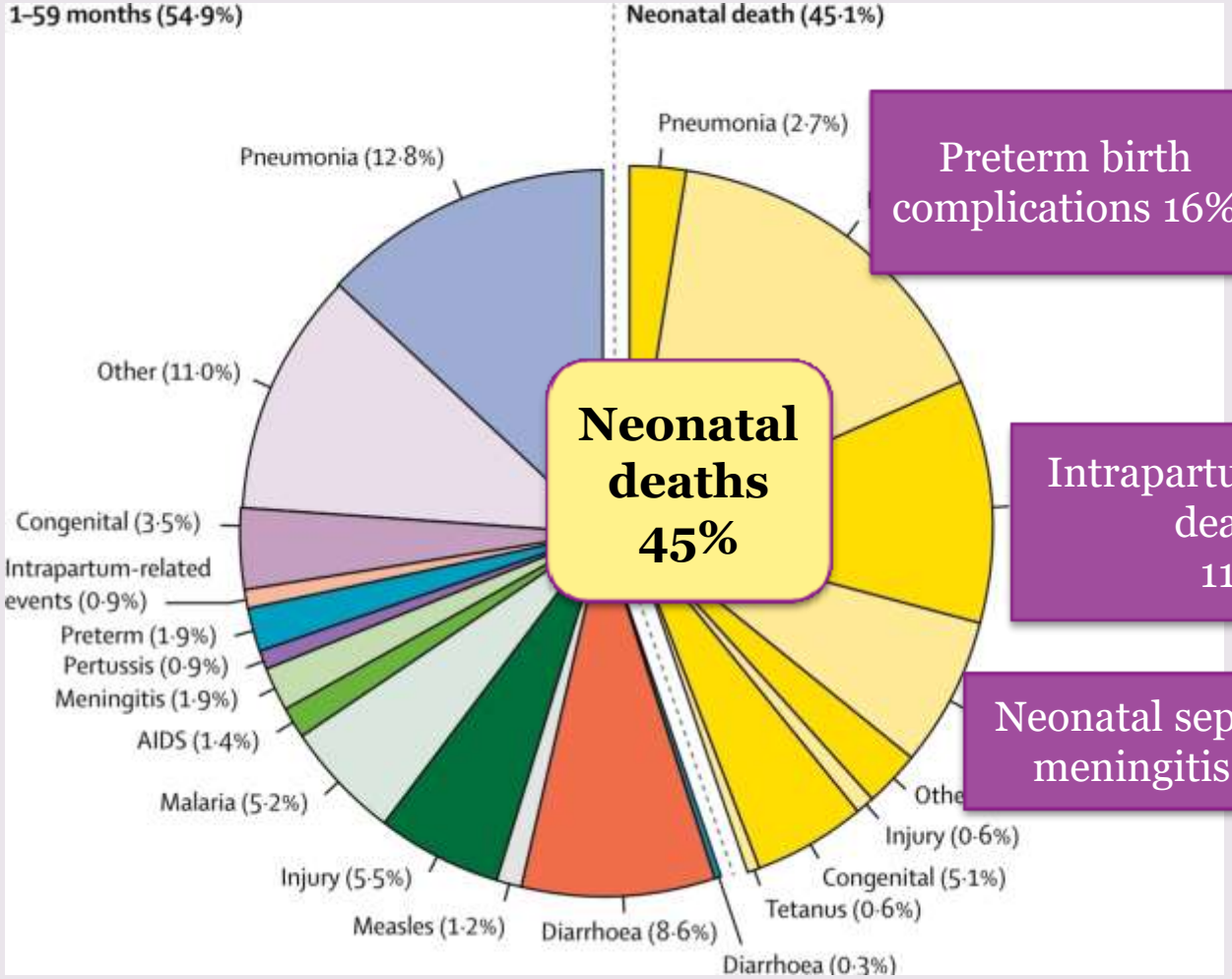
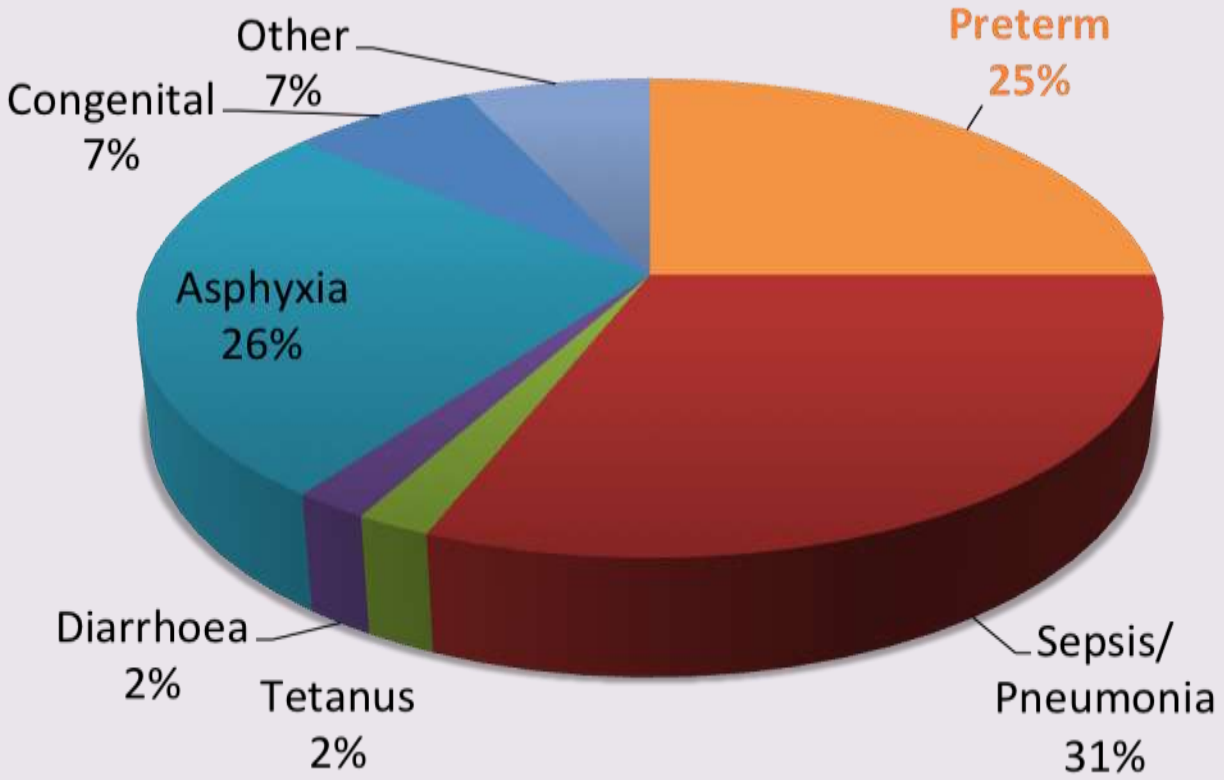
Global causes of child deaths in 2015



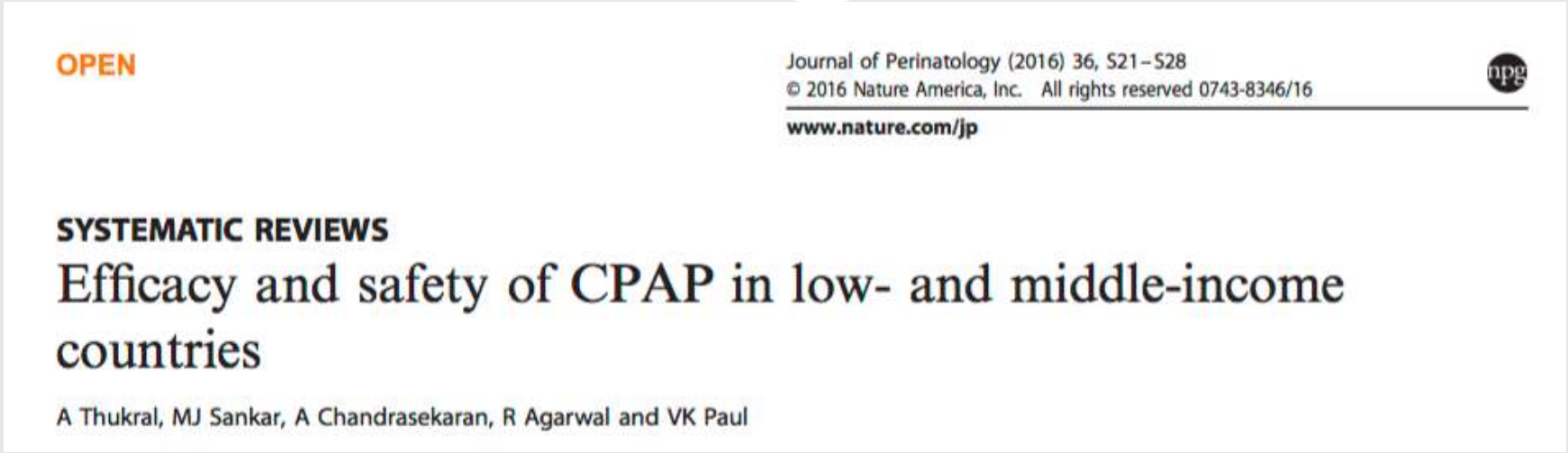
Adapted from Liu , Lancet 2016

Situation Analysis in Uganda



Respiratory Distress Syndrome

Bubble continuous positive airways pressure (bCPAP)



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SYSTEMATIC REVIEWS

Efficacy and safety of CPAP in low- and middle-income countries

A Thukral, MJ Sankar, A Chandrasekaran, R Agarwal and VK Paul

Pooled analysis of four observational studies in Fiji, South Africa and Malawi showed 66% reduction in in-hospital mortality in preterms (OR 0.34, (%%CI 0.14 to 0.82)

Setting – Mbale Regional Referral Hospital

Setting - Mbale Neonatal Unit

- Level 2 neonatal unit opened May 2015
- Can provide
  - Low flow oxygen
  - IV fluids and nasogastric tube feeding
  - IV medications including antibiotics and aminophylline
  - Phototherapy

Setting - Mbale Neonatal Unit

- Can not provide
  - Blood gas analysis
  - Portable chest x-ray
  - Routine complete blood counts, renal and lever function
  - One-on-one nursing
  - Continuous pulse-oximetry
- Staffed by
  - Full time neonatal specialist doctor
  - Two full time neonatal specialist clinical officers
  - Rotating medical interns
  - 24 hour neonatal nursing cover – one nurse per shift

Low-cost bubble CPAP

Why did we do this study

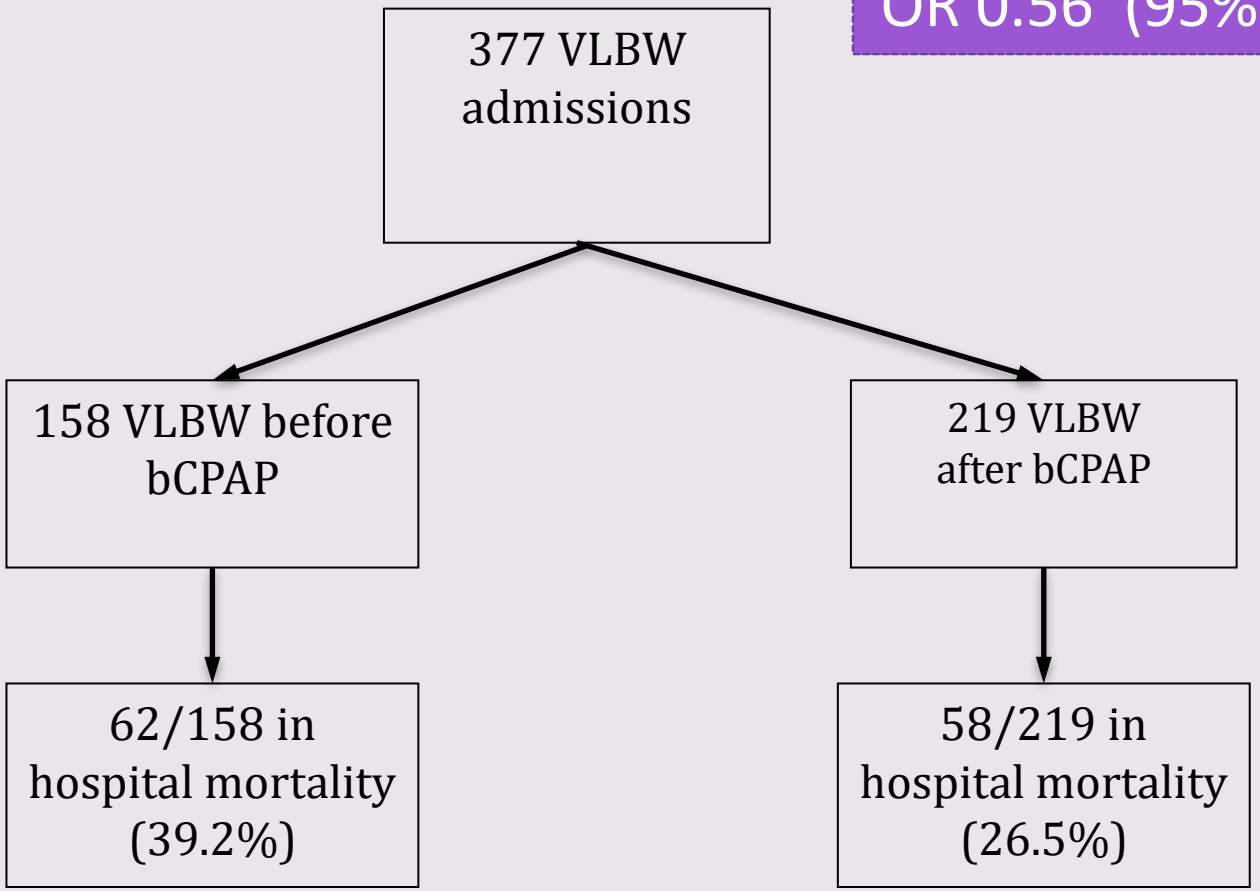
- To evaluate the impact of a low-cost bCPAP machine on preterm mortality in a LIC
- To assess the feasibility of implementing low-cost bCPAP in a neonatal unit in a LIC

Methods

- Retrospective study in Mbale Neonatal Unit
- Medical records were identified for all very low birth weight neonates (<1500g) admitted from May 2015 until December 2017
- Pre-bCPAP May 2015 – June 2016 – 14 months
- Post-bCPAP July 2016 – December 2017 – 18 months
- Clinical features and outcomes were compared before and after the introduction of bCPAP

Results

OR 0.56 (95%CI 0.36-0.86, *P* 0.01)



Results

	VLBW before bCPAP N= 158	BLBW after bCPAP N=219	P value
Male sex (%)	64 (41.5)	107 (48.9)	0.14
Weight (g) **- mean (SD)** **- median** **- range**	 1190 ±220 1230 600 – 1490	 1184 ±210 1.210 480 – 1490	 0.68
Mother's age (years) **- mean (SD)**	 25.3±6.7	 24.1 +6.4	 0.22
Place of delivery (%) - **Hospital** - **Health Centre** - **Private clinic** - **Home** - **Other** - **Unknown**	 89 (56.3) 36 (22.8%) 2 (1.3) 17 (10.8) 9 (5.7) 5	 126 (57.5) 69 (31.5) 9 (4.1) 13 (5.9) 0 (0) 2 (0.9)	 0.83 0.06 0.13 0.12
Type of delivery (%) - **SVD** - **ElCS** - **EmCS** - **Unknown**	 129 (81.6) 1 (0.6) 25 (15.8) 3 (1.9)	 189 (86.3) 0 (0) 30 (13.7) 0	 0.79 0.89 0.84
Resuscitation done - **Yes (%)**	 51 (32.3)	 91 (41.6)	 0.12

Results

	VLBW before bCPAP N= 158	BLBW after bCPAP N=219	P value
Admission vitals			
- **Temp (C)**	35.6	35.7	
- **HR (bpm)**	144.9	166.8	
- **Sats (%)**	83.0	81.7	
Treatment			
- **Oxygen only**	99 (62.7)	114 (52.1)	
- **bCPAP**	0 (0)	55 (25.1)	
Outcome in hospital (%)			
- **Discharged**	79/158 (50.0)	128 (58.4)	
- **Self-discharged**	16/158 (10.0)	33 (15.0)	
- **Died**	62/158 (39.2)	58/219 (26.5)	0.012
- **Unknown**	1/158 (0.6)	0	

Main results and key messages

- Introduction of low-cost bCPAP is feasible in a NNU in a LIC
- Low-cost bCPAP can have a dramatic impact on preterm mortality even a low-resource setting
- Policy makers in LICs should consider upscaling the implementation of bCPAP in neonatal units for the treatment of RDS

Limitations

- No accurate gestational data available
- Poor documentation of use of antenatal corticosteroids
- No record of age at which bCPAP was commenced
- Does not take into account other improvements during this time
- Incomplete neonatal outcomes
- No data on other complications such as intraventricular haemorrhage (IVH), necrotising enterocolitis (NEC), retinopathy of prematurity (ROP), patent ductus arteriosus (PDA) and longer-term neurodevelopmental outcomes

Unanswered questions

- In absence of MV and surfactant, if bCPAP fails there is no other option
- Anecdotally VLBW neonates who receive bCPAP earlier have better outcomes
- It is possible that early introduction of bCPAP could reduce the mortality from RDS further in a setting like Mbale where MV and artificial surfactant are not available
- Is there a role for prophylactic bCPAP in such settings
- Is there a possibility of simplified and affordable delivery room bCPAP

Thank you – Wanyala Nabi

Kathy Burgoine, Juliet Akiror, Linda Achom, Igiru Emma, Olupot-Olupot Peter

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