Growth and Development in KMC-NICU graduates

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Improving child survival – Need to improve neonatal health

About half of Child deaths occur in the Neonatal Period

Day	U5MR-95
1st day	20%
By 3rd day	25%
By 7th day	37%
By 28th day	50%

ICMR 2004 [n=1521]

Newborn survival challenge

Approx. 27 million neonates born per year, 30 -35% Low Birth Weight; responsible for 75% mortality

NMR 40 (2002)
1.1 million die before 4 weeks of age

Greatest Burden in the world

Introduction:

- Global experience & RCT proved benefits of KMC to Baby, Mother, Family, Community & Nation
- Kangaroo Mother Care is not widely practiced in India
- Evidences related to Growth & Development in Kangaroo Mother Care babies are scanty.

Objectives

- **Primary:**

To study the Growth & Development at one year of corrected age in Kangaroo Mother Care recipients

- **Secondary:**

To study the Breastfeeding pattern

To provide early intervention as & when required

Subjects & Methods

- **Design:**
  Prospective cohort study from Oct 2005 to Jan 2007

- **Setting:**
  NICU & KMC center – "SHISHUGHAR", KEM Hospital, Mumbai

…Subjects & Methods

- **Inclusion criteria-**

  All stable neonates with Birth weight ≤1800g.

- **Exclusion criteria-**

Parents Unwilling to participate and come for regular follow up

Multiple pregnancy

Babies having Chromosomal disorder or Life threatening congenital anomalies

…Subjects & Methods

- Baby were grouped in to different categories based on gestational age(<32 weeks, 32-36 weeks, >36 weeks) and birth weight (<1000g, 1000-1500g,1501-1800g)

- Detailed history was recorded on a predesigned profoma.

…Subjects & Methods

- **The duration of KMC provided per day was marked in "KMC Charts" during hospital stay & at home**

- **KMC stopped when signs of discomfort in baby like crying, kicking on abdomen while giving KMC**

- **At this time babies were grouped as –**

Group A - Continuous KMC those who received KMC ≥18 hrs per day.

Group B - Intermittent KMC those who received KMC <18 hrs per day.

...Subjects & Methods

- During hospital stay & on each follow up, Anthropometric parameters were noted
- Neuromotor Examination by Infant Neurological International Battery (INFANIB): at 3,6,9 & 12 months of Corrected Date of Birth (CDOB)
- Neurologically abnormal babies were referred for early intervention
- Neuro development

  Examination by Griffiths Scale

  at 6 & 12 months at CDOB

…Neurosensory Assessment

Ophthalmic evaluation

- **Indirect ophthalmoscopy at 4 weeks chronological age in babies** ≤ 1500 g or ≤ 29 weeks gestation
- **Repeat if abnormal or till retinal vasculature is complete.**
- **Optometry at 2 months CDOB to find Astigmatism & Myopia if any.**

Auditory evaluation

- **Clinical evaluation**
- **Screening BERA or AOE at discharge**
- **If abnormal, complete evaluation: diagnostic BERA, Impedence Audiometry, & free field Audiometry.**
- **Behavioral Audiometry if screening not available.**

Results

- **Total Deliveries: 3865;**
- **Babies** ≤1800g: 289 (7.4%),
- **Excluded :113**
- **Enrolled: 176;**
- **Died during follow up: 14(7.9%),**
- **lost to follow up: 17(10.9%)**
- **Babies followed up: 159(90.3%);**
- **Completed 6 months-145,9 months-106; 1 year 57 Babies at corrected age**
- **Demographic profile: Education of mother, Fathers' occupation, ANC visits, Type of deliveries, Sex comparable ,Anthropometry & Sickness in babies prior to enrollment in both groups comparable (p=.12 to 1)**

…Results

- **Group A:** 89 babies,
  Average hrs.-17.7± 3hr/day,
  Mxm 21.3 ±2.3hrs/day
  Duration of KMC-25.75 ± 2 days,
  Mortality: 2 (2.1%)*

- **Group B:** 56 babies
  Average hrs. - 9.2±3hr/day,
  Mxm15.57 ±4.6hrs/day
  Duration of KMC 30.26 ± 2 days,
  Mortality: 12(17.6%)*

*P≤0.001

KMC group with mean GA, Birth wt. Day of enrollment & hospital stay

KMC group	GA (wk) (mean ±SD)	Birth weight(g) (mean ±SD)	Day of enrollment (mean ±SD)	NICU Stay (mean ±SD)	Hospital stay (mean ±SD)
Group A n=89	33.68±3.28	1454.29 ±243.01	4.09±2.67	8.02±6.32	10.10 ±6.15
Group B n=56	34.13±2.78	1461.64 ±246.38	5.46±4.83	12.21 ±16.33	15.14 ±15.93
Total 145(100%)	33.96±2.98	1458.80 ±244.26	4.62±3.70	9.64 ±11.44	12.06 ±11.25
P	0.51	0.42	0.31	0.002	0.001

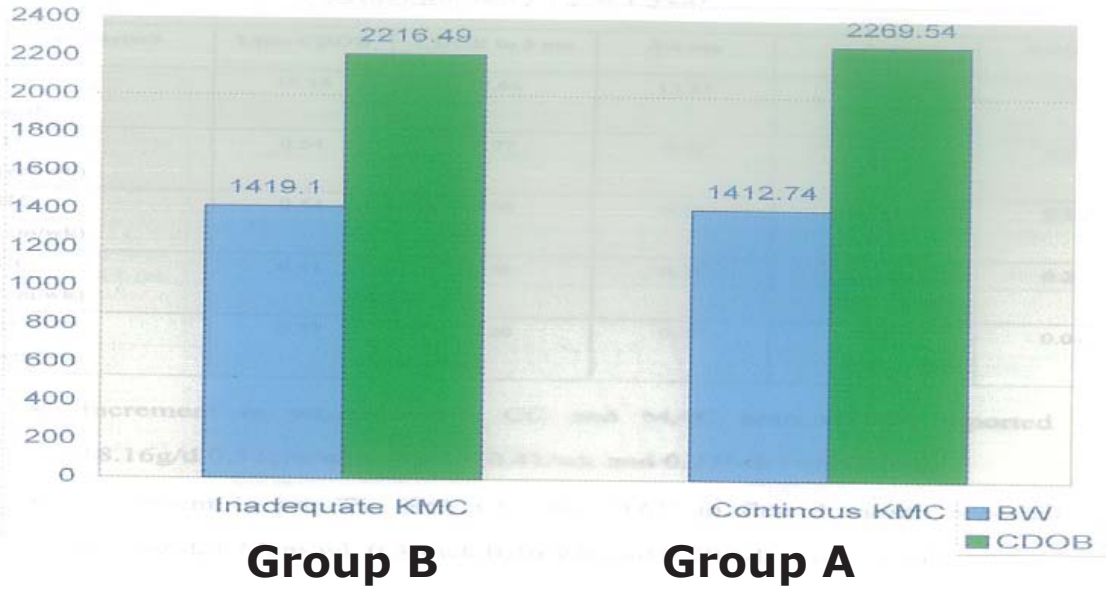
KMC & Regaining Birth Weight & Weight Gain of >15g/kg/day

KMC category	Day of regaining Birth Weight	No. of Times Weight Gain [>15g/kg/d]
Group A n = 89	13.20±6.88	227
Group B n = 56	15.16±11.23	169
Total	13.96±8.838	
P	0.20	

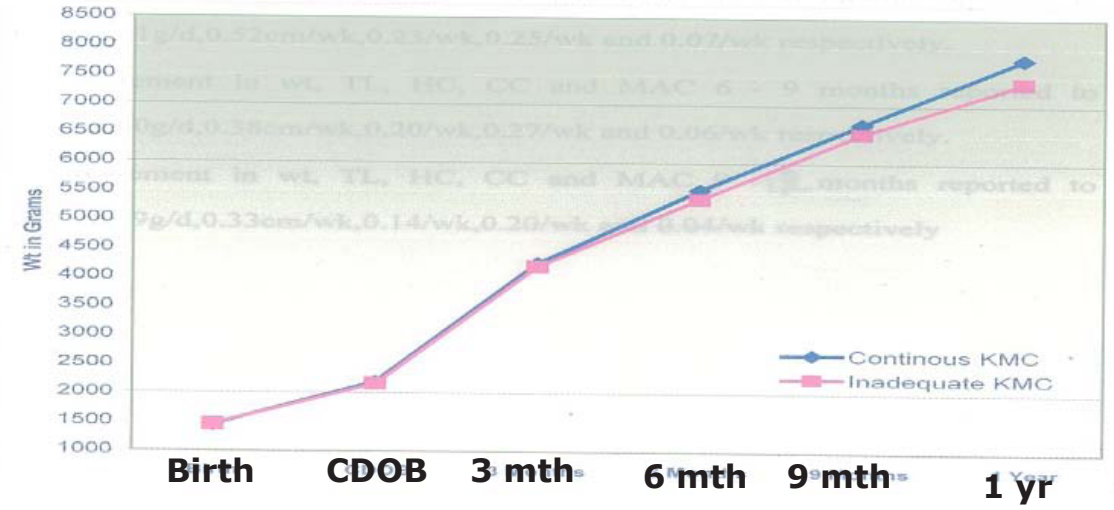
Net weight gain
(Preterm & term SGA)

KMC group		Preterm (n=115)			Term SGA (n=30)		
		BirthWt	CDOB	Difference	BirthWt		At. 2.5kg Difference
Group A	n= 69	1412.74 ±247.88	2269.54 ±445.70	856.8	n= 20	1608.40 ±148.58	891.6
Group B	n= 46	1419.10 ±253.41	2216.49 ±382.72	797.39	n= 10	1645.40 ±65.34	854.6
P		0.32	0.35	0.41		0.24	0.43

Weight at Birth & CDOB



Group B **Group A**



Weight at Birth up to 1yr

% of expected average for age 12 months of corrected age in Group A & B

Age	Wt for age(%of expected average wt for corrected age			Length for age(%of expected average Ht for corrected age			Head circumference for age(%of expected average HC for corrected age		
	Group A (n=89)	Group B (n=56)	p	Group A (n=89)	Group B (n=56)	p	Group A (n=89)	Group B (n=56)	p
CDOB (n=145)	105.67	103.45	NS	95.76	95.57	NS	97.97	95.94	0.11
3 month (n=145)	86.99	86.47	NS	99.48	99.30	NS	99.82*	96.18*	0.02
6 month (n=145)	91.95	89.88	NS	101.63	101.21	NS	100.42	100.08	0.53
9month (n=106)	99.18	99.18	NS	100.49	101.57	NS	102.76	102.50	0.64
12 month (n=57)	104.19	101.04	NS	101.29	100.97	NS	101.22	99.84	0.50

INFANIB – Neuromotor Outcome

Month INFANIB		AGA	ASGA	SSGA	Griffith DQ	
					AGA	SGA
3 N-101	A n=8	5	1	2		
	T n=36	18	12	6		
6 N-107	A n=3	2 *mild hydrocephalous	0	1	85	36.15
	T n=35	22	8	5		
9 N-82	A n=5	2	0	3		
	T n=19	12	6	1		
12 N-52	A n=3	0	0	3*	91	31.82
	T n=2	0	1 IVH	1*	-	

20%

66%

Cystic Leucomalacia

KMC Duration & Griffith Quotients for Psychomotor Development

Criteria	Age					
	6 months			12 months		
	Group A n=89	Group B n=56	P	Group A n=35	Group B n=22	P
All	94.2	92.5	NS	98.8	96.7	NS
Locomotion	89.7	88.8	NS	94.4.	92.2.	NS
Personal, social	96.6	94.2	NS	97.1	95.4	NS
Hand eye coordination	96.4	94.1	NS	96.8	96.5	NS
Audition, language	91.4	90.5	NS	93.5	92.6	NS
Execution	97.1	94.9	NS	100.2	98.1	NS

Retinopathy Of Prematurity & Gestational age

	Gestational age			
	<32 n=34	32-36 n=81	>36 n=30	Total n=145
Normal	24	76	30	130
Abnormal	10	5	0	15

Hearing & Gestational age

Birth Weight	Normal	SNHL
≤ 1500 n=76 (52%)	71(94.7%)	4(5.3%)*
1501-1800 n=69 (48%)	70(100%)	0
Gestational age		
<32 n=34 (23%)	31	3**
32-36 n=81 (56%)	80	1
≥ 37 n=30 (21%)	30	0

*P<0.05 **P<0.007

KMC Duration & Neuromotor & Psychomotor & Sensory Neural Outcome

6 months				12 months			
Variable	Group A n=89(%)	Group B n=56(%)	P	Variable	Group A n=35(%)	Group B n=22(%)	p
Tone abnormality	21(23.5)	17(30.3)	NS	Cerebral palsy	2(6)	1(5.2)	NS
Griffth DQ							
≤50	0	0	NS	≤50	1(2.8)	1(4.5)	NS
51-70	2(2.2)	2(3.5)		51-70	1(2.8)	2(9)	
71-90	5(5.6)	6(10.7)		71-90	2(5.7)	3(13.6)	
>90	82(92.1)	48(85.7)		>90	31(88.5)	16(72.7)	
ROP screening at 4 weeks-abnormal	6(6.7)	9(16)		Blindness	-		-
Deafness	2(2.2)	2(3.5)	NS	Deafness	-	-	-

KMC & Exclusive Breastfeeding up to 6 months & Breastfeeding with Complementary Feeding 7-12 month

Age (month)	Group A n=89(%)	Group B n=56(%)	Mixed Feeding	
			Group A	Group B
CDOB n=145	89(100) +	56(100)	-NIL-	
3 n=145	86(96.6) +	50(89.2)	9(6.2)	
			3(3.4)	6(10.8)
6 n=145	79(88.7) +	48(85.7)	18(12.4)	
			10(11.3)	8(14.3)
9 n=106	67(100) +	39(100)	-(+ - not significant)	
12 n=57	35(100) +	22(100)	-	

Conclusions

- NICU & Hospital Stay had significantly reduced in longer duration Kangaroo Mother Care

- Intrauterine accretion rate of >15g/kg/day was noted in both, but more no. of times in longer duration KMC

- Growth parameters were comparable in both KMC groups except the head growth at 3 months was significantly higher in longer KMC

…Conclusions

- Neuro motor, Psychomotor development & Neuro sensory outcome were comparable
- SSGA at high risk of developmental sequel
- Early intervention therapy was effective as evidenced by improved Neuro motor outcome
- Providing KMC more than 18 hrs /day in LBWI - feasible in Hospital & Home setting
- Reduction in mortality in longer duration Kangaroo Mother Care

Limitations……

- The present study was a prospective observational study
- Follow up rate of present study was 90.34% at 6 months
- At the end of study period some babies had not completed 12months corrected age
- Follow up rate could be improved by increasing the study period , repeated counseling & involvement of Medical Social Worker
- KMC duration recorded after discharge was as per the history given by the mother/relatives,& was not under supervision by health personnel

Recommendations

- Kangaroo mother care must be adopted for the care of LBWI in all settings & at all levels of care for appropriate Growth & Development and for improved Breastfeeding Rate

- Ambulatory Kangaroo Mother Care should be established to provide quality care to LBWI & reduce the duration of hospitalization & there by optimum use of scarce resources

KMC to HRLBW In Labor Ward

≤1800 NICU transfer-incubator/KMC

≥1800 stable S-S-C initiate BF & tr to PNC

…KMC to HRLBW
In Postnatal Care Ward

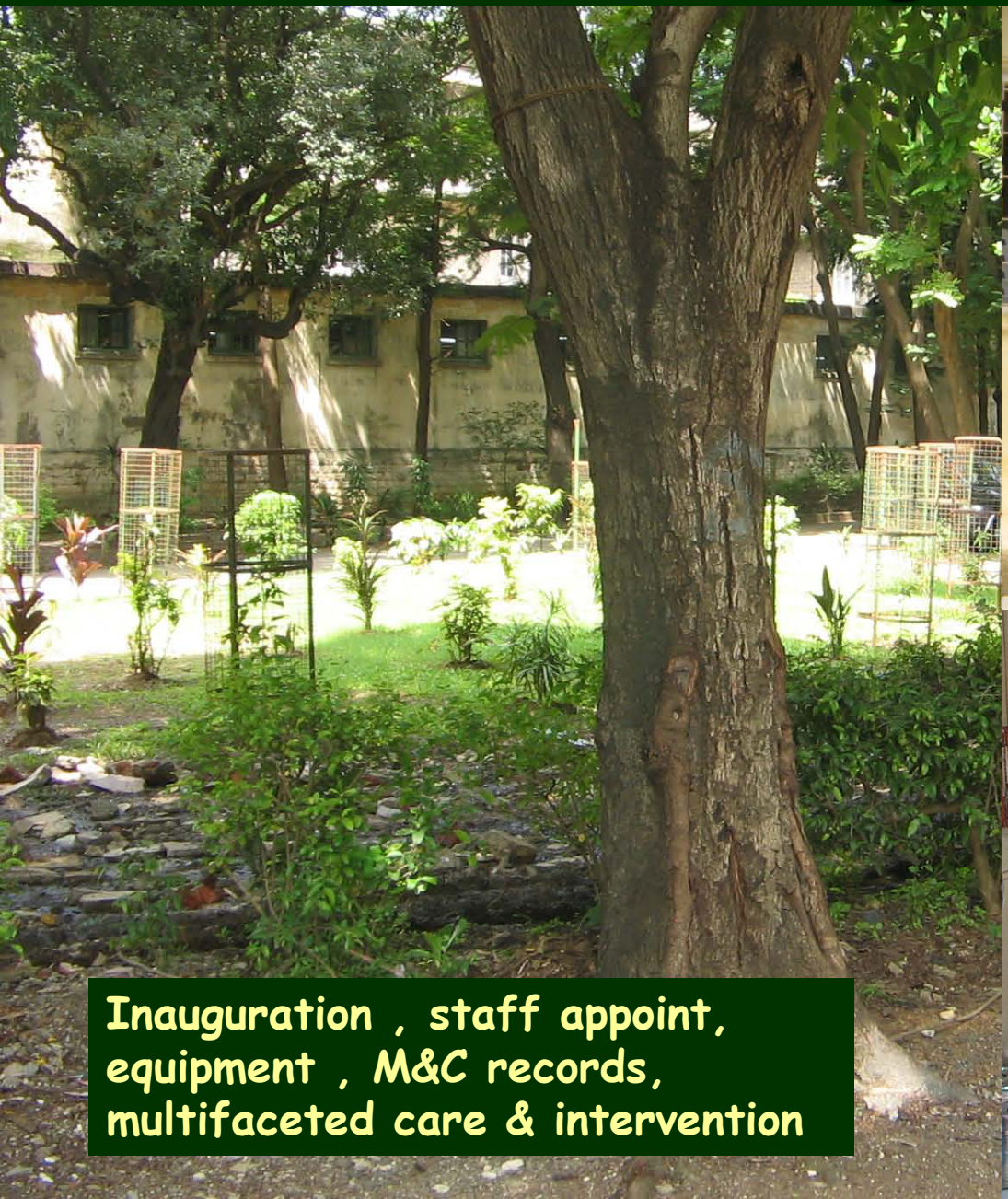
Counseling mothers & fathers and KMC of NICU graduates

Establishment of Transitional Care

24 hrs KMC : resting chairs and pillows & help from other family members

KMC in Triplets

AMBULATORY Kangaroo Mother Care



Inauguration , staff appoint,
equipment , M&C records,
multifaceted care & intervention

AMBULATORY CARE

Growth monitoring-
15-20 g/kg/d
Dancis chart

Br[illegible]eeding

Psychomotor assessment

Shishu Ghar

Illness

Eye & ear examination

Vaccination

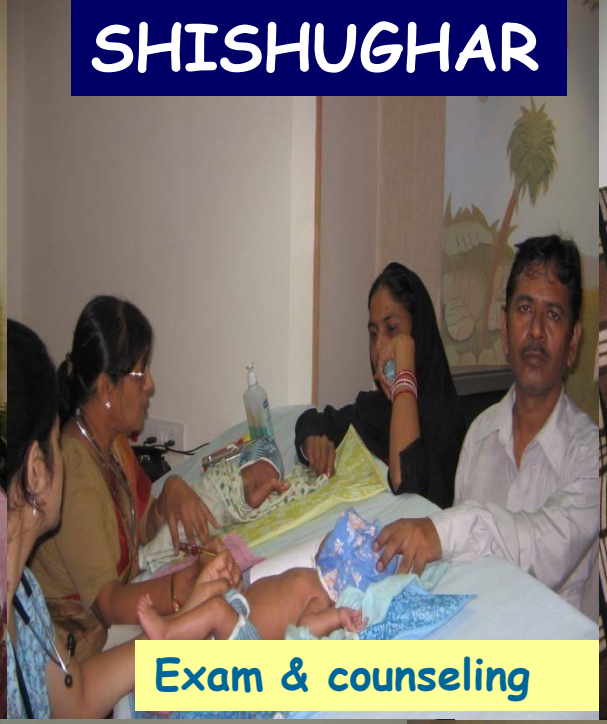
Occupational therapy

Pulse Ox – for babies on home oxygen therapy

Education of mothers & family

SHISHUGHAR

Registration



Exam & counseling

Nebulisation

Early intervention

Health talk

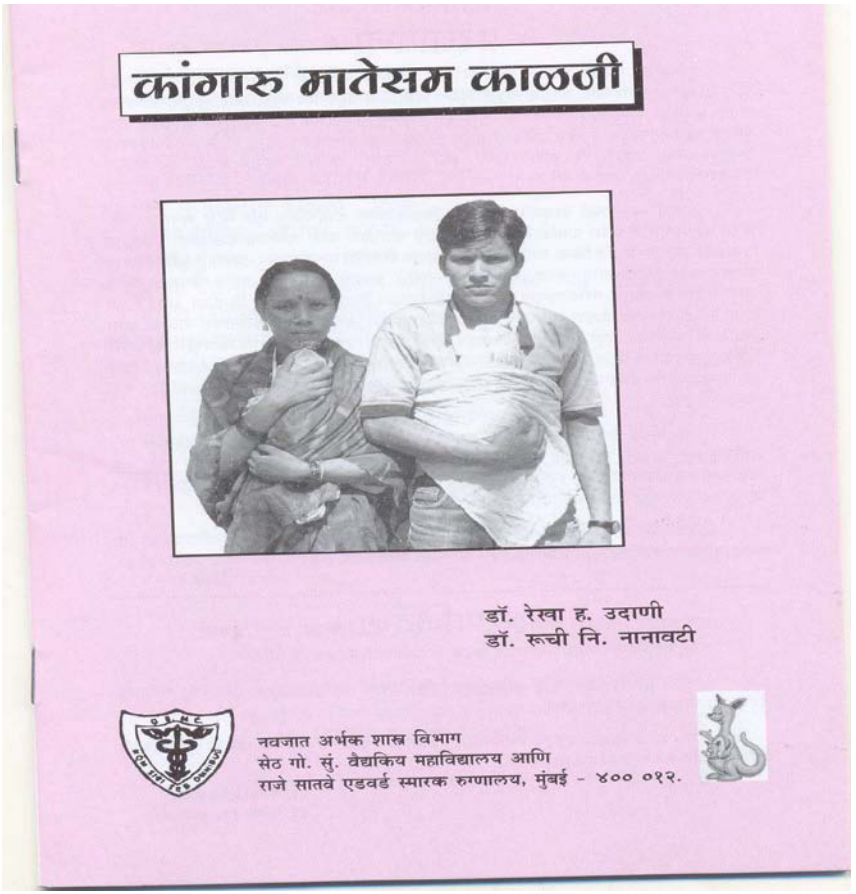
Continue KMC

- light work at home
- during travel

Development of training material

Training Manual
on
Kangaroo Mother Care

Baby-friendly care for
Low birth weight babies



Dissemination of knowledge & research

20 Workshops , 50 Tr programs and guest lectures

Target groups-Medical colleges-West & south India
pediatricians/obstetricians/community HCPr/Nursing personnel

Take Home Message

- Implement Kangaroo mother care at Facility & Community through Training of Health Care Personnel
- Involve National Professional Bodies & KMC Coordinator to develop networking & coordination with International & national, Govt & NGO donor agencies for Training & Implementation
- Disseminate awareness through various media on WARFOOT basis to develop KMC culture in the nation for better quality survival of LBW babies for achieving ***Millennium Development Goals*** in Asia and near East

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Thank you

Increment in anthropometry upto 1 year

Parameters	Upto CDOB	CDOB to 3 mo	3-6 mo	6-9mo	9-12mo
Wt (g/d)	18.16	22.66	13.51	14.00	13.59
Tl (cm/wk)	0.54	0.77	0.52	0.38	0.33
HC (cm/wk)	0.54	0.36	0.23	0.20	0.14
CC (cm/wk)	0.41	0.46	0.25	0.27	0.20
MAC (cm/wk)	0.27	0.20	0.07	0.06	0.04