

Original Research Article

Assessment of infrastructure of first referral unit facilities in Surguja division: a responsibility of providing emergency obstetric care

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ABSTRACT

Background: Availability of emergency obstetric care (EmOC) is one of interventions to reduce maternal and newborn deaths. The health system fails when effective and affordable health interventions do not reach the population, when Poor infrastructure, drugs and equipment are lacking, and qualified human resources are scarce. The objective of the present study was to assess the availability of EmOC infrastructure in first referral units (FRUs) of Surguja division, Chhattisgarh.

Methods: A cross sectional study was designated with 13 FRUs of Surguja division. A semi structured, closed-ended questionnaires was observed on the basis of check list, reviewing record, and interview by available staff.

Results: FRUs of Surguja division for physical infrastructure scored 68.5%, for essential medicine 69.2%, for equipments 50.7%, for instruments 45.3% and for availability of blood 34.6%, for health man power category of specialist score was 25.7% but for supportive staff 65.4%.

Conclusions: Our study revealed three existing bottlenecks in the healthcare delivery system as inadequate civil infrastructure, short fall of specialists as well as inadequate supplies of drugs and equipment, hampering the function of facility.

Keywords: Health facility infrastructure, First referral unit, EmOC

INTRODUCTION

A pregnant woman is a dyad of a unit of two individuals consisting of the mother and the foetus. The unity of the dyad which starts after conception continues through the antenatal and postnatal periods. The dyad shares the critical birth experience jointly. Maternal health refers to the state of complete physical, mental, and social well-being of women during pregnancy, childbirth, and postpartum period.^{1,2} Maternal death according to WHO refers to “the death of woman while pregnant or within 42 days of termination of pregnancy, irrespective to the duration and site of pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes.”³

Regarding the magnitude, every minute, one maternal death occurs somewhere in the developing countries. Maternal mortality is the tip of the iceberg.⁴ According to the estimates, in 2016 maternal mortality ratio (MMR) was recorded as 130 per 10,000 live births, down from 167 in 2011-2013 but did not achieved the Millennium Development Goals (MDG) target for India of 109 maternal death per 100,000 live birth by the year 2015.^{5,6} On a national level with Empowered Action Group (EAG) states and Assam achieving a reduction of 188 from 246 which is significant.⁵ It is worth noting that Kerala (81) along with Tamil Nadu (91) and Maharashtra (104) have already achieved MDG target in 2007-2009.⁷ But Chhattisgarh being a new state with high burden of MMR still lag behind these states with MMR 244 and

Surguja division with 271 MMR is second most contributory division in the state due to causes related to pregnancy and childbirth.⁸

Majority (80%) maternal death is due to direct causes (Figure 1).⁹ These causes are preventable and reduce 80% of maternal death only if women access to essential obstetric services through health system.⁹

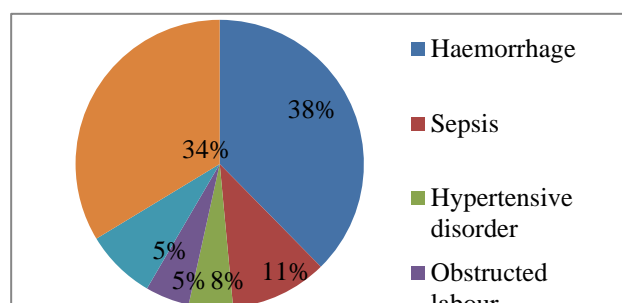


Figure 1: Causes of maternal mortality.¹⁰

Over the past decade, national plans and programmes in India have stressed the need for universal screening for high-risk pregnancies and for operationalizing essential and emergency obstetric care (EmOC). Therefore, provision of EmOC as close to the community as possible was taken up under the Child Survival and Safe Motherhood Programme of India launched in 1992 and supported by the World Bank and United Nations Children’s Fund which emphasized the importance of access to EmOC by setting up first referral units (FRUs) at the community health centres or sub-district level hospitals in 1992.¹⁰ These FRUs are the first link to which a woman at high risk is referred prenatally or sent for EmOC and where the following critical services should be available 24-hour round the clock at fully functional FRUs as services including surgical interventions like caesarean sections; new-born care; blood storage facility.^{10,11}

The health system fails, when effective and affordable health interventions do not reach the population. This occurs when provider skills are inadequate, drugs and

equipment are lacking, poor infrastructure and qualified human resources are scarce.¹²

It should be noted that the critical interventions may currently not be available even in some district headquarter hospitals, particularly in the newly created districts in the EAG states and Chhattisgarh state being one of them. Therefore, operationalization effort must be carefully sequenced, and should start by making district hospital fully operational as a FRU.

The term ‘infrastructure’ is used to describe the elements of health care delivery system. In context to health care delivery system it refers to physical infrastructure, manpower, drugs, equipments and blood availability which are the prerequisite for health care delivery. That’s why the study has been conducted to assess the status of FRUs facility for providing EmOC in order to prevent maternal mortality in Surguja division of Chhattisgarh.

METHODS

A descriptive, cross sectional, observational hospital based study was conducted in the government health facilities, designated as FRUs of Surguja division (Chhattisgarh), India from February 2015 to April 2016. Simple random sampling used for selection of study setting i.e., Surguja division and the study area included all 13 govt. designated FRU’s. They were 5 district hospitals and 9 community health centres (CHC’s). Study tool used was semi structured, closed-ended questionnaires designed by using the Indian Public Health Standards Guideline of Govt. of India (GoI) 2012 and guideline for operationalizing FRUs GoI 2004. Assessment categories were physical infrastructure, manpower, equipments, essential drugs, blood availability with many sub categories (Table 1). Study technique used was observational using check list, reviewing record, and interview of available nursing staff at respective ward, labour room, drug store keeper, in charge of maternity ward. Pilot study was done in 2 centres (i.e., designated FRU’s 1 CHC and 1 district hospital) out of Surguja division using the above mentioned tool.

Table 1: Distribution of score of categories according to number of sub categories assessed in 13 FRUS.

S. No.	Main categories	No. of sub categories	Max. score of main categories	Min. score of main categories
1	Physical infrastructure	09	234	0
2	Manpower			
a)	specialist	03	78	0
b)	Medical officer	03	78	0
c)	Supportive staff	04	104	0
3	Essential Medicine	05	130	0
4	Instrument	05	130	0
5	Equipment	06	156	0
6	Blood	01	26	0

The compilation of study done by using excel and analysis was done on the basis of scoring system for each facility. Score 0, 1 and 2 was used for subcategories only. Score '0' mean not available at all, score '1' mean available but not according to norm, score '2' mean available according to norm. So the maximum score of each sub category is 26 and minimum score is '0'. Total score of main categories depended upon number of sub categories. Later sub categories score was compiled to find out score of main categories. Each score was also interpreted as percentage.

Ethical statement

Ethical approval for the study was obtained from institutional ethics review committee of Pt. J.N.M. Medical College Raipur, AYUSH University and National Health Mission (NHM) director of the Chhattisgarh state and in charge of the respective.

RESULTS

Physical infrastructure

In assessment of physical infrastructure subcategories included were labour room, eclampsia room, newborn care corner (NBCC) in labour room, operation theatre (OT) blood storage unit, laboratory, Newborn Stabilisation Units (NBSU), nurses duty room, doctors duty room. Status of labour room score was 25 (96.1%) and NBCC in labour room score was 26 (100%) which indicates good preparedness for expecting mother and new born. But OT room score with 18 (69.2%) hampered the provision of comprehensive EmOC. Assessment of duty room, doctor's duty room score was 22 (84.6%), while nurse's duty room score was only 12 (46.1%). Bad preparedness of NBSU and eclampsia room was interested with scoring of 04 (15.3%) and 0 (0%) respectively. While blood storage unit score was 12 (46.1%). Laboratory score with 26 (100%) indicated status of good preparedness for lab services. Overall score for physical infrastructure of FRU's was 145 (61.9%) reflecting presence of poor infrastructure (Table 2).

Table 2: Status of physical infrastructure of FRUs of Surguja division.

Civil infrastructure	Score	%
Labour room	25	96.1
Eclampsia room	00	00
NBCC in labour room	26	100
OT	18	69.2
Blood storage unit	12	46.1
Laboratory	26	100
NBSU	04	15.3
Nurses duty room	12	46.1
Doctors duty room	22	84.6
Total	145	61.9

Essential medicines, equipment's, instruments, blood

Category of essential medicine included 4 antibiotics (Inj. Gentamycin, inj. metronidazole, inj. ceftriaxone, inj. ciprofloxacin); 2 analgesic (inj. paracetamol, inj. diclofenac); 3 IV fluid (NS, RL, 5% dextrose); 23 emergency drugs included all life-saving drugs and for management of obstetric complication (adrenaline, atropine, ergometrin, salbutamol, derriphylline, hydrocortisone, inj. insulin, promethazine, digoxin, frusemide, aminophylline, methyl dopa, sodium inj. bicarbonate, Ca gluconate, misoprostol, oxytocin inj, capsule nifedipine, inj. duvadilan, inj magnesium sulphate, inj. ritodrine, inj dexta, inj. diazepam, inj. phenytoin.); 3 anaesthetic drugs (halothane, ketamine, lignocaine 2%).

Score on availability of essential drugs in FRUs of Surguja division was 90 (69.23%). Maximum lacking was found in availability of emergency drugs with score 13(50%) followed by analgesic and anaesthetic drugs with score 14 (53.9%) and 15 (57.67%) respectively. On the contrary, availability of IV fluid was 100% (Table 3).

Table 3: Status of essential medicine, equipment's, instruments and blood availability of FRUs of Surguja division.

	Scores	%
Essential medicine		
Antibiotics	22	84.6
Analgesic or anti-inflammatory	14	53.9
IVF	26	100
Emergency drugs	13	50
Anaesthetic drugs	15	57.69
Total	90	69.2
Equipments availability		
Equipment of labour room	13	50
NBCC	13	50
Operation theatre	16	61.5
NBSU	3	11.5
Blood storage unit	14	53.8
Laboratory	20	83.3
Total	79	50.7
Instruments		
Instruments of labour room	13	50
NBCC	11	47.8
Operation theatre	18	69.23
NBSU	4	15.38
Laboratory	13	50
Total	59	45.3
Availability of blood	9	34.6

For study purpose, instrument category included small articles, contents of tray while equipment category included machine, big articles and logistic. On assessment of availability of equipments in FRUs of Surguja division

score was only 79 (50.7%). Poor or non-availability of equipments at various areas like NBSU and NBCC, labour room was observed with score 3 (11.5%) and 13 (50%) each respectively. Blood storage unit scored 14 (53.8%); OT 16 (61.5%) and laboratory 20 (83.2%) (Table 3).

In another main category instruments, its availability score in FRUs of Surguja division was 59 (45.38%). Maximum score in its subcategory was found in OT 18 (69.23%) followed by labour room and laboratory scored 13 (50%). While score in NBSU and NBCC was 4 (15.38%) and 11 (47.8%) respectively. This finding was due to non-availability of physical infrastructure for NBSU (Table 3).

Category of blood availability observed presence of blood group A, B, AB, O Rh positive in FRUs. Score of 9 (34.61%) was obtained (Table 3).

Health workforce

On assessment of human manpower; where in specialist group included obstetrician, anaesthetic and pediatrician. Medical officer category included trained EmOC, lower segment caesarean section (LSAS), NBCC. Supportive staff included staff nurse, pharmacist, lab technician, OT assistant. Study shows that pertaining to specialist workforce score was 20 (25.7%). In specialist subcategory obstetrician scored 8 (30.7%). Situation of pediatrician and anaesthetic was worse with each score 6 (23.1%). Analysis of training status of medical officer scored only 34 (43.5%). Its subcategory trained in EmOC scored 14 (53.8%). Situation was worse with poor score in training in LSAS and Navjaat Shishu, Suraksha Karyakram (NSSK) with 8 (30.7%) and 12 (36.75%) respectively.

Table 4: Health manpower in FRUs of Surguja division.

Health workforce	Score	%
Specialist		
Obstetricians	8	30.7
Anaesthetics	6	23.1
Paediatricians	6	23.1
Total	20	25.7
Medical officers		
Trained in EmoC	14	53.8
Trained in LSAS	8	30.7
Trained in NSSK	12	46.1
Total	34	43.5
Supportive staff		
Staff nurse	15	57.6
pharmacist	20	77
Lab technician	22	85.6
OT assistant	11	42.3
Total	68	65.4

Pertaining to supportive manpower, Surguja division scored only 68 (65.4%). Score of lab technician was 22 (85.6%), followed by pharmacist 20 (77%), staff nurse 15 (57.6%) and OT assistant 11 (42.3%) (Table 4).

DISCUSSION

The study covered all the designated FRU's of Surguja division which has hilly terrain, inhabited by tribal population who depend on the government facility to get health related services. This is probably first study in this region that has assessed the status of infrastructure of FRU's. So an effort has been made to throw light on the key issues which might be affecting the functionality of FRUs for providing optimal level of care.

Access to quality public healthcare remains a pressing need amongst rural and remote populations of India. The NHM has been promoting institutional delivery to reduce maternal and neonatal deaths. But present study found that there are constraints of physical infrastructure, human resources, equipments, drugs and blood. If there is lacking of physical infrastructure, there is also lack of other resources. Similar finding was observed in many studies [Anwar et al, Sahu et al, Service Availability and Readiness Assessment (SARA) index Uganda].¹³⁻¹⁵ A study conducted by State institute of health and family welfare, Rajasthan in CHC found labour room availability was 90.3%, OT availability according to norm was only 49.7%. 90.3% had laboratory room. Blood storage unit was available at 58.1%.¹⁶ These findings are not consistent with present study which scored labour room 96.1%, OT 69.2%, laboratory room 100%, blood storage unit 46.1%. This difference in finding may be due to different data analysis method. But both studies show presence of poor physical infrastructure.

Most of the equipments and instruments required to provide EmOC at different physical infrastructure were not available interpreted by score obtained was 50.7% and 34.6% respectively. A study done by Anwar et al observed different equipments scores ranging from 36.6% to 95.1%.¹³ Again both studies indicates non availability of all equipments and instruments at all facility. Somewhat better situation was observed in present study pertaining to essential drugs scored with 69.2%, with availability of *in vitro* fertilisation (IVF) 100%; with emergency and anaesthetic drugs 57.9%. Similar finding in Sahu et al showing that IVF, oxytocin, antibiotics, available in all facilities.¹⁴ While under category of emergency drugs adrenaline 33.3%, methyldopa, magnesium sulphate, nifedipine, diazepam in 66.7% of facility. But again both studies showed overall deficit in supply of medicine. Among the 13 FRUs, blood availability scored was only 34.6% in comparison to blood storage unit score 46.1%. This indicates that there is lack of availability of all types of blood groups even in presence of blood storage unit. Similar finding in SARA index Uganda 2013 also shows that blood supply sufficiency was 36%.¹⁵

Good EmOC is most critical for reducing MMR, and C-section is the central issue in EmOC as it requires a trained surgeon and anaesthetist. An obstetric and anaesthetic specialist is necessary in FRUs for EmOC. But in this study main barrier in delivering was least availability of specialist (25.7%). A study done by Gaidhane in 2 CHCs of Maharashtra observed that one of the mostly providing non-emergency services due to non-availability of 24×7 specialist other CHCs don't have any specialist available.¹⁷ Similarly a study done by Raman availability of gynaecologist and anaesthetic is a problem and observed that obstetrician only in 6 facilities out of 12 and anaesthetic only in 3 out of 6 while only 1 FRU out of 12 had pediatrician.¹⁸ In another study done by Dasgupta in different districts of Uttar Pradesh found that skilled human resource continued to be scarce. Only 10 (19.23%) obstetricians were available for the 52 CHCs in spite of the fact that CHCs were meant to serve as first referral centers.¹⁹ Also in one of the editorial paper Pundev et al showed that current position of specialist manpower at CHC reveal that as on March, out of sanctioned posts, 40.7% of obstetricians, 43.1% of paediatricians were vacant and in comparison to existing infrastructure, there was shortfall of 65.1% of obstetricians, 79.8% of pediatricians.²⁰

In order to reduce the maternal and newborn mortality, reforms related to human resources are critical to improving health systems.^{13,18} The government is focusing on overcoming the constrain of specialist by introducing successful initiatives i.e., training of MBBS doctor in LSAS, EmOC, Chhattisgarh rural medical course incentive, training of staff nurses (skill birth attended, NSSK for performing resuscitation).²¹⁻²⁴ But in our study there was lacking of trained medical officer pertaining to EmOC services. A trend can be seen of better quality of care at the FRUs where these EmOC doctors are posted as the number of referrals from these FRUs to higher centres has decreased by around 70% over a period of time.²⁵ This is due to FRU preparedness in Maharashtra and Gujarat was good (except blood storage in Gujarat).²⁶ This is good initiative as study from Gujarat and Maharashtra facilities showing, where EmOC doctors were doing well at all the FRUs and are independently handling emergencies and also performing LSCS operations.²⁵ So we should learn from Gujarat and Maharashtra government that to minimize the lack of specialist firstly we require to train medical officer in EmOC, LSAS, NSSK and secondly before posting to the FRUs these facilities should be prepared in terms of other resources as per norm.

The result of assessment of FRUs of Surguja division suggests that maximum FRUs not in position to provide EmOC and NCC. Even with lack of infrastructure, report by NITI AAYOG shows Chhattisgarh state under the category of moderately improved in overall performance in 2014-15 base year rank.²⁶ But report June 2019 shows Chhattisgarh state under the category of least improved with 23.53% of FRUs functioning.²⁷ This might be due to

infrastructure constraints already mentioned in this study. As a consequence, limited healthcare efforts reaching to remote areas and thus state is unable to sustain its performance.

CONCLUSION

Our study revealed three existing bottlenecks in the healthcare system: poor physical infrastructure, short fall of specialists as well as inadequate supplies of drugs and equipment, leading to non-operationalization of facility. By using this data on facility infrastructure, health authorities will be able to take decision regarding prioritization of constrain hampering operationalization of the health facilities and before posting of trained faculties, availability of at least physical infrastructure shall be done, so that they can line up required equipments, instruments and drugs etc. to make facilities functional for saving maternal and child life. However health policy decision making cannot be based on snap shot research.

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