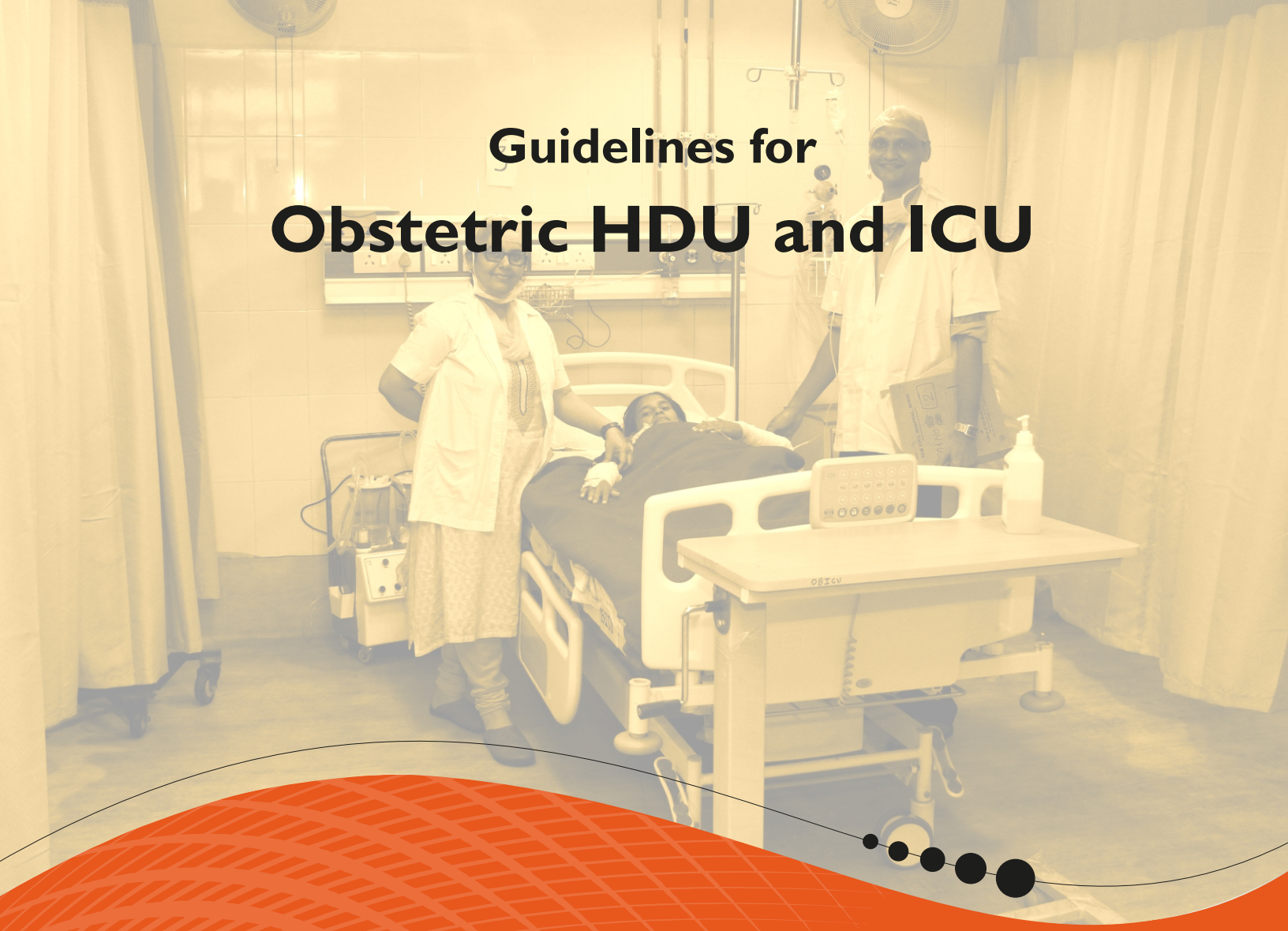

Guidelines for
Obstetric HDU and ICU

March 2016

Maternal Health Division
Ministry of Health and Family Welfare
Government of India

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First Published, March 2016

These guidelines are printed with support from the Children's Investment Fund Foundation (CIFF)

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सत्यमेव जयते

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MINISTRY OF HEALTH & FAMILY WELFARE
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Preface

The Government of India is considering quality of maternity services as a strategic priority. Numerous efforts have been made as a continuation of this prioritization. Institutional delivery rates have improved significantly in the country in the last decade. Quality improvement initiatives have been introduced by the Government of India in various States. Infrastructure strengthening is underway in most of the States.

However, focus of most of these initiatives is the capacity and quality improvement in the system for normal obstetric care, and prevention and management of obstetric complications. During recent reviews, capacity of the system to address obstetric emergencies and resultant life-threatening complications was found to be inadequate. It is widely known that the life-threatening scenarios resulting out of obstetric complications may require management by specialists in emergency medicine under special settings.

In view of this, Guidelines for Obstetric High Dependency Units (HDU) and Obstetric Intensive Care Units (ICU) have been framed to enable states to strengthen their capacity to deal with severe obstetric complications which will prove to be the last mile in reducing preventable maternal deaths.

I am sure that these Guidelines will go a long way in helping the State program officers to improve their capacity to manage these life-threatening conditions. I congratulate the Maternal Health Division within the ministry in developing these Guidelines in consultation with the leading experts on the subject matter in the country.

(C.K.Mishra)

NATIONAL HEALTH MISSION
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Foreword

Despite considerable progress made in maternal health, India is still lagging behind in its need for reducing maternal mortality. Activities to facilitate high-quality basic care during childbirth, timely identification and management of complications, and improved monitoring and accountability in basic and emergency obstetric care are important components of the Government of India's strategy to end preventable maternal deaths.

To close the remaining gaps in the quality of services for mothers and new-borns, the Government of India is strengthening the infrastructure of labor rooms and maternal and child health (MCH) wings across different states in the country. The next major step in our efforts to end preventable maternal deaths is to improve care during life-threatening scenarios arising out of maternal complications. These life-threatening situations, if not addressed through high-quality specialist care in resourced environments may lead to death of the pregnant women, which is preventable.

To address this remaining challenge and to provide comprehensive protection to the women during the delivery period, the Ministry has developed the Guidelines on improving care for women during life-threatening emergencies. These Guidelines also provide clear guidance on how to set up High-dependency Units (HDU) and Obstetric Intensive Care Units (ICUs) at different levels. The Guidelines have been developed through a series of expert group consultations and careful review of various models working within and outside the country.

The Guidelines provide a clear pathway to improve care during obstetric emergencies at various levels thereby helping the country achieve its goal of reducing preventable maternal mortality. I wish this initiative all the success and urge the state government to adopt these Guidelines as soon as possible as a part of existing programs. I also compliment the valuable contribution made by the Maternal Health Division of the Ministry in formulating these Guidelines.

Rakesh

(Dr. Rakesh Kumar)

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Program Officer's Message

The Government of India is committed to introducing comprehensive solutions towards reducing maternal mortality in the country. A lot of effort has gone into improving the rates of institutional births in the country and subsequently improving the quality of care during these institutional births. Recently launched initiatives such as 'Dakshata' focus on comprehensive improvement in quality of care during childbirth.

However, care during severe obstetric complications leading to life-threatening situations, which is not a focus of current initiatives, is also a critical need of the country to address unnecessary maternal deaths. With this vision, the Ministry of Health & Family Welfare, in partnership with the leading experts in obstetric and emergency care in the country, has developed these Guidelines to set up High-dependency Units and Obstetric Intensive Care Units in the country.

The Guidelines provide clear and step-wise recommendations to the program managers to establish these care units in their states. Effective implementation of these Guidelines will help improve health systems for care of women during obstetric emergencies and related severe complications.

I express my deep gratitude to Shri C.K.Mishra, AS&MD (NHM) for providing constant support and guidance. I am indebted to Dr. Rakesh Kumar, Joint Secretary (RCH) for his able and extraordinary leadership in taking the process forward.

I thank all the members of the Expert Group for their contribution in developing the content of these technical and operational Guidelines. I sincerely thank Dr. Bulbul Sood and Jhpiego team, especially Dr. Somesh Kumar, Dr. Vikas Yadav, and Dr. Deepti Singh for their technical inputs, support in content development, and facilitating the process of guideline development. I would also like to thank Dr. Malalay Ahmadzai, Health Specialist UNICEF, my colleague Dr. Veena Dhawan AC-MH, Mohd. Shoeb Alam, Consultant UNICEF, Dr. Tarun, Dr. Rajeev, Dr. Pushkar and Dr. Salima and Ms. Jenita, Consultants, MoHFW for their valuable contributions.

I am hopeful that the efforts put in by the experts in drafting these Guidelines shall be useful for all stakeholders while working towards improving the quality of services to the mother and newborn in the country.

Baswal

(Dr. Dinesh Baswal)

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Introduction of Obstetric HDU/ICU

Background

Any pregnant woman can develop life threatening complications with little or no advance warning. The complications of pregnancy and labor are essentially of two types- the first set of complications include obstetric complications like Postpartum Hemorrhage (PPH), Pre-eclampsia/Eclampsia (PE/E) etc. which require intensive obstetric care by specially trained providers, and the second set of complications include multi-organ involvement/failure which necessitates care provision by intensivist and super-specialists such as those from nephrology, neurology, cardiology, pulmonology etc.

The women with obstetric complications need access to quality maternal health services that can detect and manage life threatening obstetric complications. These women need 24X7 personalized care by skilled providers, essentially led by obstetricians or Emergency Obstetric Care (EmOC) trained providers. For a small proportion of women who have progressed to a clinical condition where there is multi-organ involvement/failure, the care has to be provided in an intensive care unit setting led by intensivist/super-specialists.

For the above mentioned conditions, there is a need for setting up specialized units for appropriate and timely care, and these guidelines give a broader framework to establish such units.

Types of specialized care units

What is an Intensive Care Unit (ICU)?

ICU is a specialized area of the hospital which is specifically designed, staffed, located, furnished and equipped, dedicated to management of critically sick patient, injuries or complications. It is a department with dedicated medical, nursing and allied staff trained in critical care.

What is an Obstetric ICU?

It is an ICU which is dedicated to obstetric patients who have developed multi-organ failure necessitating specialized care by super-specialists like intensivist/ nephrologist/ cardiologist, pulmonologist/ endocrinologist etc.

What is a High Dependency Unit (HDU)?

HDU is an area in a hospital where patients can be cared more extensively than in a normal ward, but not to the point of intensive care. So, it is also known as the intermediate care unit. Patients in HDU may require ICU admission later (step up) or at the same time, patients in ICU who had an improvement in their condition, may be shifted to HDU (step down), before shifting them to the general ward.

Why dedicated Obstetric HDUs are required?

- In India, most of the public health facilities do not have a separate special care unit for high risk pregnancies and postpartum mothers with complications. Such women are being managed in the labor room, without dedicated team(s) of competent providers and appropriately equipped facilities.
- To further bring down the MMR, facility of skill based services in dedicated critical care set up, with state-of-the-art equipment and technology and a team of appropriately trained professionals are the need of the hour.
- Any pregnancy can develop life threatening complications at any time with or without any warning.
- Out of the total complications, incidence of high risk pregnancy is approximately 7 to 8%.
- Care of critically ill patients is a unique challenge in obstetrics.
- When things go wrong in obstetrics, they go wrong fast – "they fall off a cliff".
- Medical conditions might present a risk to the pregnancy, and pregnancy may also modify the disease state.
- Drug therapy may be affected by altered pharmacokinetics during pregnancy, and may have an impact on the fetus.

The HDU Concept

- HDU is an area for management of high risk pregnancies requiring vigilant monitoring and interventions by specially trained teams.
- Obstetric HDU is a part of the maternity wing and located near the labor room and operation theatre, for easy and prompt shifting of the patient whenever required.
- It is recommended that all pregnancies with complications be managed in obstetric HDU. HDU is a step-down/step-up & intermediate care unit between labor room and ICU.

Where to set up Obstetric HDU & Obstetric ICU?

- To start with, it is suggested that all District Hospitals should have an Obstetric HDU and all the Medical Colleges should have both- an obstetric HDU and an obstetric ICU (or ICU with dedicated obstetric beds), if the prerequisites as contained in this operational guideline are fulfilled. Later on, based on the availability of resources, the states can set up obstetric HDUs in high delivery load facilities such as community health centers and block primary health centers (CHCs and block PHCs).
- After initial examination in the examination room (of triage area), it is suggested that, at the district level and in medical colleges, all pregnancies with complications may be managed in the obstetric HDU.
- Below the district level, after triaging, the complicated cases should be closely monitored by an obstetrician or EmOC trained medical officer.
- All normal cases identified after triaging, can be delivered by a skilled birth attendant (SBA) (preferably with a back-up support of an obstetrician/ EmOC trained medical officer).

Proportion of beds vis-à-vis delivery load in obstetric HDU

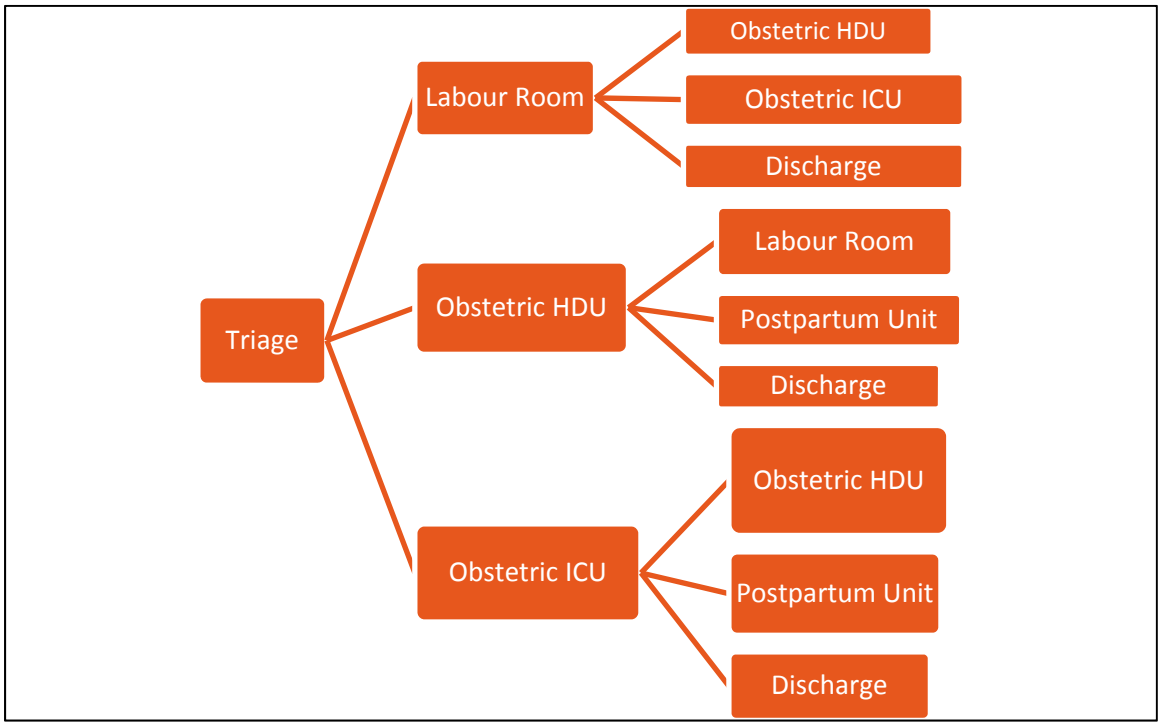
No. of deliveries per month	No. of beds required in HDU
Up to 250	4
250 - 500	8
> 500	No of beds can be increased proportionately

- 1 room of 150 sq. ft. shall be designated as Isolation Room at one end in the Obstetric HDU for management of high risk mothers with infections requiring isolation (such as pregnant women with HIV +ve, H1N1, HBsAg +ve, Chicken Pox etc.). This should have a separate entry from the entry for rest of the HDU patients.
- It is suggested that every medical college should have dedicated obstetric ICUs or beds earmarked/dedicated beds in their ICUs for care of obstetric cases which have developed multi-organ failure/complications.
- If resources permit, it is recommended that every medical college should have at least four bedded obstetric ICU attached to the obstetric HDU.
- The states have the flexibility to establish more need based obstetric HDUs/obstetric ICUs in high case load facilities, subject to fulfilling the mandated prerequisites, as follows:
  - To optimally utilize the skills of human resources, particularly specialists, it is advised that all the expected normal deliveries or obstetric conditions be sent to labor room/ward, where an SBA will care for the pregnant woman. Obstetrician or EmOC trained medical officer can be called in case of any emergency.
  - On the other hand, the high risk and complicated cases should be admitted to obstetric HDU for constant care under direct supervision of an obstetrician. However for round the clock monitoring, resident doctor/ EmOC trained doctor should to be posted.
  - Depending on the clinical condition of pregnant woman, the severity of her illness and/or multi-organ involvement, the decision for admission to obstetric HDU or referral to obstetric ICU/ ICU should be taken by the obstetrician. However, referral to ICU/ obstetric ICU should only be done if admission to the same has been assured by the ICU in-charge.

Triaging Policy and Admission Criteria

The representation given below (diagram-1) gives a brief flow of patients under the 'Triaging Policy':

Diagram -1



Scope of HDU: Who can be admitted in HDU?

The Scope of Obstetric HDU: Following conditions may require admission in obstetric HDU

Obstetric Complications	Pregnancy with Medical Complications
▪ Pregnancy/Labor Pain with Severe Anemia (< 7 gm %) and its complications	▪ Pregnancy with Gestational Diabetes.
▪ Accidental Hemorrhage- Placental Abruption, Couvelaire Uterus	▪ Pregnancy with Diabetic Ketoacidosis
▪ PostPartum Hemorrhage	▪ Pregnancy with Cardiac Diseases
▪ Placenta Previa	▪ Pregnancy with Jaundice
▪ Adherent Placenta and other placental abnormalities	▪ Pregnancy with Thyrotoxicosis
▪ Obstetric Hysterectomy	▪ Pregnancy with Thyroid Storm
▪ Severe Pre-eclampsia/Hypertensive Crisis	▪ Pregnancy with Pheochromocytoma
▪ Eclampsia	▪ Pregnancy with other Endocrinal Crisis like Addison's disease etc.
▪ Broad Ligament Hematoma	▪ Post-operative ARF and other renal problems
▪ HELLP Syndrome	▪ Leukemia and other hemolytic disorders
▪ Perforation during abortion	▪ Pregnancy with Dengue
▪ Sepsis & Systemic Inflammatory Response Syndrome (SIRS)	▪ Pregnancy with complications of Malaria
▪ Pregnancy with Thrombophilia	▪ Pregnancy with Asthma and other respiratory problems.
▪ Multiple Gestation with complications	▪ Pregnancy with OHSS (Ovarian Hyper Stimulation Syndrome)
▪ Pregnancy with complications due to Uterine Anomaly and Pathologies	▪ Pregnancy with Appendectomy or any other surgical emergency
▪ Hydatidiform Mole	▪ Pregnancy with Trauma
▪ Ruptured Ectopic	▪ Pregnancy with Poisoning
▪ Postoperative patients requiring hemodynamic monitoring or intensive nursing care	▪ Pulmonary edema due to perioperative fluid overload, CCF, complication of severe pre-eclampsia or tocolytic therapy with β-agonists etc.
	▪ Pregnancy with DIC
	▪ Burns during Pregnancy
	▪ Pregnancy with Cancer

Note:

- Many other such conditions which may require admission of pregnant woman in obstetric HDU/ICU may be present, and these need based admissions should be made based on the clinical judgement of the obstetrician.
- Isolation: Pregnancy with H1N1-pyometra, HIV and other infectious diseases should be admitted in the isolation room of obstetric HDU/ ICU.

Parameters differentiating admissions to Obstetric HDU and ICU/ Obstetric ICU

Obstetric HDU	ICU/ Obstetric ICU
▪ Systolic Blood Pressure (SBP) <90 and >160 mm of Hg ▪ Diastolic Blood Pressure: <50 and >110 mm of Hg ▪ Mean Arterial Blood Pressure <60 mm of Hg ▪ Heart Rate >110 and <60 per minute ▪ Respiratory Rate: >25 per minute ▪ Urine >0.5ml/Kg/Hour (>30 ml per hour) ▪ Any single organ dysfunction	▪ RR <8 and >35 breaths/minute ▪ Heart rate <50 and >140 beats/minute ▪ Systolic B.P. <80 mm Hg, or 30 mm Hg below patient's usual B.P. ▪ Urine output <400 ml in 24 hrs, or <160 ml in 8 hrs and client unresponsive to simple routine measures ▪ GCS <8 in the context of non-traumatic coma ▪ Any unarousable patient ▪ Serum sodium outside the range 110 to 160 mmol/L ▪ Serum potassium outside the range 2.0 to 7.0 mmol/L ▪ pH outside the range 7.1 to 7.7 ▪ PaO2 <6.6 kPa and/or PaCO2 >8.0 kPa ▪ SaO2 <90% on supplemental oxygen ▪ Need for advanced respiratory support ▪ Inotropic support ▪ DIC ▪ ARDS ▪ Multi-organ failure

Process of Shifting of a Patient from Ward/ Triage Room to HDU or ICU/ Obstetric ICU

The key steps to be taken are:

1. Inform the family/companion of pregnant woman of the decision, and take consent.
2. Case sheets containing history, examination, investigations and management should be maintained.
3. Obstetric HDU staff should be appropriately informed.
4. The patients should be escorted by doctor/staff with all existing treatment including continuation of patent IV line.
5. Keep monitoring the vitals of the patient.
6. Adequate follow-up by the treating doctor.
7. Oxygen and supine hypotension prevention (by performing lateral tilt to 15-20 degree),if required.
8. Ensuring patent airway.
9. Baby should be shifted along with the mother, if delivered already.

Referrals from outside to HDU:

Ensure attaching completely filled referral slips and availability of emergency medications while transferring during referral.

Setting up of Obstetric HDU and Obstetric ICU

The obstetric HDU should be a special part of the maternity wing. The set up requires specific area layout and protocols (as detailed below).

(A) Location:

- It should be located near the labor room and operation theatre.
- Reference to the annexure of map in MNH toolkit (annexed in this guideline) will help in its establishment.
- Proximity to other areas and essential support services such as the main wards, ICU, radiology, laboratory, blood bank etc.
- There should be single entry/ exit point to obstetric HDU and obstetric ICU.
- The isolation room should have a separate entry.
- There should be provision for emergency exit points for ease of evacuation in cases of disasters.

(B) Space:

- HDU should have space for minimum four beds when the delivery load is up to 250 deliveries in a month (Annexure I), and minimum eight beds when the delivery load is 250 to 500 deliveries in a month (Annexure II).
- The pace should be 120-130 sq. ft. per bed in obstetric HDU and 13-150 sq. ft. per bed in obstetric ICU.
- Apart from the patient care area, there should be an ancillary area (of 100% to 120% extra space) for accommodating the nursing station/ storage/ patient movement area/ equipment area, patient toilet and to maneuver equipment, beds and trolleys etc.
- The beds should be at least 2 ft. from the back wall to give caregivers an easy access to the head in case of any emergency.
- There should be space for bed-side movable lockers with facility of trolleys/ drawers and for keeping medicines, consumables and personal belongings of the patient.

(C) Privacy:

- There should be a partition between the rooms for ensuring privacy of the patients.
- If the space is more, each bed can be separated by fixed partitions or curtains.
- The curtain fabric should be fire and water proof, washable, clean, light colored, inherent stain resistance and non- allergic.
- The curtain height is determined by the floor-to-ceiling height, and curtains usually should finish approximately 8-10" above the finished floor (Joint Commission's Patient Privacy Standards).
- The curtains should have mesh at the top which will allow both light and ventilation in the patient room.

- The curtains should be hanging from the overhanging rails.

(D) Flooring: The floor should be made of large vitrified, antiskid, stain proof and easy to clean tiles with seamless joints. The tiles should be of light color (preferably white or off-white).

(E) Walls: The walls should be of durable glazed tiles which are easy to clean, stain resistance, flame retardant and have a visual appeal. It will be preferable to have a finishing of wall height of up to 6-7 ft. with the tiles similar to floor tiles. Colors should be chosen carefully to avoid an adverse impact on the skin color of patients and neonates, light color (white or off-white) being the preferable choice.

(F) Ceiling: The ceiling should be leak proof. It is suggested that no lines or wires be kept or run over the ceiling or underground. It should be easy to explore in case repair is required, as damages are common and may occur any time.

(G) Nursing Station: The nursing station should be with the following facilities and seating capacity:

Staff Requirements (per shift)	
8 bedded HDU	4 dedicated nurses and 2 EmOC/ MOs
4 bedded HDU	2 dedicated nurses and 1 EmOC/ MO
For 4 bedded obstetric ICU (no separate guidance is being given for existing ICU in medical colleges)	4 dedicated nurses and 1 intensivist

Space requirements for nursing station:

a. Adequate space for central monitoring and 2 computers (for 8 bedded HDU/ ICU- Annexure II and IV).
b. Adequate space for central monitoring and 1 computer (for 4 bedded HDU- Annexure I).
c. Scrub Area and wall clock behind the nursing station.
d. Facility for keeping records and emergency medicines.

(H) Health Management and Information System (HMIS): Facility of HMIS entry should be provided for data collection, data transmission, data storage, data processing, data analysis and presentation of the data. This will help in decision making by the hospital management for improved health care services.

(I) Store Room for Equipment: A separate room should be made to keep the equipment such as the sonography machine, portable X-ray machine, transport ventilator, nebulizer, radiant warmer, blood warmer, crash cart(s), BIPAP/ CPAP machine, etc.

(J) General Store Room: A general store room should be made to keep bed linen, disposables and consumables, personal protective attire like caps and masks, slippers, etc.

(K) Toilets: Two toilets are required for 8 bedded HDU according to space (Annexure II).

(L) Buffer Zone: A protective clean zone should be made available located before the entry in obstetric HDU/ ICU. This zone would include area for changing shoes, patient's changing room with lockers, janitor's closet, two changing/ overnight stay rooms for doctors (1 each for male and female with lockers, beds, book shelves etc.), dining area, space to keep wheel chairs and trolleys, changing room for staff, toilets (1 each for male and female with urinal in the male toilet with flush facility).

(M) Autoclaving and Sterilized Supply: This should happen from the Central Sterilized Supply Department (CSSD).

(N) Waiting Area: Waiting area for the patients' attendants should be provided, with facility for seating capacity of at least 2 relatives per patient, facility of drinking water, a large TV with LCD display, toilets, newspapers and educational material etc. The waiting area can be shared with waiting area for the LR and/or OT.

(O) Facilities:

(a) All the cots in the obstetric HDU/ ICU must be birthing cum patient bed with the following features:

- Safe working load of 180 kg (392 lbs).
- Size 1800x620x800 mm.
- Electrically/manually operated.
- Battery back-up in the event of power failure.
- Dual-sided manual CPR levers.
- Easy-to-operate Trendelenburg, reverse Trendelenburg, with both side tilts.
- Compact size to fit into the small delivery rooms.
- Retractable platform, optimizing access to perineal area, mother and baby during the delivery procedure.
- Mattress should be in 3-parts of minimum 6 inch, with perineal cut-out seat section. Mattress should be washable with seamless moulding.
- Adjustable safety rails on both the sides.
- Good quality castors with brake system for optimum mobility/stability.
- Comprehensive range of easy-to-fit accessories, including adjustable leg rests, IV rod, handgrips, high and low foot supports, a removable step and a fluid collection bowl.
- Removable, moulded head and foot panels.

(b) Each bed will require at least 2 oxygen, 1 air and 2 suction outlets, and at least 10 central voltage stabilized power points (6 power-points of 5 amp and 4 points of 15

amp) preferably 5 on each side of the bed . Adapters should be discouraged as they tend to become loose.

(c) Heating, Ventilation and Air-conditioning (HVAC) system along-with ceiling fans & power backup exclusive for HDU for uninterrupted power supply should be installed. Voltage stabilization is mandatory. Suitable and safe air quality must be maintained at all times. Temperature should be adjustable within each cubicle/ room as per the patient comfort and choice.

(d) General Lighting: Access to outside natural light is recommended. The colorless concealed LED Lights with sufficient high illumination should be provided. It should be bright enough to ensure adequate vision without eye strain.

(e) Hand Hygiene and Prevention of Infection: Sink should be of the operation room style with water supply through elbow operated taps. Every bed should have alcohol based anti-microbial instant hand wash solution source. All entrants should don a mask and cap, and ideally an apron which should be replaced daily.

(f) Waste Disposal and Pollution Control: This is mandatory and a huge safety issue both for the patient and the staff/doctors of the hospital, and society at large. It is important that all government regulations (State Pollution Control Board) should strictly be complied with.

(g) Laboratory backup facility for 24 hours.

(h) In-house or nearby blood bank.

(i) In- house or nearby SNCU/NICU.

(j) Lactation Support: Facilities for breast feeding (or use of breast pump) should be available to all post-natal mothers in obstetric HDU. Babies are usually not allowed in obstetric ICU, but breast pump facility should be made available.

(k) Provision for fire safety, preferably through automatic water sprinkling system or normal fire extinguishers.

(l) For uninterrupted power supply noiseless generator or inverter with instant switchover, search protector and voltage stabilizer. An earthing pit for proper earthing should be ensured, with monitoring once in 2 years.

(m) Nurse calling system with a central display and an audio-visual alarm.

(n) Facility for keeping records and registers at the nursing station.

(o) Ambulance: One hi-tech ambulance with all advanced life support measures for critically ill mother, and with a transport incubator and ventilator support for critical new born.

List of Instruments and Furniture for HDU Set-up

List of instruments and furniture for 8 bedded Obstetric HDU

1. Maternity cot- Electronically/ manually maneuvered with facility for all positions, and with mattress for provision of lithotomy and delivery
2. Adjustable bedside table
3. Stethoscope
4. B.P. apparatus
5. Thermometer
6. Glucometer
7. Adult weighing scale
8. Measuring tape
9. IV stand
10. Infusion pump-1 per bed
11. Syringe pump-1 per bed
12. Fetoscope/ Fetal Doppler
13. Videoptioc laryngoscope with monitors
14. Intubating laryngeal mask airway (LMA)
15. Ryle's tube
16. Abdominal drain
17. One ultrasound machine with color doppler and Echo facility
18. One CTG machine
19. Multipara Bedside Monitors- One per bed with the following parameters: SPO2/ NIBP/ ECG/ RR/ Temperature. It should be wall mounted with adjustable height and angle of view
20. Central Monitoring System connecting all the bed side monitors to monitor vital signs of all the patients
21. Adult Intubation kit with laryngoscope, with different size blades and different size endotracheal tubes
22. Baby resuscitation kit/cart
23. One crash cart fully loaded with BCLS (basic cardiac life support) medications
24. One defibrillator with TCP and AED
25. Portable X-ray machine
26. Stock of all emergency drugs and if possible O -ve blood
27. Trays for procedures for putting central lines, ICD, catheters
28. Disposable gloves
29. Autoclaving machine for sterilization
30. Drum with instruments for uterine and vaginal packing
31. CNS tray with torch, hammer etc.
32. Enough good color corrected light for good exposure

33. Central oxygen supply
34. Wall mount suction
35. X-ray view box
36. Anesthesia apparatus
37. Bakri Balloon/ Condom Catheter (first line surgical approach for PPH which works by way of compressing bleeding spiral arteries against the uterine wall)
38. One transport ventilator to shift the patient to ICU
39. One non-invasive ventilator
40. Two BIPAP
41. Minimum two warmers
42. Two movable shadow-less spot lights for procedures with adjustable arms
43. Refrigerator-Two, one for staff in changing room and one for HDU
44. Two blood warmers
45. Separate Eclampsia box
46. Intermission compression device for DVT prophylaxis
47. ABG Machine
48. Partograph
49. Flexible fibro scope
50. Patient controlled analgesia delivery system
51. Thromboelastography
52. Input/output chart
53. Catheter and urobag
54. Ready printed/display of important protocols and checklists
55. Hub cutter
56. Puncture proof container
57. Color coded bins for bio-medical waste
58. Wall clock
59. Two CCTV cameras for security (one inside the HDU/ ICU and one at the entry point of buffer zone)
60. One EPABX system
61. Water beds
62. Wheel chair and trolley
63. Tables, chairs, slippers, masks, caps, etc. for doctors

Note: All equipment being procured should be with warranty and annual maintenance contract at-least for 3 to 5 years.

Obstetrician is the head of the obstetric HDU. He/ she will decide when and whom to call from the list of multidisciplinary team (wherever available), for management of the obstetric patient.

	Regular	On Call - Assured	On Call - If available
Obstetric HDU	In-charge- Experienced/ Trained (Full Time Obstetrician) EmoC/ Medical Officers round the clock. Obstetric nursing staff (24x7) (nursing staff to patient ratio should be 1:2, there should be 1 extra for lay off or covering leave/ day off) **Support Staff** a. Pharmacist b. Dietician c. Counsellor d. Housekeeping and cleaning e. Security f. Data Entry Operator g. Electrical Technician	a. Anesthetists b. Physician c. Paediatrician d. Surgeon e. Radiologist	
Obstetric ICU	▪ In-charge- Intensivist/ Critical Care Specialist/ Anesthetist ▪ 24X7 presence of Anesthetist (SR) or LSAS trained MO ▪ Nursing staff to patient ratio should be 1:1. (there should be 1 extra for lay off or covering leave/ day off) **Support Staff** a. Pharmacist b. Dietician c. Counsellor d. Housekeeping and cleaning staff e. Security f. Data Entry Operator g. Electrical Technician **h.** Bio-medical Engineer	a. Obgyn b. Critical Care specialist or Physician	Surgeon Radiologist Hematologist Cardiologist Nephrologists Neurologist Endocrinologist Pulmonologist, Vascular Surgeon

*** All staff should be adequately trained in recovery care and cardiopulmonary resuscitation (CPR).**

Monitoring and Management at HDU

History: Record the date, time and reason for requesting this level of care, name of clinician contacted, a summary of the current problems, review of the patient's observations and findings on clinical examination, and a plan for the ongoing care. Future review should be completely documented.

Immediate initial assessment and resuscitation should be done.

Maternal observation: Following parameters should be recorded at least hourly in the acute phase of the illness.

a. Temperature
b. Blood pressure
c. Heart rate
d. Respiratory rate
e. Transcutaneous oxygen saturation
f. Hourly urine output

Following management to be done as per case requirement:

- ✓ Fluid and electrolyte balance.
- ✓ Monitor organ function- Cardiovascular, Renal, Pulmonary, Hepatic, and Cerebral.
- ✓ Initiate baseline and specific investigations as indicated.
- ✓ Treat primary condition (severe pre-eclampsia, hemorrhage, sepsis, PTE, etc.).
- ✓ Hypovolemic shock is managed with fluid therapy- Crystalloid/ Colloid/ Blood/ Blood Components.
- ✓ Non-invasive monitoring like SPO2, ABP, CVP, ABG, lungs functions and others is done.
- ✓ Anti-convulsant therapy is given wherever is required.
- ✓ Inj. magnesium sulphate (MgSO4) is given as per protocol for Severe Pre-Eclampsia or Eclampsia patient.
- ✓ Check fetal condition with CTG.
- ✓ Maintain utero-placental oxygen delivery.
- ✓ Left lateral position, if required.
- ✓ Oxygen via face mask, if required.
- ✓ Sepsis- Broad spectrum antibiotics are given (covering both gram negatives & anerobes).
- ✓ Proper care for nutrition should be taken- Enteral and parenteral nutrition is given.
- ✓ If required, inotropes are given.
- ✓ Fluid balance and electrolytes correction is taken care of.

- ✓ Pain management is done.
- ✓ Final management is individualized depending on the underlying clinical condition.
- ✓ Involve appropriate clinicians from relevant specialties.
- ✓ WATCH FOR → Pulmonary edema/ ARDS/ SIRS/ DIC
  Multi-organ failure
  Poor cardiac output despite fluid resuscitation
  Septic shock
  D.I.C
  ↓
  TRANSFER TO Obstetric ICU

Care for fetus in obstetric HDU/ ICU:

- Generally, fetal morbidity and mortality reflect on the maternal condition closely.
- Simple measures such as avoidance of supine hypotension by a 15 degree left lateral tilt, and oxygen via face-mask can improve utero-placental oxygen delivery.
- Fetal condition should be observed by continuous electronic fetal monitoring.
- Give corticosteroids if < 34 weeks.
- Labor and delivery as per maternal indication and/or fetal indication.
- Whenever required, consider delivery, and the decision for mode of delivery based on the obstetric indication.

Patient's case record must contain the following:

- Proper History
- Clear, legible and accurate
- Diagnosis
- Laboratory and imaging findings
- Operative note
- Operative findings
- Management summary
- Must include: date and time/ signature
- Explaining the condition of the patient to the birth attendant/ relative, and getting it documented in the case sheet.
- Getting the consent of the patient for any procedure and/or blood transfusion, and getting it documented in the case sheet.

Guidelines and protocols to be followed:

As HDU care involves management of critically ill obstetric patients, guidelines and protocols should be in place to encourage appropriate responses to these critical situations, and justify actions that are sufficient and efficient- neither excessive nor deficient. SOPs for all these protocols should be clearly laid down in consultation with experts-

- Admission and discharge criteria to/ from the HDU.
- Resuscitation of the pregnant patient.
- Management of major hemorrhage.
- Management of pre-eclampsia and eclampsia.
- Severe hypotension/ hypertension/ diabetes mellitus/ diabetic ketoacidosis/ sepsis.
- Management of failed/ difficult intubation.
- Protocol for regional/ general anesthesia and regional block for analgesia
- Protocol for management of post dural puncture headache.
- Protocol for Management of postoperative pain.
- Protocol for thrombo-prophylaxis.
- Management of patients on thrombo-prophylaxis.

Note: In addition, protocols for specific obstetric conditions not enumerated above, needs to be followed as per its standard treatment protocol.

Discharge from HDU to Ward

Discharge of patients from a high dependency unit shall take place:

- When a patient's physiologic status has stabilized.
- Patient is hemodynamically stable.
- The need for intensive patient monitoring is no longer necessary.
- No further continuous intravenous medication or frequent blood tests required.
- No active bleeding.
- No supplementary oxygen required.
- Patient is ambulatory.
- The patient can be cared for in a general ward unit.
- Average time of stay in HDU is usually 24-72 hours.
- Discharge with full written document.

Training

Training

Obstetric HDU and ICU require trained and dedicated staff to manage obstetrical complications. Regular orientation courses should be organized as under:

Activity	Duration	Nurse	MO	OBGYN
Basic resuscitative measures	3 months training to be given in Medical Colleges by posting them in ICU and in Obstetric department	✓	✓	
Training for Intubation		✓	✓	
IV Line and Medication		✓	✓	
Blood and Component Transfusion		✓	✓	
Daily checking on emergency trolley		✓	✓	
ICU Procedures		✓	✓	✓
For obstetrical emergencies	In LR and Obs Wards and OT	✓		
Emergency Drills every 3 months		✓	✓	✓

Comparison of Obstetric HDU and Obstetric ICU

Comparison of obstetric HDU and obstetric ICU

- HDU will suffice when single organ support or no organ support is required.
- HDU would not normally accept patients requiring mechanical ventilation, but could manage those receiving close monitoring.
- Patients with multi organ failure cannot be kept in HDU.
- HDU is an option in terms of efficacy and fulfils the need of ICU.
- It can be established in most obstetric unit in a room which is equipped for it.
- It allows continuity of antenatal, intra-partum and postnatal care provided by the same team.
- It reduces need of ICU with continuity of care.
- A dedicated obstetric HDU with the knowledge, familiarity, expertise of an obstetrician and a specialist team would be the best place to monitor and treat the critically ill obstetric patients.

Criteria	Obstetric HDU	Obstetric ICU	Medical ICU
No. of units required	Many	Less	Less
Patient	Pregnant women (Ante, intra or postnatal)	Pregnant women (Ante, intra or postnatal)	Any Patient (Male or Female)
Admission Criteria	Obstetrical or medical complication in a pregnant woman requiring close and continuous monitoring	Obstetrical or medical complication in a pregnant woman requiring ventilator support, multi-organ failure, dialysis, DIC etc.	Medical Conditions, Surgical Conditions with life threatening complications
Bed requirement	10% obstetric patients	0.9% of obstetric patients	Requirements differs from hospital to hospital
Space Requirement	120-140 sq. ft. per bed	140-160 sq. ft. per bed	120-140 sq. ft. per bed
Facilities required	Basic cardiac and respiratory, metabolic monitors, Blood Component therapy, Fetal Monitoring, Sonography with Color Doppler/ Echo,	HDU + Invasive Monitoring, Ventilators, Bed side Dialysis, Plasmapheresis, Pace makers,	Invasive monitoring Ventilator, Bed side Dialysis, Plasmapheresis, Pace-makers, Bronchoscopy, Endoscopy,

Criteria	Obstetric HDU	Obstetric ICU	Medical ICU
	Transport Ventilator etc.	Bronchoscopy, Endoscopy, Tracheostomy, Own or outsourced CT Scan and EMRI	Tracheostomy, Own or outsourced CT Scan and EMRI
In-charge	Obstetrician	Obstetrician/ Critical care specialist/ Anesthetists	Critical Care specialist/ Anesthetists
Baby Accompanied	Yes, allows lactation support	No	No
Human Resources	Nurse/ Patient - 1:2	Nurse/ Patient - 1:1	Nurse/ Patient - 1:1
Team Composition	**In-charge-** Experienced/Trained (Full Time Obstetrician) EmoC/ Medical Officers round the clock. Obstetric nursing staff (24x7) (nursing staff to patient ratio should be 1:2, there should be 1 extra for lay off or covering leave/ day off) **Support Staff** a. Pharmacist b. Dietician c. Counsellor d. Housekeeping and cleaning e. Security f. Data Entry Operator g. Electrical Technician h. Bio-medical Engineer	**In-charge-** Experienced/ Trained Full Time Obstetricians Obstetric Anesthetists 2 EmoC/ Medical Officers round the clock ▪ Obstetric support staff (24x7) ▪ nursing staff to patient ratio should be 1:1. (there should be 1 extra for lay off or covering leave/ day off) **Support Staff** a. Pharmacist b. Dietician c. Counsellor d. Housekeeping and cleaning e. Security	Anesthetists, Intensivists/physician ON CALL- Specialists, Super-specialists for 24 hrs. Trained dedicated Nurse & Bio-medical Engineer, Support Staff

Criteria	Obstetric HDU	Obstetric ICU	Medical ICU
		f. Data Entry Operator g. Electrical Technician h. Bio-medical Engineer	
Hospital Acquired Infections -	Possibility is less	Possibility is more	Possibility is more
Capacity Building	Specially trained in Obstetric conditions and its complications	Specially trained in Obstetric conditions and its complications and also critical care	Specially trained in medical and surgical complications and also critical care
Financial Burden	Treatment is cheaper than ICU	Treatment is costly	Treatment is costly
Environment	Patient friendly	Not so patient friendly in comparison to HDU	Not so patient friendly in comparison to HDU

Annexures

Annexure I: 4 bedded Obstetric HDU

3600SQFT

8 BEDDED
HDU UNIT
57'-0"X28'-0"

EMERGENCY
EXIT

NURSING STATION

SCRUB AREA

EQUIPMENT AREA

GENERAL
STORE
10'-0"X11'-0"

SHOE CHANGE

8'-0"
WIDE
CORRIDOR

PATIENT'S
CHANGING
ROOM
9'-0"X9'-0"

STORAGE
LOCKERS

STORAGE
LOCKERS

STORAGE
LOCKERS

STORAGE
LOCKERS

EQUIPMENT
ROOM
10'-0"X10'-0"

DIRTY
UTILITY
7'-6"X11'-0"

TOILET
12'-0"X10'-0"

BUFFER
AREA

CHANGING
ROOM
6'-0"X6'-0"

TOILET
6'-0"X6'-0"

DUTY DOCTOR
ROOM
12'-0"X11'-0"

STAFF ROOM
11'-0"X10'-0"

TOILET
8'-0"X6'-0"

8'-0"
WIDE
CORRIDOR

5'-6"

TOILET
(M)

6'-3"

TOILET
(F)

5'-6"

9'-9"

STRETCHER
TROLLEY
8'-0"X10'-0"

DOCTOR
CHANGING
ROOM
12'-0"X10'-0"

STORAGE
LOCKERS

STORAGE
LOCKERS

STORAGE
LOCKERS

STORAGE
LOCKERS

STORAGE
LOCKERS

29'-9"

10'-3"

DW

9'-6"

WAITING AREA
FOR
PATIENT
ATTENDANTS

18'

10'

CB

8'-3"

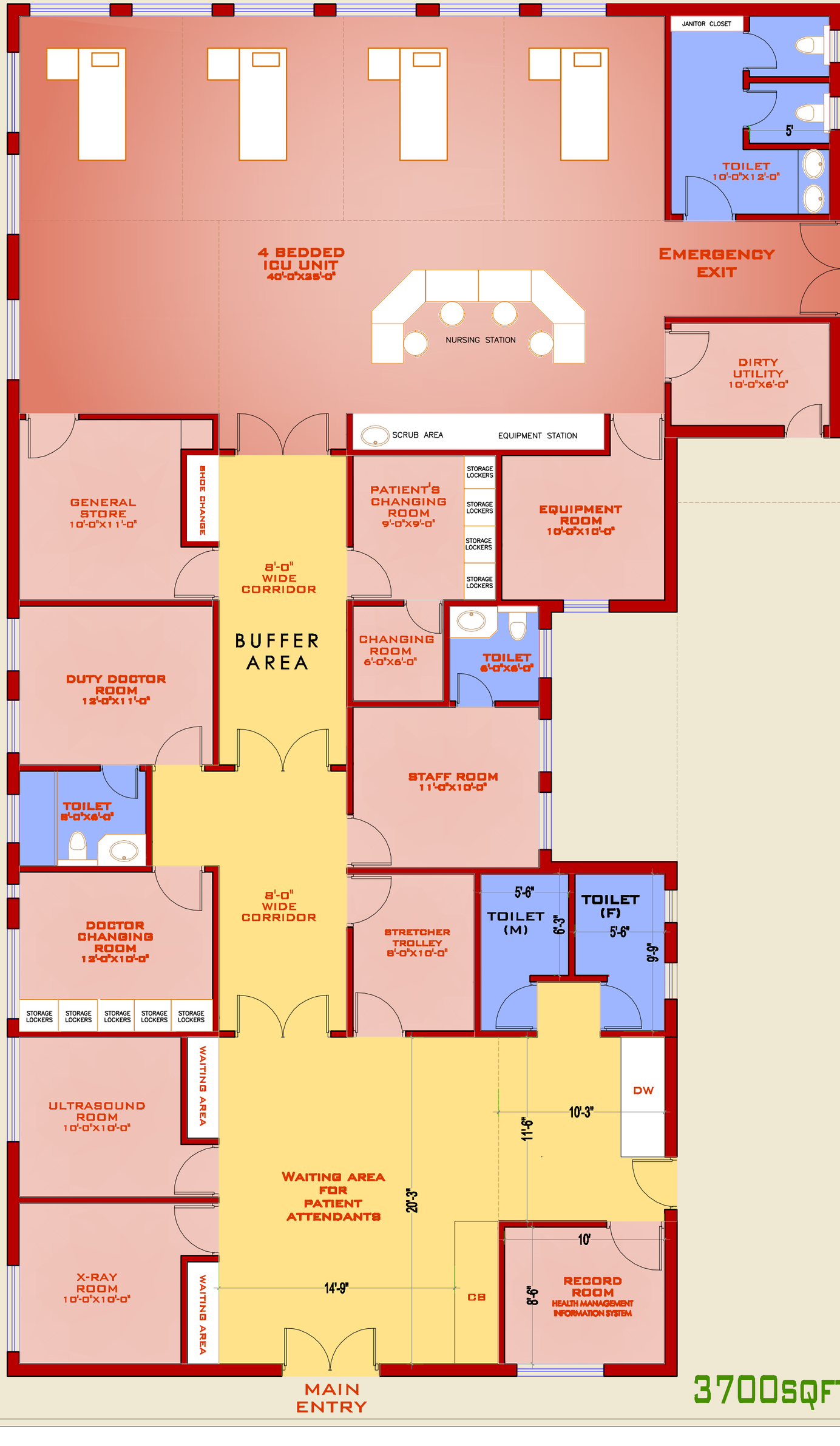
RECORD
ROOM
HEALTH MANAGEMENT
INFORMATION SYSTEM

MAIN
ENTRY

4200 SQFT

Annexure II: 8 bedded Obstetric HDU

Annexure III: 4 bedded Obstetric ICU



3700SQFT


8 BEDDED
ICU UNIT
57'-0"X28'-0"
EMERGENCY
EXIT
NURSING STATION
SCRUB AREA
EQUIPMENT STATION
GENERAL
STORE
10'-0"X11'-0"
SHOE CHANGE
8'-0"
WIDE
CORRIDOR
PATIENT'S
CHANGING
ROOM
9'-0"X9'-0"
STORAGE
LOCKERS
STORAGE
LOCKERS
STORAGE
LOCKERS
STORAGE
LOCKERS
EQUIPMENT
ROOM
10'-0"X10'-0"
DIRTY
UTILITY
7'-6"X11'-0"
TOILET
12'-0"X10'-0"
BUFFER
AREA
DUTY DOCTOR
ROOM
12'-0"X11'-0"
CHANGING
ROOM
6'-0"X6'-0"
TOILET
6'-0"X6'-0"
STAFF ROOM
11'-0"X10'-0"
TOILET
6'-0"X6'-0"
8'-0"
WIDE
CORRIDOR
DOCTOR
CHANGING
ROOM
12'-0"X10'-0"
STORAGE
LOCKERS
STORAGE
LOCKERS
STORAGE
LOCKERS
STORAGE
LOCKERS
STORAGE
LOCKERS
STRETCHER
TROLLEY
8'-0"X10'-0"
5'-6"
TOILET
(M)
6'-3"
TOILET
(F)
5'-6"
9'-9"
WAITING AREA
ULTRASOUND
ROOM
10'-0"X10'-0"
WAITING AREA
FOR
PATIENT
ATTENDANTS
20'-3"
10'-3"
DW
10'
X-RAY
ROOM
10'-0"X10'-0"
WAITING AREA
14'-9"
CB
8'-6"
RECORD
ROOM
HEALTH MANAGEMENT
INFORMATION SYSTEM
Annexure IV: 8 bedded Obstetric
ICU
4300SQFT

सत्यमेव जयते

Maternal Health Division
Ministry of Health and Family Welfare
Government of India

NATIONAL HEALTH MISSION
राष्ट्रीय स्वास्थ्य मिशन