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Obstetric Hemorrhage

Evidence-based Management and Recent Advances

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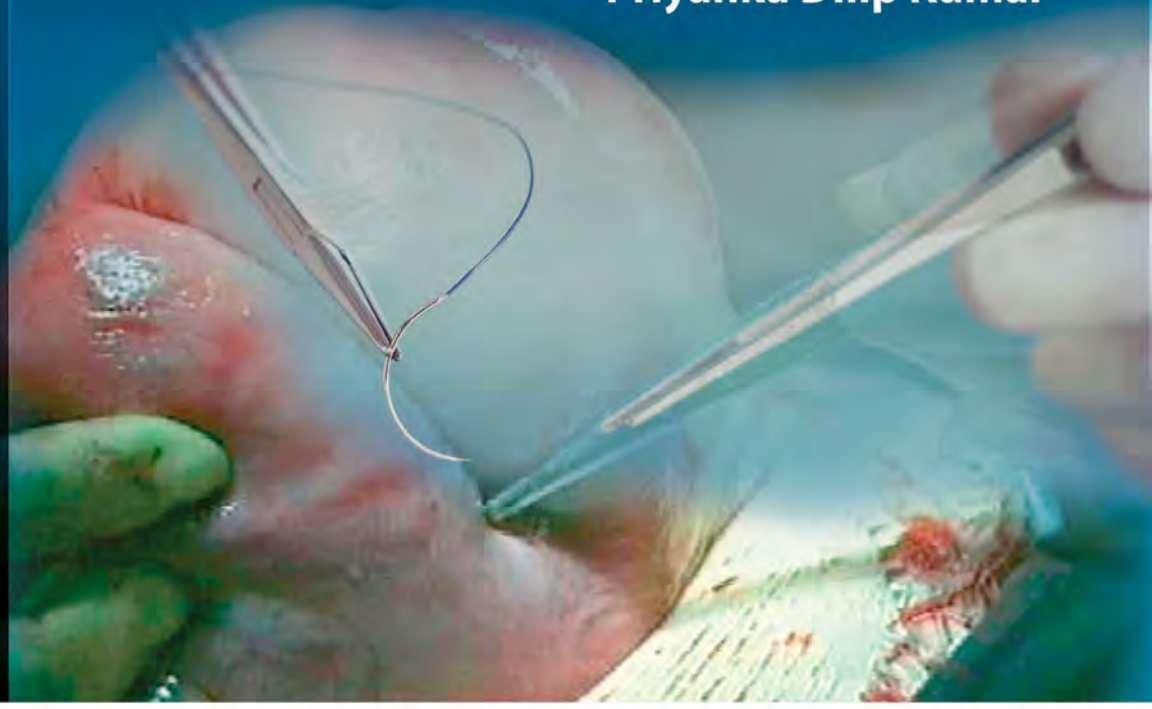

Forewords
CN Purandare • Nandita Palshetkar • Sabaratnam Arulkumaran

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Chapter 3

Safety in the Labor Ward

Nuzhat Aziz, Pallavi Chandra

INTRODUCTION

Childbirth is a complex process. The place of childbirth, the labor and delivery (L and D) unit becomes the most vital area for all mothers going through pregnancy. The work in this area is unique. With the majority of workload being unplanned, unpredictable workload makes the L and D a unique place to work in, compared with other high-paced, high-risk areas, such as the operation theaters (OTs). The team here deals with complexities of obstetric care, where the risk factors change their profile rapidly, where emergency responses are expected to be prompt and precise and where errors can lead to major catastrophes. Requirement for appropriate communication and coordination between multidisciplinary teams adds to the complexity. Promoting safety in intrapartum period is the basic central concept of designing an L and D unit.[1] Safety is the condition of being protected from danger, risk or injury. Promotion of safety starts with the design of a unit and ends with periodic accreditation and assessment of each of its processes.

DESIGNING FOR SAFETY

The design of an L and D aims to provide patient satisfaction, creating a home-like environment, which may be converted to an intensive care facility, as and when the need arises. The variables that are taken into consideration into the layout and design are the planned number of deliveries per month, the bed strength, workflow design, the dimensions of each room, concept of triage, high dependency unit (HDU), emergency OT, neonatal resuscitation area, the equipment, lighting solutions, storage, workstations, waste management (dirty utility) and toilets. Workflow pattern should start from an emergency entry point to obstetric triage which then leads to L and D or emergency OT or HDU or antenatal ward (Figs. 1 and 2). This triaging concept allows the L and D area to receive only those who need its services. The Emergency OT should be a part of the L and D complex to allow rapid category 1 cesarean sections (CSs). The recommendations by the Government of India mandate the presence of HDU for all and an obstetric intensive care unit (ICU) if the number of deliveries exceed 500 per month.[2] If the workflow of a unit has the concept of a first stage room (as is found in places with high volumes), then it has to be different from HDU. The risk categorization at admission into low- and high-risk pregnancy also enables appropriate allocation of resources. The criteria for HDU and ICU admissions allow appropriate monitoring of these women and thus promote safety.[2] The checklist for designing an L and D complex is shown in Tables 1 and 2.

IDEAL BED STRENGTH FOR SAFETY

The overloading of a system with volumes exceeding its capacity is the most common reason for failure of safety processes. The bed strength of L and D is dependent on

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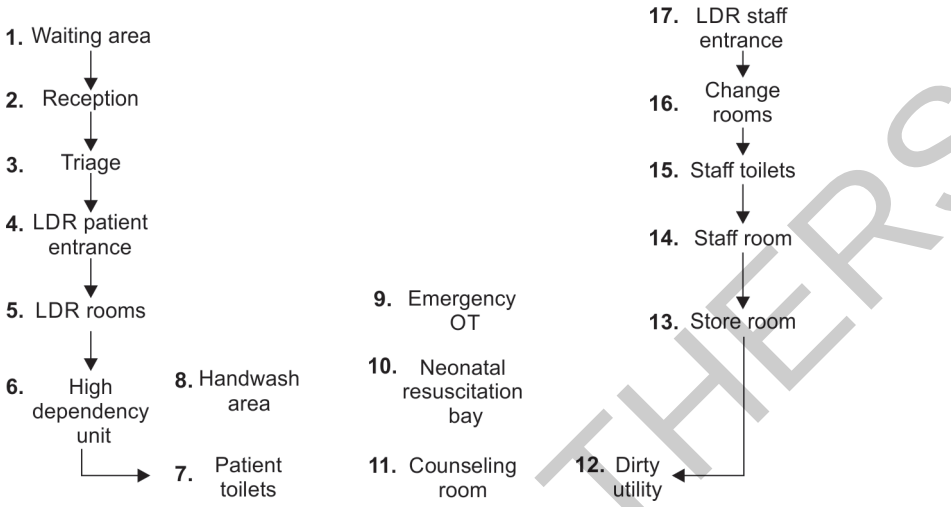

Fig. 1: Workflow design for labor, delivery and recovery (LDR).



Fig. 2: Labor and delivery complex.

the projected number of deliveries that are expected to take place in that unit. The birth volume in a birthing unit is linked to the admission rate, vaginal birth rate, emergency CS rate and the average duration of stay for vaginal delivery or a CS. The formula used to calculate the number of labor, delivery, and recovery (LDR) beds required is as follows: The number of LDR rooms = Projected LDR events × ALOS/365 × occupancy rates.[3] Projected LDR events are vaginal births and emergency cesareans that go from the labor ward; ALOS is the average length of stay in days, usually taken as 12 hours or 0.5 days. For example, a hospital with 3,600 deliveries a year with 30% CS rate will have 2,400 vaginal births and 600 emergency giving 3,000 LDR events per year.

Number of LDR rooms = 3,000 × 0.5/365 × 0.75 = 5.49 or 6 LDR rooms complex. Safety of maternity care in an institute is through designing for a specific projected number and then defining your limits of booking.

DESIGNING EACH LDR ROOM FOR SAFETY

The changing perspectives on birthing have changed the birthing room—LDR to a focus on more emphasis on mobility, concealment of all equipment behind panels, which can be taken out if needed. Complete emergency care would require gas lines, delivery bed, operative light source, emergency equipment to monitor mother and fetus and local storage. Addition of railings for support, Rebozo, birthing balls, a shower area, a water tub for hydrotherapy or water birth are optional but very useful to the woman to maintain mobility and upright positions. The storage of all equipment, drugs, instruments, bed sheets, sterile trays in the same room allows easy access in times of emergency (Fig. 3).

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TABLE 1: Checklist for designing an L and D complex for 3,000 births per year.

LDR complex

- Waiting area for patients
- Reception for labor ward complex
- Two entrance—for patients and for staff with access doors
- Staff entrance leading to:
  - Change room for staff, with lockers
  - Change room for doctors, with lockers
  - Toilet
  - Dirty utility room
  - Store
  - Delivery (LDR) rooms—6 in number
    - Ideal size 15 × 17 feet
    - With attached bathroom
    - Ceiling mounted light
    - Oxygen/suction lines
  - Neonatal resuscitation bay
    - For two resuscitation trolleys
    - Parking one trolley
  - Labor ward trolley parking area
  - Equipment bay
    - For crash cart
    - For charging and parking equipment
    - Refrigerator
  - Working station for labor ward
    - Sitting and standing platforms
    - 3 computer terminals with printer
    - With pin board for notices
    - Nursing call system
    - Pneumatic system
    - Cabinets for storage
    - Below and above the working area
    - Reading lights in the working area
    - Phone lines—3
  - Wash area (surgical hand scrub)
  - Patient display board for 6 delivery rooms
  - High dependency unit/induction room
    - Beds—6 in number
    - Oxygen and suction lines
    - Nursing station
    - Storage
    - Wash basin for washing hands
    - Patient display board
    - Ultrasound, crash cart and CTG machine parking area
    - Toilet for patients
  - Doctors lounge
    - A table with 8 chairs
    - A couch to sleep

Contd...

Contd...

LDR complex

    - Labor ward (LW) handover board
    - With toilet
    - Microwave, refrigerator, tea, coffee trays
    - Lockers
  - Staff lounge
    - A table with 8 chairs
    - A couch to sleep
    - Notice board
    - With toilet
    - Lockers
  - Counseling room leading to patient entry/exit door

Maternal and fetal monitoring equipment can be either wall mounted or on trolleys. Panels can be used for concealment of equipment to promote a concept of home-like room, without any medical equipment. Good visualization is paramount for rapid control of traumatic hemorrhage. A ceiling-mounted light has more advantages than a movable or a wall-mounted source. A checklist for equipment in an LDR room is given in Table 3.

EQUIPMENT FOR SAFETY

The L and D should be equipped with all monitors required for maternal and fetal monitoring, for a low-risk mother has a transition to a high-risk zone suddenly. The electrical power supply needs may vary and needs to be thought of before planning the infrastructure of L and D. The LDR and HDU beds require at least 6 plug points, three each of 5 and 15 amps, with one or two having a connection to the uninterrupted power supply (UPS) source. The equipment which are commonly used in L and D requiring an electrical power supply are delivery bed, infusion set, maternal multiparameter monitor, cardiotocography machine, ultrasound machine if needed. The ultrasound machine is a very essential safety tool that must be present in all L and D units

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TABLE 2: Components of LDR, triage and HDU as a checklist.

	Triage	*LDR complex*	*HDU*
Reception	Yes	Yes	
Toilet for patients family	Yes	Yes	
Nursing station	Yes	Yes	Yes
Trolley and wheelchair parking	Yes	Yes	
Triage rooms/beds	3	6	4–6
Toilets for patient use	Yes	Yes	
Staff room with toilet	1	1	
Counseling room	Yes	Yes	
Crash cart parking area	Yes	Yes	Yes
Storage room	Yes	Yes	Cabinets
Plug points for each bed	6	6	6
Handwash area	Wash basin	Scrub area	Wash basin
Equipment bay	Yes	Yes	Yes
Dirty utility	Yes	Yes	

(LDR: labor, delivery and recovery; HDU: high depending unit)



Fig. 3: Storage and signage in each labor, delivery, and recovery (LDR) room.

as it aids in rapid decision making. Most of the electrical equipment require charging and need a storage place which is designated by the term equipment bay with multiple electrical sockets of different amps. Standby equipment is sometimes designated as equipment library, to be utilized by all departments across the hospital, a concept of safety.

EMERGENCY KITS FOR SAFETY

A toolkit has all the required equipment, drugs and disposables in a single box or tray for a management of a specific condition or a procedure. Obstetric emergencies require prompt and quick response to prevent a catastrophe. Being prepared for an emergency with all the instruments needed for that emergency is very helpful. For example, a cervix exploration set has required instruments, to visualize, hold the cervix and suture the tear. A postpartum hemorrhage (PPH) tray similarly has all equipment required in the management of PPH, including Vacutainers for blood samples, drugs and documentation sheets (Fig. 4). The toolkits that should be present in the L and D are a delivery tray or set, PPH tray, eclampsia tray, cervix exploration set, anal sphincter injury repair set, Foley catheterization set, and postpartum intrauterine contraceptive device (PPIUCD) tray. The contents of these sets have to be verified and replaced on a daily basis which is recorded as a log for verification. A vaginal pack, sterile, autoclaved is always kept for emergency use along with a

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TABLE 3: Checklist for planning each LDR.

Individual LDR room planning

Major requirements:
- Labor and delivery bed
- Good light source—ceiling light
- Recliner/chair for patients attender
- Stool for doctors/nurses
- Trolley in LW
- CTG machine
- Handheld Doptone
- Wash basin with elbow operated arm
- Cabinet—topmost draw and baskets below
- Cabinet to hold linen for the room

Minor equipment:
- BP apparatus
- Stethoscope
  Infusion pump
  Patient board, with pen stand
- Partogram board
- CTG board to display
- Clock
- Handrub on the wall
- Paper towel stand
- Sharps container
- Clock
- Dustbin
- Thermometer

Cabinet tray to have space for:
- Aprons, disposable sheets
- Gloves
- Foley catheter, urobag
- Venflon, swabs and stickers
- Drugs—to stock for immediate use
- ARM hooks
- Syringes
- Sterile sets—speculums, one delivery set, one epidural set
- Foley catheterization set

Plug points:
- Bed
- CTG machine
- Infusion set
- Two or three extra points—ultrasound machine, multiparameter monitor

Oxygen and suction lines

Bakri balloon.[4-6] The crash cart is mandatory in the labor ward and in the triage. The crash cart requires a disposable scalpel blade for a perimortem CS if needed.

STAFFING FOR SAFETY

Presence of a consultant 24 × 7 has been proven to be one of the factors that improve safety in L and D units. It facilitates confidence, earlier decision making, and promotes vaginal birth. The staffing again depends on the projected number of births. The nurses or midwifery staffing is planned with a concept of providing 1:1 care in LDR and 1:2 in the HDU. The working hours should be reviewed and most optimal shift hours chosen to avoid fatigue. Errors are most often reported in night within a 24-hour shift system. A labor ward coordinator should be supernumerary to the staff not be responsible for patient care directly, with a role to coordinate the systems in labor ward.[7]

TRAINING AND CERTIFICATION FOR SAFETY

Training of the team and assessment of the skills are a vital part of improving safety in labor wards. Multidisciplinary training may help better coordination in a crisis. Teams that work together should also have training and drills together, in the place of work rather than offsite. The mandatory and optional certifications can be decided by the team. Training needs have to be identified, and training opportunities provided. We have included basic life support, obstetric emergencies, perineal repair, electronic fetal monitoring and basic surgical training as mandatory. Growth assessment protocol (GAP) by perinatal institute, Birmingham also has now been added to basic prerequisite for working in obstetrics department. Training is one aspect; assessment is another part of making sure the team is geared up to dealing with emergencies. Simulation-based training and assessment should be the way forward for making obstetric emergencies safer for our mothers.[8]

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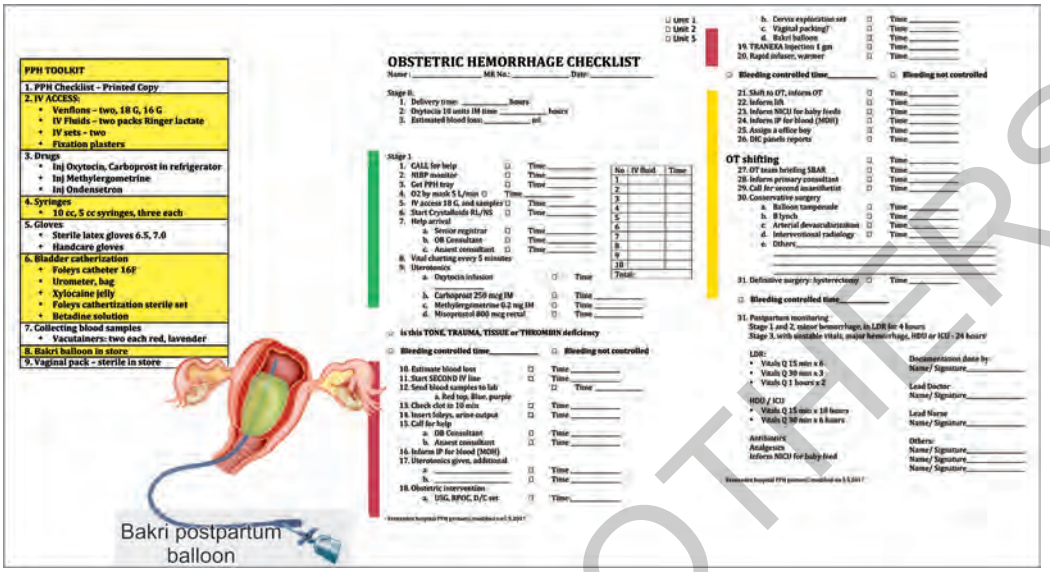

Fig. 4: Postpartum hemorrhage (PPH) toolkit and checklist.

INFECTION CONTROL SYSTEMS IN THE LABOR WARD

The process of cleaning, disinfecting, maintenance of hygiene in the labor ward is of paramount importance. The handwashing or hand disinfection policy needs an L and D design to promote these practices with a wash basin, surgical handwash, placement of hand rubs at strategic locations. Audits to ensure the control of hospital-acquired infection rates with a hospital infection control committee help to keep the processes under check.[9]

SIGNAGE FOR SAFETY

Appropriate signage for all storage, drugs, equipment and documentation sheets (*see* Fig. 3). Any person coming to the labor ward for the first time should be able to navigate and be able to access the required item. Induction to the labor ward policies, and crash cart, obstetric emergencies trays, and code blue policies has to be done.

OBSTETRIC HANDOVER BOARD

Shift handovers serve to ensure continuity of care between one group of healthcare providers and another; they involve changes in numbers, seniority and experience of staff and represent the formal transfer of responsibility and accountability from one team of health workers to another. Obstetric handover board can be designed and individualized for every unit updated at regular intervals (Fig. 5). This board can be kept in the staff lounge or in the working station, taking care to maintain patient confidentiality.

COMMUNICATION, TEAMWORK FOR SAFETY

One of the major reasons for errors and mismanagements is poor or lack of communication. It may be lack of communication within a team, or between different teams, or from one handover to another. A structured handover, an accepted method of communicating [situation, background,

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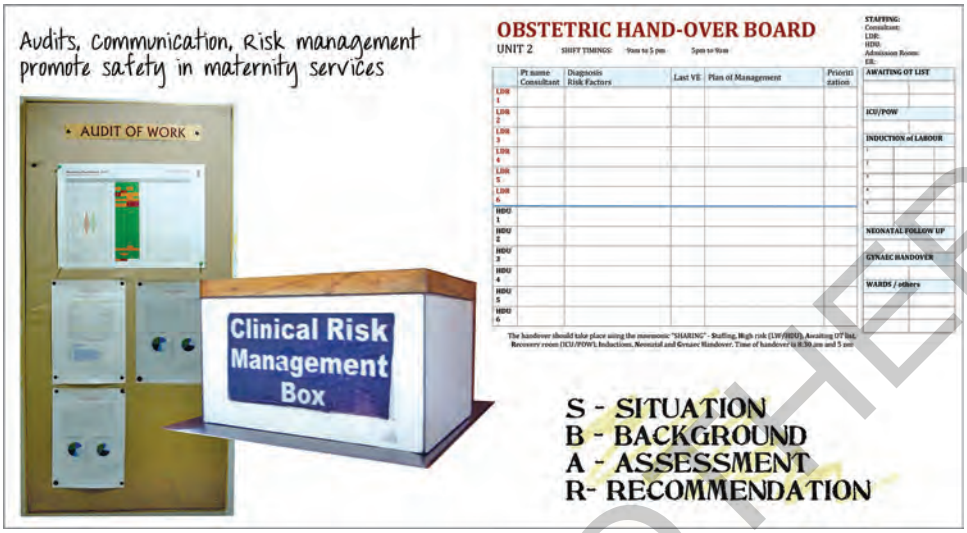

Fig. 5: Audits, handover board, clinical risk management (CRM), communication in L and D complex.

assessment, and recommendation (SBAR)], or a formatted method of writing notes [subjective, objective, assessment, and plan (SOAP)] are ways to ensure a high quality of standards with uniformity.[10,11] Promoting team building exercises, improving teamwork is an important aspect of safety.

ALARMING AND ALERTING SYSTEMS

Hospital emergency alerting systems have code blue for resuscitation, pink for baby alert amongst many others including fire and disaster. Standardized color codes are preferred and announced over the public address system, with a predesigned rehearsed response. There has been a recommendation to use plain language instead of color coding, which was found to increase the levels of stress in the response team. When the L and D has a special need for an urgent CS, an alerting system between the OT, anesthesia and neonatal teams is required. It can be a color code over the public addressing system or a separate sound and light alarm system. The advantage of this alerting pathway is the removal of human response, telephone delays, and communication errors. We use a red light with alarm for category 1 cesarean (urgent) and a yellow one to call for category 2 cesareans [the National Confidential Enquiry into Patient Outcome and Death (NCEPOD) classification of urgency of cesareans][12] as shown in Figure 6.

AUDITS, MATERNITY DASHBOARD FOR SAFETY

The quality indicators for an L and D unit can be divided into workforce, maternal and fetal morbidity, mortality related or can be process-related complaints. The indicators can be added by the team, for example surgical site infection rates, or breastfeeding at birth, to allow an audit cycle coming into play for this parameter. Display of results to the team allows each one to become a part of the quality improvement program (Fig. 5). The Obstetric Dashboard concept was first presented by the Royal College of Obstetricians and Gynaecologists and has since been adapted and modified by many.[13] The concept of

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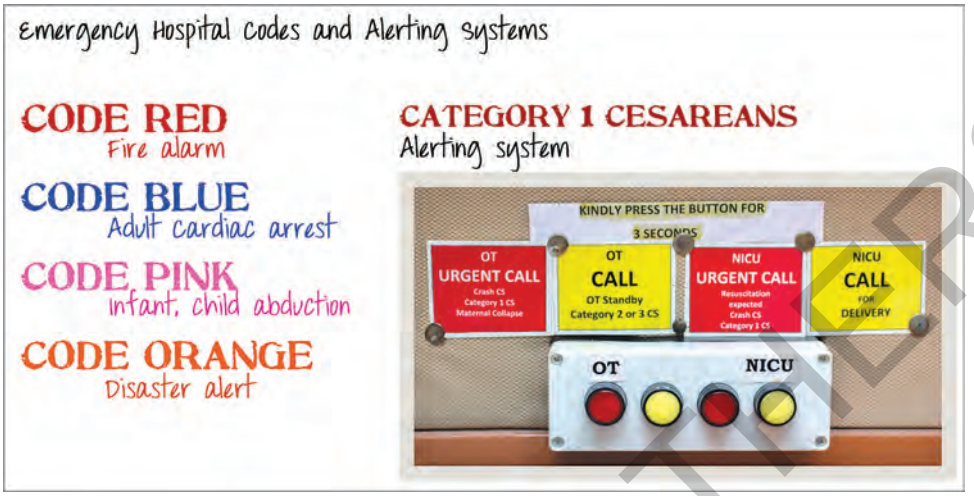

Fig. 6: Emergency codes and alerting systems.

green, amber and red coding for each of the indicators allows a color-based attention to the indicators which need urgent attention.

CHECKLISTS FOR SAFETY

The number of diagnosis, the pathways, and emergency responses is so varied and so many that it is humanly impossible to memorize and reproduce them when needed. It is also a known human factor that we are not at our best when we find ourselves in a stressful situation. Checklists are very helpful to ensure that no step is omitted and to ensure all steps are done in a particular order.[5] The checklist can be with a verbal prompt in emergencies such as PPH (*see* Fig. 4). Checklists are also an excellent tool to document the events that have taken place, a tool of medicolegal importance. The checklists commonly used in obstetrics are the WHO childbirth checklist, PPH, eclampsia, shoulder dystocia, adherent placenta, obstetric anal sphincter repair or to document events accurately like vaginal births, CSs or instrumental delivery.

CLINICAL RISK MANAGEMENT FOR SAFETY

Principles of safety also encompass strategies for identification and prevention of harm to patients; unintentional harm. Hospital systems can expose patients to a multitude of errors; a human error or a process or a system error. Errors are an effect of consequences rather than causes and need to be minimized by placement of systems which ensure that errors are prevented. Clinical risk management (CRM) system ensures there is an open and free environment of reporting of errors or deviations from protocol and adverse outcomes. Anonymous reporting through slips and boxes placed in all nursing stations have been a very good feedback system for us for many years (*see* Fig. 5). The reporting should be acknowledged and appreciated for CRM leads to improvement of processes and rectifies errors. CRM committee is a multispecialty management team which then disseminates the learning points to the team.[14]

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BACKUPS

It is better to have a backup plan B if the initial plan A fails. It is the team leader or coordinator's responsibility to have backups planned and available when needed. Unavailability was found to be one of the factors quoted in adverse outcomes. It may mean backup of beds, staff, equipment, electricity or expertise. Safe places have backups and emergency exit plans.

MIDWIFERY TEAM AS SAFETY PRINCIPLE

Improving safety in our maternity services is the only way to improve the maternal mortality and morbidity. Teams with midwifery services are much safer that those without. Midwifery services have been shown to have a major impact on reduction of morbidity.[15] Risk stratification and midwifery care for the low-risk patients allow the obstetricians to focus on high-risk pregnancies and care.

CONTINUOUS SUPPORT IN LABOR AS SAFETY FOR MOTHER

A support person in labor was designated as one of the most effective interventions in obstetric care, for improving outcomes. Not allowing a support person with a laboring mother is one of the worst practices that have to be addressed and eradicated as a priority. The supporting person is an advocate for the mother's safety and promotes respectful care. The evidence for having a birth partner or support person is overwhelming and cannot be ignored.[16]

WHAT IS A SAFE LABOR WARD? CONCLUSION

A woman entering the L and D is apprehensive, hopes to birth without any medical interventions, expects to be respected, cared for and monitored for any deviation from the normal. The care we provide should be woman centered, respecting her culture, preferences and choices. Maternity care should be safe, and capable of dealing with the most adverse complication that may arise for her or her baby.

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Obstetric Hemorrhage

Evidence-based Management and Recent Advances

It is wonderful to see the rapid advances in medical technology in the last two decades. There is no doubt that some of these innovations are instrumental in dealing with obstetric emergencies and saving mothers' lives. However, India's failure to achieve the target MDG5 for maternal mortality indicates that we need to build more evidence and translate it into practice. In particular, obstetric hemorrhage remains a challenge, as no interventions for prevention and treatment, have made the desired impact. Obstetric hemorrhage is an important cause of maternal mortality accounting for about 30% of all maternal deaths worldwide. The book *Obstetric Hemorrhage: Evidence-based Management and Recent Advances*, as a firm step forward to establish protocols and guidelines for developing countries. The contributors have been chosen carefully based on their work profile and experience. The chapters are crafted to elaborate on cost-effective newer technologies for management of obstetric hemorrhage. The book enhances skill and builds capacity for our fraternity in tackling matters of critical care in such patients.

Sheela V Mane MBBS MD FICOG FICMCH is a Senior Consultant in Obstetrics and Gynecology and has been running a hospital of her own, Anugraha Nursing Home, Bengaluru, for the past several years. She has been a faculty at Ambedkar Medical College for 20 years and at present is a postgraduate DNB teacher at KC General Hospital, Bengaluru, Karnataka, India. She has been a Past President of the Bangalore Society of Obstetrics and Gynecology, Chairperson of Safe Motherhood Committee, 2008-2011, FOGSI, Vice President, FOGSI, 2014, and FOGSI National Coordinator for postpartum hemorrhage workshops for the past several years. The first of such workshops was conducted with Dr B-Lynch at Bengaluru in May 2010. This was followed by series of workshops across the country, during which she realized that there were many lacunae in the care of women suffering from obstetric hemorrhage and the thought of compiling a book with the experiences of Stalwarts came to her mind.

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Priyanka Dilip Kumar MBBS DNB is a young enthusiastic Obstetrician and Gynecologist practicing at Anugraha Nursing Home, Bengaluru. She is reproductive medicine specialist, a Visiting Consultant at NU Hospitals, Bengaluru, Karnataka, India. She has been a pillar of support for her two seniors and has worked hard for the compilation of manuscripts.

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