

Maternal near-miss reviews: lessons from a pilot programme in India

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Introduction

Decline in maternal mortality in India

India has made significant progress in reducing the maternal mortality ratio (MMR) from 212 to 178 per 100 000 live births (Figure 1).^{1,2} However, the country has a long way to go before it will meet Millennium Development Goal 5, which sets out to reduce MMR to 150 per 100 000 live births by 2015, or the National 12th Plan of India, which sets out to reduce MMR to 100 per 100 000 live births by 2017. Among the several strategies implemented by the Maternal Health division of the Ministry of Health and Family Welfare, Government of India to reduce MMR, the Maternal Death Review launched in 2010 was an important initiative.³ The Maternal Death Review provided detailed information on various factors at facility, district, community, regional and national levels that were to be addressed to reduce maternal deaths.

Near-miss case review

In the last two decades, the concept of conducting a Maternal Near-Miss (MNM) review has gained importance as an additional strategy to help identify gaps in health service provision.⁴

A near-miss has been defined as 'a woman who almost died but survived complications during childbirth'.⁵ Near-miss audit has been considered a less threatening approach than maternal death audit, and can be used to identify what needs to be done to improve the quality of maternal health care. Compared with Maternal Death Review, the fear of blame and punishment is less in near-miss review so, if a near-miss review is performed effectively, it can in practice more easily lead to implementation of changes that will improve the quality of services.⁶ Near-miss cases generally occur more frequently than maternal deaths and therefore a

more reliable quantitative analysis can be carried out, which can provide a more comprehensive profile of health system functioning.^{7–9} Identification of the obstacles and gaps in the health system and a coordinated approach to resolve these can ultimately lead to an improved health system.

The Indian experience

Under the guidance of the Government of India, key stakeholders were identified and a National Technical Group (NTG) was constituted. The NTG was given the task of fulfilling four key objectives and developing a comprehensive way forward to guide the decisions at Government of India level for considering national implementation of MNM. The four key objectives were: (i) to agree on the national MNM policy framework and definition of MNM in the Indian context; (ii) to agree on the criteria for identifying an MNM; (iii) to agree on the tools for recording and reporting an MNM case; and (iv) to pilot test, and make recommendations for the next steps, including potential scale up across the country.

The pilot programme was implemented in six medical colleges: (i) Jawaharlal Nehru Medical College, Aligarh Muslim University—Aligarh, Uttar Pradesh; (ii) Government Medical College and Sultania Janana Hospital—Bhopal, Madhya Pradesh; (iii) Institute of Social Obstetrics and Government Kasturba Gandhi Hospital for Women and Children—Chennai, Tamilnadu; (iv) Post-Graduate Institute of Medical Sciences—Rohtak, Haryana; (v) Mahatma Gandhi Institute of Medical Sciences—Sevagram, Maharashtra; and (vi) Kamala Nehru State Hospital for Mother and Child (Indira Gandhi Medical College)—Shimla, Himachal Pradesh. The NTG comprised technical experts from the Maternal Health Division—Government of India, Ministry of Health and Family Welfare, Federation of Obstetric and Gynaecological Societies of India, Mahatma Gandhi Institute

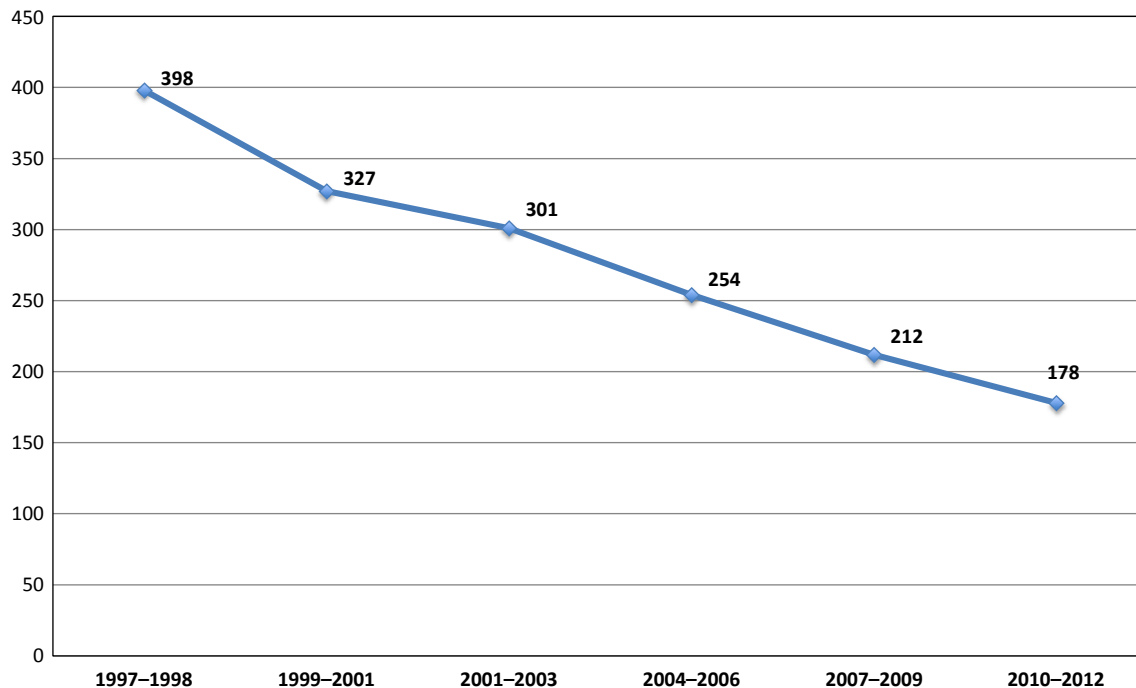


Figure 1. Maternal mortality ratio in India (1997-2012).

of Medical Sciences, AVNI Health Foundation, development partners (United Nations Population Fund, United Nations Children's Fund, World Health Organization) and other key stakeholders including: National Neonatological Forum; Society of Midwives of India; Indian Nursing Council; Indian Association of Paediatrics; State government representatives of Karnataka, Haryana, Tamilnadu, West Bengal, Madhya Pradesh, Andhra Pradesh; National Health Systems Resource Centre and National Institute of Health and Family Welfare. The NTG also included representatives from the six medical colleges where the pilot was being implemented.

MNM pilot implementation process in India

The MNM pilot programme was implemented in ten phases spread over a period of 16 months during 2012/13 (Table 1).

A comprehensive MNM definition and criteria that were felt to be suitable for the Indian setting were agreed by the NTG.

It was agreed that an MNM would be defined as 'a woman who survives life-threatening conditions during pregnancy, termination of pregnancy, childbirth or within 42 days of pregnancy termination, irrespective of receiving emergency medical/surgical interventions or otherwise.'

Taking into consideration all the reviewed literature, as well as pregnancy disorders, symptoms, signs, laboratory investigations and management interventions, a new comprehensive list of criteria was developed by the Indian NTG

for use to identify an MNM (<http://www.avnihealth.org/images/whatsnew/criteriafinalmodifiedaftercommentsab.pdf>). To identify cases of MNM, criteria were divided into four broad sections with adverse events under each section to facilitate identification and tabulation of causes leading to an MNM. The four sections and adverse events were: (i) Pregnancy-specific disorders (haemorrhage, sepsis, hypertension); (ii) Pre-existing disorders aggravated during pregnancy (anaemia, respiratory dysfunction, cardiac dysfunction, hepatic dysfunction, endocrinal disorders (diabetic ketoacidosis, thyroid crisis), neurological dysfunction, renal dysfunction/failure); (iii) Pregnancy-specific medical disorders (liver dysfunction/failure, cardiac dysfunction/failure); and (iv) Incidental and accidental causes of maternal death that could have occurred in pregnancy (accident/assault/surgical problems, anaphylaxis, infections, embolism and infarction).

Within each section and under each adverse event a detailed list of disorders, conditions or complications, clinical findings (symptoms and signs), results of investigations and interventions were listed. The NTG agreed that for a case to be listed as an MNM it should meet a minimum of three criteria in each section, one each from: (i) clinical findings (either symptoms or signs); (ii) investigations carried out; and (iii) interventions carried out to manage the case *or* any single criteria which signifies cardiorespiratory collapse.

Each institution included in the pilot programme identified a team comprising obstetrician/gynaecologists who

Table 1. Description of activities completed in each phase

| Phase | Activities |
|-------|--|
| I | Identification of key technical partners for design, development and programme management. |
| II | Desk research, through which secondary information and experiences related to near-miss audit from across the world as well as in India were collected for reference and for building a case for implementation of MNM in India. |
| III | The NTG was constituted with all program partners. |
| IV | The NTG met and agreed a draft policy framework, case definitions and criteria for the identification of a maternal near-miss and agreed tools to be used for reporting during the pilot phase. |
| V | Pilot testing: Six medical colleges across India were involved in using the definitions/criteria/tools and reported their findings. As an additional support during this phase, one NTG member visited each of the centres for guidance and mentoring. |
| VI | A mid-term review of the programme was carried out at the end of 3 months. The NTG reviewed the reports and suggested changes to the definition/criteria/tools, which were then implemented. |
| VII | The revised policy framework, definition, criteria for case selection, and tools for reporting were used by the six medical colleges. |
| VIII | Data entry, cleaning, quality checks and data analysis. |
| IX | NTG met for the third time and reviewed the final report. They agreed on the final policy framework to be given to the Government of India for its release as a national policy for implementation. |
| X | Report preparation, submission for release of the MNM policy framework, definitions, criteria, and tools, design and development of MNM software. |

were on duty at any given point in time. When a case of MNM arrived in the institution, this team attended to the woman, one member of the team was assigned the duty of filling in the MNM tool for recording and reporting the MNM case. The unit head and the head of the department reviewed the MNM case using the tools developed and sent this information to two experts leading the implementation process. After review, the two experts would discuss the MNM case with the pilot institution in terms of the classification of the case, and after discussion, if the agreed criteria were met, the case was accepted and included for analysis.

Results of the pilot study

A total of 264 cases of MNM were reported and these represent 0.96% of a total of 27 433 deliveries at the participating institutions. Of the 264 cases identified, 169 (64%) of the women were between 20 and 29 years of age (Figure 2), 111 (42.0%) were admitted with severe morbidity,

103 (39.0%) were referred with severe morbidity (Figure 3). Of these, 30 (all from the 103 referrals; 11.4%) came from private hospitals, 73 (27.6%) from public hospitals and the rest had reported directly from home. When admitted to the institution, most of the women were admitted during pregnancy (Figure 4). The average reported time from onset of illness to admission was 48.4 hours.

Women were admitted to the facilities with multiple disorders (355 disorders were diagnosed in the 264 MNM cases), haemorrhage was the leading cause of MNM (Figure 5). Of the women with hypertensive disorders, 70% (49/70) had eclampsia and 30% (21/70) had severe pre-eclampsia. A detailed break-down of women with haemorrhage showed that most of the critically ill women with haemorrhage were in the postpartum phase (37%), 24% occurred in late pregnancy, 16% were associated with ruptured uterus, 19% occurred in early pregnancy and 4% were intrapartum.

A total of 488 interventions were performed; 24.6% (65/264) of the women required immediate resuscitation and 11.7% (31/264) required mechanical ventilation. In 10.2% (27/264) of them uterine evacuation was undertaken, 18.2% (48/264) underwent laparotomy for intractable postpartum haemorrhage, ruptured uterus or ectopic pregnancy, 14.8% (39/264) had hysterectomy, 4.9% (13/264) had repair of major genital injuries, 1.1% (3/264) had manual removal of placenta, 0.8% (2/264) had repositioning of an inverted uterus, 1.5% (4/264) had internal iliac ligation, and 51.9% (137/264) of women underwent other interventions including version, cervical and vaginal tear repair, or drainage of vulval or broad ligament haematoma. A total of 86% (227/264) of women received blood transfusions (223 whole blood/packed cell/sedimented cells, 122 fresh frozen plasma, 12 platelets and for two women the details were not available).

Lack of antenatal care was noted in 30.7% (81/264) of all MNM cases. Timely referral was a problem in 26.5% (70/264): referral was either delayed or was not done properly, e.g. no one accompanied the woman.

Out of the 264 women in which the MNM tools were completed, 198 MNM tools had valid responses with regard to contributing factors. A total of 393 responses were registered because many women gave three or four responses for each of the options given in the tool. Delay in seeking treatment 60.6% (160/264) and lack of transport at 30.3% (80/264) were major contributory factors for MNM (Figure 6).

Observations and way forward

As a result of this programme, several points were highlighted:

- The number of MNM cases reported was high during the pilot. Data in the reports and case notes were complete

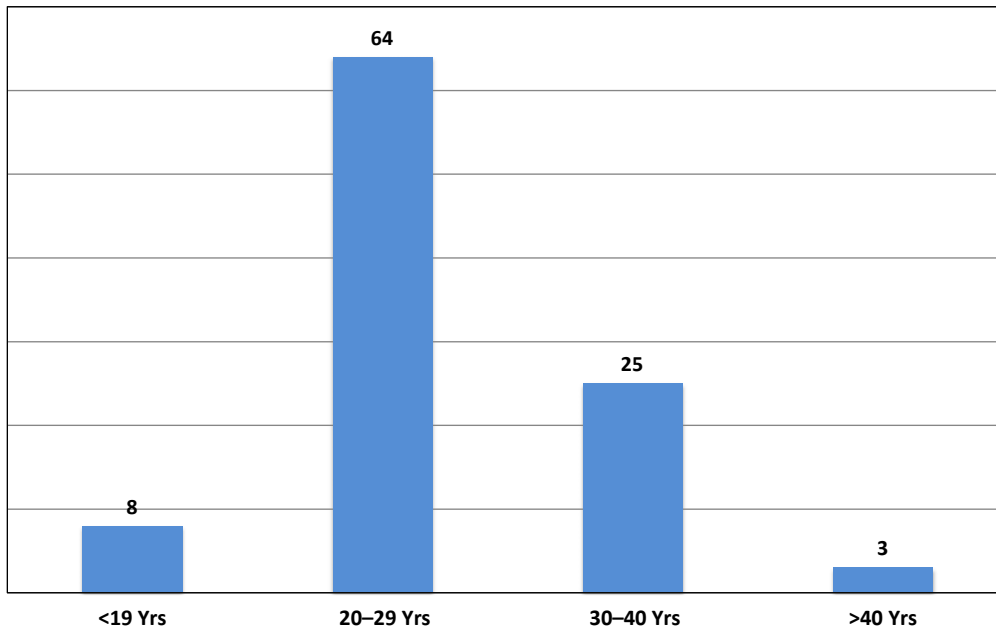


Figure 2. Age distribution of maternal near-miss cases identified ($n = 264$, % of total).

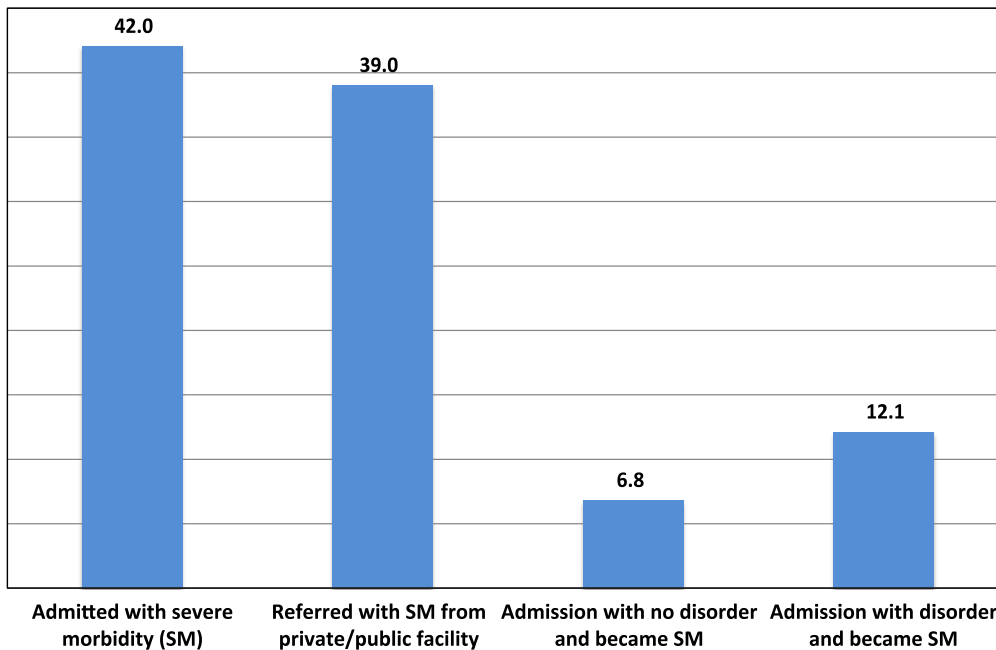


Figure 3. Characteristics of women identified to be a maternal near-miss ($n = 264$, % of total).

in the majority of women. MNM reporting was not considered as 'threatening'. MNM can yield information critical to improving quality of care.

- Building the skills of healthcare providers in procedures such as repair of cervical and vaginal tears, resuscitation of adults and babies, medical and surgical management of postpartum haemorrhage, B-lynch suture to manage atonic postpartum haemorrhage, stepwise devascularisa-

tion and internal iliac artery ligation and peripartum hysterectomy as well as the management of sepsis and hypertensive disorders of pregnancy remain important.

- More work needs to be done to educate women and their families regarding birth preparedness and complication readiness because 'Type 1 delay' was noted to be associated with severe maternal morbidity in many cases. Prevention and timely treatment of anaemia must receive

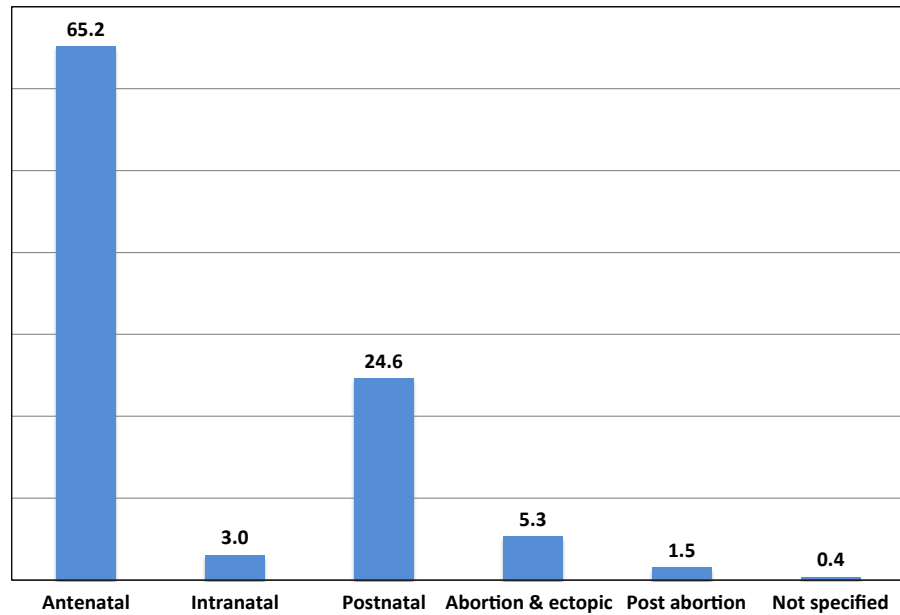


Figure 4. Time of pregnancy for women identified as a maternal near-miss ($n = 264$, % of total).

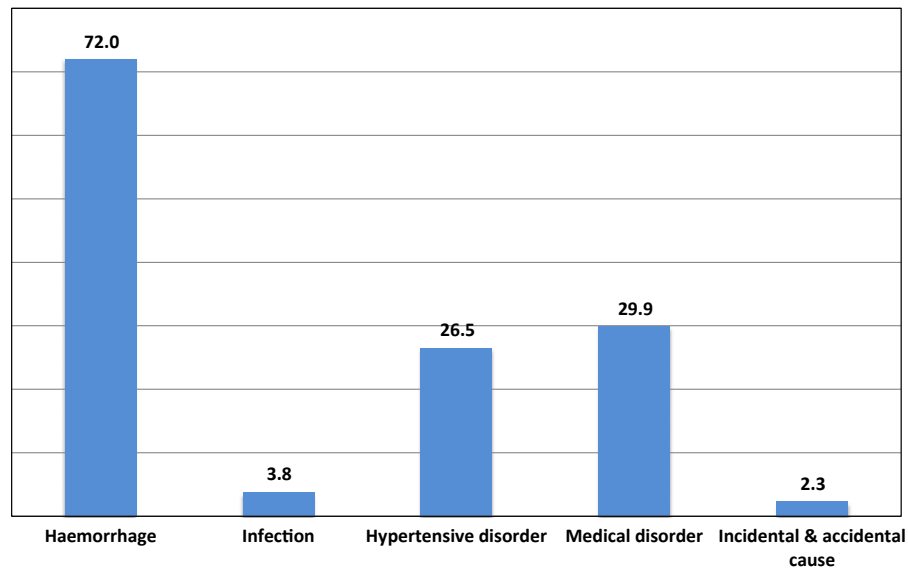


Figure 5. Underlying illness identified as cause of maternal near-miss ($n = 264$, % of total).

more attention to reduce the risk of mortality from obstetric haemorrhage.

- The tools developed currently capture the location and facility details and can help to identify where an MNM case has come from when referred to a higher level health facility. A database of all such locations for any particular setting can help to focus interventions in a particular location, e.g. if the majority of MNM cases came from a particular block or district and are associated with anaemia in pregnancy, this block or district

can be identified for priority attention for improving the quality of antenatal care including ensuring iron and folic acid are available and distributed. The introduction of maps or geographic information system to identify any such problem locations and monitor the progress of interventions put in place over time will be of additional value.

- MNM Data Management software linked to the Mother and Child Tracking System and Maternal Death Review software introduced in India has been developed. As a

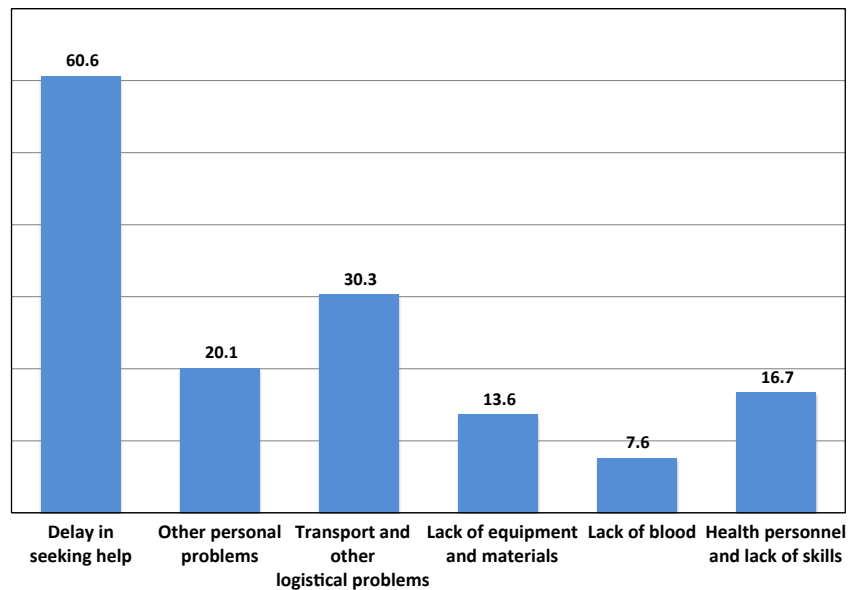


Figure 6. Factors contributing to cases of maternal near-miss ($n = 264$, % of cases per factor).

large set of data will still be captured on paper in India, analysis of data for surveillance, interventions and corrective action will be a challenge. A computer-based program to compile the data, carry out analysis and generate reports for action has been developed and can be used as soon as MNM review is launched nationally in India. States and Districts will be able to access the reports directly, enabling data sharing, which is more difficult with paper-based reports.

- As the majority of MNM are attended to at the tertiary facility level and MNM reporting is less difficult in these settings, the focus of MNM implementation will likely initially be at the tertiary level (Medical Colleges/District Hospital converted to Medical Colleges/Hospitals attached to Medical Colleges), then using the Medical College experience and teams, MNM audit can subsequently be scaled up to the District Hospital level.

Using the information collected in this pilot programme, a report on the benefits of MNM review and the need to implement MNM review across India was prepared and submitted to the Government of India in October 2013 along with the MNM policy framework. The final MNM definition, criteria for identifying MNM cases, tools for recording and reporting the data, a training plan for scale-up, the implementation process and flow of information, its review and actions to be taken were included as part of the submission. (http://avnihealth.org/index.php?option=com_content&view=article&id=4&Itemid=26).

Disclosure of interests

No conflict of interests are declared by the authors and co-authors.

Contribution to authorship

CP contributed to conception, planning, technical guidance and leadership for carrying out and reviewing the work. AB contributed to conception, planning, programmatic guidance and management, analysing, writing and editing the article. MM and HB contributed to conception, technical and administrative guidance and editing the article. SC and PS contributed to conception, planning, carrying out, analysing and editing the article. PKS contributed to conception and technical guidance, and ST contributed to the planning, carrying out, analysing and editing of the article.

Details of ethics approval

We are submitting a case study, based on the reports collected at the six medical colleges.

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