

BMJ Open Practice of death surveillance and response for maternal, newborn and child health: a framework and application to a South African health district

Fidele Kanyimbu Mukinda ¹, Asha George,¹ Sara Van Belle,² Helen Schneider³

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¹School of Public Health, University of the Western Cape, Faculty of Community and Health Sciences, Cape Town, South Africa

²Department of Public Health, Institute of Tropical Medicine, Antwerp, Belgium

³School of Public Health, South African Medical Research Council (MRC)/Health Services and Systems Unit, Cape Town, South Africa

Correspondence to

Dr Fidele Kanyimbu Mukinda; fmukinda@uwc.ac.za

ABSTRACT

Objective To assess the functioning of maternal, perinatal, neonatal and child death surveillance and response (DSR) mechanisms at a health district level.

Design A framework of elements covering analysis of causes of death, and processes of review and response was developed and applied to the smallest unit of coordination (subdistrict) to evaluate DSR functioning. The evaluation design was a descriptive qualitative case study, based on observations of DSR practices and interviews.

Setting Rural South African health district (subdistricts and district office).

Participants A purposive sample of 45 front-line health managers and providers involved with maternal, perinatal, neonatal and child DSR. The DSR mechanisms reviewed included a system of real-time death reporting (24 hours) and review (48 hours), a nationally mandated confidential enquiry into maternal death and regular facility and subdistrict mortality audit and response processes.

Primary outcome measures Functioning of maternal, perinatal, neonatal and child DSR.

Results While DSR mechanisms were integrated into the organisational routines of the district, their functioning varied across subdistricts and between forms of DSR. Some forms of DSR, notably those involving maternal deaths, with external reporting and accounting, were more likely to trigger reactive fault-finding and sanctioning than other forms, which were more proactive in supporting evidence-based actions to prevent future deaths. These actions occurred at provider and system level, and to a limited extent, in communities.

Conclusions This study provides an empirical example of the everyday practice of DSR mechanisms at a district level. It assesses such practice based on a framework of elements and enabling organisational processes that may be of value in similar settings elsewhere.

INTRODUCTION

The United Nations (UN) put accountability for maternal, newborn and child health (MNCH) on the global agenda, placing three interrelated accountability processes at the centre of its ‘Global Accountability

Strengths and limitations of this study

- This paper puts forward a framework of elements for evaluating the functioning of maternal, newborn and child (MNC) death surveillance and response (DSR) at the district level.
- The functioning of DSR mechanisms in a South African district that had benefitted from DSR strengthening interventions was evaluated using the framework.
- Field observations of MNC DSR processes and interviews with front-line providers and managers were conducted.
- The framework was applied to one rural district that had developed functioning DSR practices; it needs to be further tested and validated in other contexts.
- The framework and appraisal methods may be of value in similar settings elsewhere.

Framework’, namely, monitoring, reviewing and response.¹ Death surveillance and response (DSR) has become one of the means to operationalise these accountability processes in many health systems, with the view to improving the quality of maternal, neonatal and child healthcare, and eliminate preventable deaths.^{2–5}

DSR entails a continuous cycle of identification, notification and review of deaths, followed by action to improve the quality of care and prevent future deaths.⁶ Its essence is, therefore, the capacity to record, review and respond to each death using affordable, effective and evidence-based actions linked to the findings.⁵

There is now a well-established tradition of DSR in low-income and middle-income countries (LMICs), focusing primarily on maternal deaths.^{2 4 6–10} In facilities and contexts where maternal deaths are relatively rare, maternal ‘near-miss’ cases may

also be audited.⁵ More recently, LMICs have begun including the review of perinatal and neonatal deaths into DSR systems, referred to as maternal and perinatal DSR (MPDSR)^{11–13}; and in some settings, DSR extends to under-5 deaths.^{14–16}

In addition to facility-based processes, community-based DSR is recommended where a high proportion of deliveries (and deaths) occur outside of health facilities, and where community participation is crucial to implementing identified key actions.^{5 11} In this regard, verbal and social autopsies have been developed as a participatory tool for community-based DSR, exploring clinical and social causes of death from a community perspective.^{17–19}

DSR processes are typically defined nationally but implemented at facility level with support from and coordination by local or district teams.^{20 21} Although there are no globally standardised approaches,⁴ the literature points to several elements underpinning effective DSR processes, encompassing analysis of modifiable factors involved, the tone of the review process and the range of participants involved.

The analysis of modifiable factors underlying maternal and child deaths has been codified into the ‘three delays’ model of care-seeking and utilisation: (1) the delay in deciding to seek care early; (2) the delay in reaching a health facility; (3) the delay in providing or receiving adequate care at the facility.^{6 22–25}

In formulating a response, the literature on DSR recommends moving away from identifying and sanctioning individuals,²⁶ and towards the setting up of non-punitive ‘no-blaming’ approaches that foster collective and individual participation.^{2 20} Such approaches are less likely to result in ignoring the incident or the temptation to defer responsibility onto others.^{2 3 5}

DSR processes ideally involve a multidisciplinary team with the representation of a range of clinicians (nursing, medical and other professionals), managers and support staff (such as information officers). This brings together the array of provider knowledge and skills, together with commitments from managers to enhance ownership of the findings and turn recommendations into concrete actions.^{2 5 6}

South Africa has a long-standing history, going back to the mid-1990s, of maternal, newborn and child DSR that has become integrated into the routine functioning of front-line health services. DSR processes are linked to three ministerial committees established in 1998, namely the National Committee for Confidential Enquiry into Maternal Deaths,²⁷ the National Perinatal and Neonatal Morbidity and Mortality Committee²⁸ and the Committee on Morbidity and Mortality in Children under 5 years (CoMMiC).²⁹ These committees function at national level with mandates exercised at local (health district) level through three of the DSR processes, namely, the Confidential Enquiry into Maternal Death (CEMD), the Perinatal Problem Identification Programmes (PPIP) and the Child under-5 Problem Identification Programmes (CHIP). These mechanisms are situated in a dense and

complex accountability ecosystem at the front line of health provision.³⁰

There have been significant reductions in maternal, neonatal and child mortality in South Africa over the last decade, attributed principally to the prevention and treatment of HIV.³¹ However, despite a long history and institutionalised practice, there is little understanding of the role of DSR implementation and functioning in this mortality reduction. Clear guidance on how best to assess this functioning is also lacking; one study showed no association between consistent auditing and perinatal mortality rates.³²

Given the lack of standardisation and consensus on elements for assessing the functioning of DSR, this paper proposes an assessment framework using criteria drawn from the literature and then applies the framework to evaluate existing maternal, peri/neonatal and child DSR mechanisms in one South African district.

This paper thus seeks to answer the following question: Based on a comprehensive assessment framework, how functional are the district’s DSR mechanisms?

METHODOLOGY

Definitions

In this paper, the term DSR refers to all death reporting and review processes related to maternal and child health, even if they do not have all the ideal components of DSR. They include phenomena commonly reported in the literature such as maternal death review (MDR) or audit, maternal death surveillance and response, MPDSR, or surveillance and review of child deaths.

Conceptual framework

A framework to assess the functioning of DSR mechanisms was developed using criteria drawn from the literature and supplemented by field observations and interviews with front-line providers and managers.

We conducted a search of the literature using the above terms and consulted with experts in the field to identify the elements of well-functioning DSR. On the basis of these, a conceptual framework was developed. We combined the WHO Continuous Action Framework to eliminate preventable deaths,⁶ the ‘Three Delays’ framework,²² and other elements identified in the literature^{2 4 6 20} to assess the DSR processes. These are outlined in [tables 1 and 2](#). The framework distinguishes between (1) the surveillance process (what, how, who); (2) the identification of modifiable causes of death and investigation as per the three delays model and (3) the types of responses (actions) triggered, whether proactive or reactive. These elements provide a holistic and comprehensive assessment of the various steps and processes involved in DSR. Given that mortality reductions require coordination across levels,³³ the framework adopts an area-based approach, using the most decentralised structures of in health systems coordination, notably the subdistrict, as its unit of analysis.

Table 1 WHO's four components of continuous action in maternal death surveillance and response system

Identify and notify deaths	Identification and notification on an ongoing basis: Identification of suspected maternal deaths in facilities (maternity and other wards), followed by immediate notification (within 24 and 48 hours, respectively) to the appropriate authorities.
Review maternal deaths	Review of maternal deaths by local maternal death review committees: Examination of medical and non-medical contributing factors that led to the death, assessment of avoidability and development of recommendations for preventing future deaths, and immediate implementation of pertinent recommendations.
Analyse and make recommendations	Analysis and interpretation of aggregated findings from reviews: Reviews are made at the district level and reported to the national level; priority recommendations for national action are made based on the aggregated data.
Respond and monitor response	Respond and monitor response: Implement recommendations made by the review committee and those based on aggregated data analyses. Actions can address problems at the community, facility or multisectoral level. Monitor and ensure that the recommended actions are being adequately implemented.

Study design

We conducted a descriptive, exploratory qualitative case study of the forms and functioning of maternal, neonatal and child DSR processes applying the framework (table 2).

Study setting

The study was conducted in one of the three health districts in Mpumalanga Province situated in the North-east of South Africa. The district has a population of about 1.1 million, with the vast majority (61%) living in rural areas.³⁴ It contains 1 regional hospital, 8 district hospitals and 76 primary healthcare facilities, distributed among 7 subdistricts.

The study district was targeted for health systems strengthening support because of high maternal and child mortality.³⁵ Intensified efforts were specifically made to strengthen DSR in the district over several years, building on long-standing processes (24-hour reporting, CEMD and PPIP, CHIP). Besides these, DSR processes were accompanied by improved district clinical support with the introduction of district clinical specialist teams (DCST) and a new mechanism of coordination, referred to as the monitoring and response unit (MRU). These initiatives were widely regarded as having impacted positively on maternal and child mortality in the district.³⁶ In these respects, therefore, the district could be regarded as

Table 2 Framework for the functioning of maternal, neonatal and child death surveillance and response (DSR)

I. Surveillance process (What and How?) ^{2 4-6}			
Elements of effective maternal, neonatal and child death surveillance and response ^{2 4-6}	1. Continuous surveillance (full cycle) integrating death auditing, review, communication and feedback mechanism (identify and notify; review, analyse and make recommendations; respond and monitor response)		
	2. Recommending cost-effective and evidence-based practices		
	3. 'No naming, no blaming' (confidentiality, non-punitive tone of the process)		
	4. Integrating learning and response from DSR into continuing professional development, quality improvement, health system strengthening and community education		
	5. Institutional support culture at all levels of the health system (management)		
	Actor participation (Who?) ^{6 55}		
	6. Driven by multidisciplinary teams (clinical, support, managerial)		
	7. Integration across levels from PHC facilities to hospitals, districts and higher levels		
	8. Involvement and commitment of the managers to act on the findings		
9. Community participation in review and response (social and verbal autopsies)			
II. Following a holistic approach to identifying modifiable causes			
'Three delays' ²³	First delay in deciding and seeking Care	Second delay in identifying and reaching a health facility	Third delay in receiving adequate appropriate care
III. Actions (proactive and reactive)			
Provider level	Capacity building, in-service training		
System level	Health system improvement, provision of resources		
Community level	Community education		

**Table 3** Death surveillance and response mechanisms—purpose, frequency and target

Observed mechanisms	Purpose	Frequency	Target				Participants
			Maternal	Perinatal	Neonatal	Child <5	
24-hour reporting, 48-hour review	Specific to MNCH; compulsory Death notification	Linked to death event	✓	✓	✓	✓	Facility; Patient Safety committee (subdistrict and district)
Confidential enquiry into maternal death	Specific to MNCH; quality assurance; Compliance	Linked to death event	✓				National, province, district, hospital
Perinatal problem identification programme	Specific to MNCH; clinical; includes perinatal and maternal death audit; quality assurance	Monthly	✓	✓	✓		District, hospital, PHC facilities
Child under-5 problem identification programme	Specific to MNCH; clinical; audit; quality assurance	Monthly				✓	District, hospital, PHC facilities
Monitoring and response unit	Specific to MNCH; managerial; multidisciplinary	Monthly/bimonthly	✓	✓	✓	✓	District, hospital, PHC facilities
Morbidity and mortality	General (not specific to MNCH)	Monthly	✓	✓	✓	✓	Hospital
Clinical audit/clinical governance	General (not specific to MNCH)	Monthly	✓	✓	✓	✓	District, hospital, PHC facilities

MNCH, maternal, newborn and child health.

having relatively well-functioning DSR at the time of the research. Although not nationally representative, it was nevertheless well suited for the qualitative exploration of functioning using a DSR assessment framework.

The framework was applied to maternal, peri/neonatal and child DSR mechanisms observed in the district, summarised in [table 3](#) and described in the next section. Five mechanisms were specific to MNCH (24-hour Reporting and 48-hour Review, CEMD, PPIP, CHIP, MRU). An additional two, which also dealt with maternal, neonatal and child deaths, the morbidity and mortality, and clinical audit/clinical governance meetings, were general facility-based morbidity and mortality and clinical audit/governance mechanisms.

Maternal, neonatal and child DSR mechanisms in the study setting

This section briefly describes DSR mechanisms that are specific to MNCH.

Compulsory 24-hour reporting, 48-hour review

Any maternal, perinatal, neonatal or child death is mandatorily recorded at the facility where the death occurred and reported within 24 hours internally to the district office, and externally to the Department of Home Affairs for issuing of a death certificate. This is the standard operating procedure applied in all facilities in South Africa. In

the study district, following the introduction of the MRU and the DCST, a district-level system was also established to review all maternal and under-5 child deaths within 48 hours, independent of other processes. This process of 24-hour recording and reporting and 48-hour case review was referred to as 'real-time death reporting'³⁷; and its purpose was to enable actions to be taken as quickly as possible to address modifiable factors, such as correcting a skills or staffing gap, provision of resources or community education.

Confidential enquiry into maternal death

The CEMD was introduced in South Africa in 1997 and involves a standardised process of reporting and auditing. Maternal deaths, in addition to being reported to the district and Home Affairs, are also reported to the provincial MNCH coordinator within 24 hours, who allocates a unique number. A copy of the patient folder and a completed Maternal Death Notification Form are included in the report and submitted to a team of provincial assessors (obstetrician, medical officer, midwife and anaesthetist). Assessors will go to the facility to enquire about the causes of death, as well as any avoidable or modifiable factors. The resulting annual and triennial reports and recommendations (without details on individual cases) are disseminated to provincial and district

structures and academic institutions for collation with general recommendations for action, such as training on the Essential Steps in the Management of Obstetric Emergencies.^{38–40}

Ongoing review and response structures

As indicated, several routine meeting structures are established for auditing and responding to maternal, perinatal/neonatal and child deaths (table 3).

Perinatal/child problem identification programme

The PPIP/CHIP review meetings take place monthly at facility level. The meeting consists of systematically auditing the patient file related to death, comparing the management of the case against standard treatment protocols and guidelines. Through discussion, participants identify gaps in clinical management and modifiable factors related to the caregiver, provider or system and set up improvement plans, including capacity-building needs for the provider team. Data are entered into a specifically designed software package. The meetings observed were chaired by the clinical manager or the medical officer in charge of obstetrics and gynaecology, or by a nurse operational manager of the maternity ward.

Monitoring and response unit

The MRU brings together a team of actors, including managers (PHC, hospital), clinicians, information officers at subdistrict and district levels, associated with the system of local, real-time death reporting referred to above. The aim is to enhance the governance of MNCH and to improve area-based coordination between the various actors and levels of care. MRU meetings are intended to be convened monthly at subdistrict and bimonthly at district level. At district level, the meetings observed were chaired by the district manager or a representative, usually, the MNCH coordinator or the district quality assurance manager, while at subdistrict level, the MRU meeting was chaired by the chief executive officer (CEO) of the district hospital or a representative.

Study sample and data collection

The subdistricts were purposefully selected in a prior study as representing the range of buy-in to one particular DSR strategy (MRU)³³; the implementation of DSR mechanisms in these subdistricts was also perceived by district managers as representative of what was happening in the district as a whole. We combined semistructured interviews, non-participant observation of meetings with a desk review of key documents as data sources for this study.

Semistructured interviews

We conducted 45 semistructured, individual interviews with purposefully selected respondents among those involved with maternal, neonatal and child DSR from two of the seven subdistricts and the district office. Respondents were either members of the enquiry or audit team or participants in one of the DSR meetings (MRU, PPIP,

CHIP). Participants consisted of district programme managers (N=10) and members of the DCST (N=3), hospital hospital CEOs (N=2), hospital nursing managers (N=4), facility and hospital operational managers (professional nurses heading a ward in a hospital or managing a primary healthcare facility (N=5), medical officers (N=7), professional nurses (N=3), allied health professionals (N=5), emergency service manager (N=1) and facility information managers (N=2). A semistructured interview guide was developed and pretested (online supplemental appendix 1).

Interviews were conducted by the first author as part of a wider study. To ensure privacy and confidentiality, interviews were held in the respondent's office or in the boardroom outside the meeting time. With respondents' signed consent and permission, the interviews were audiotaped and transcribed verbatim. The interviewer took notes during and after the interview and summarised the interview on a predesigned coversheet.³⁰ All audio files and transcripts were reviewed by the authors to ensure quality.

Non-participant observation

From May 2018 to September 2019, for a total 59 days distributed over 1–3 weeks in each of the two subdistricts, we conducted non-participant field observations by engaging in various activities and meetings related to maternal, peri/neonatal and child DSR in which health system actors were actively engaged. A structured observation sheet was designed for this purpose.³⁰ We observed the following meetings: PPIP and CHIP, MRU, morbidity and mortality, clinical audit, clinical governance and patient safety committee. During a meeting, apart from the general observation schedule, we specifically observed the structure of the meeting, standard agenda, actors involved, presentation and discussion of cases, decision process and related actions (capacity building, provision of resources or community engagement). We also reviewed the agendas and minutes of these meetings.

During this fieldwork, three maternal deaths occurred in the district and we were able to observe one formal district meeting and engage in informal discussions with district actors on the unfolding maternal death enquiry process linked to these three deaths.

Data management and analysis

Interview recordings were transcribed verbatim, and observation and reflection notes compiled by the first author (PhD student). All data were coded using Atlas.ti version 8, and a thematic analysis was used to analyse the data.⁴¹ Key themes were identified following both a deductive approach based on a preset list of themes from the criteria of DSR functioning and inductively wherever new insights were identified.⁴² Details of the analysis process are reported elsewhere.⁴³ The themes were grouped into two main categories, namely, (1) the forms and (2) the functioning of DSR. Finally, the findings were presented to respondents in various meetings or individual meetings to verify and validate the results.

Table 4 Summary of the functioning of DSR mechanism in practice

DSR mechanisms						
	24-hour reporting, 48-hour review	Confidential enquiry into maternal death	Perinatal/child under-5 problem identification programme	Monitoring and response unit	Morbidity and mortality	Clinical audit/clinical governance
Functioning in practice (What/How?)	Reporting and Auditing	Naming; obligation to inform and explain actions and decision taken;	'No naming, no blaming'	'No naming, no blaming'	'No naming, no blaming', auditing and quality assurance	'No naming, no blaming', auditing and quality assurance
Actors involved (Who?)	National, province, district, hospital	Facility (PHC, hospital)	Clinical (district, hospital, PHC)	Managers, clinical and non-clinical (district, hospital, PHC)	Clinical (hospital)	Clinical (district, hospital, PHC)
Actions (proactive and reactive)		Reactive; possibility of imposing sanction; targeting individual; institutional training	Proactive; taking collective responsibility; capacity building; system improvement	Proactive; taking collective responsibility, in-service training; system improvement and community education	Proactive; in-service training	Proactive, in-service training

DSR, death surveillance and response.

Positionality, reflexivity and ethics considerations

Interviews and participant observation can face ethical challenges given the sensitive nature of a research topic that can potentially expose hidden realities.⁴⁴ The conduct of this study was facilitated by our previous engagements in the study setting, and subsequently as part of the first author's PhD study. These involved a period of immersion and observation, which allowed for the building of trust with participants, and to be able to contextualise and interpret the interviews and observations. To minimise descriptive and interpretive biases, regular feedback and discussion of the findings were conducted during the follow-up meetings in the district; and iterative processes engaged between the first author (PhD student) and the coauthors (PhD supervisors) involving continuous questioning of the understanding of data and reviewing of findings.

All interviews proceeded with signed informed consent.

Patient and public involvement

Patients or the public were not involved in the design, conduct, reporting or dissemination plans of this study.

RESULTS

Functioning of maternal, neonatal and child DSR mechanisms

Tables 4 and 5 present an application of the framework and a descriptive summary of the functioning of each of the DSR mechanisms observed in practice. We report on the overall functioning of DSR, drawing across all the forms of DSR observed and the views expressed by the

respondents about them. We present key themes that emerged as critical from the elements outlined in table 2.

Surveillance and reporting process

Continuous surveillance cycle and evidence-based practices

All DSR mechanisms followed a structured approach to DSR, integrating recording and reporting of death, reviewing and classifying causes and making recommendations for actions based on established guidelines for MNCH. The MRU was most explicit in emphasising the completion of the surveillance cycle in its '4R's' approach that is, 'Report, Review, Record, Respond' to a maternal or child death.

The 'no-name, no-blame' approach

From our observations and the respondents' views, the perinatal and child (PIIP/CHIP) and the MRU meetings were the most likely to promote the 'no-name, no-blame' approach. The chairperson of the meeting ensured that confidentiality was maintained throughout and that no one was blamed for the occurrence of the adverse event. Otherwise, respondents noted that the meeting could be transformed into a 'punishment exercise' that would discourage actors' participation:

...The perinatal meeting itself is not making anybody accountable. The meeting itself is about discussing things, it is not to point to individuals, because it's going to be discouraging for the people [to attend] if it's a punishment exercise... (DCST).

Table 5 Functioning of DSR mechanism compared with elements from the literature

DSR mechanisms						
	24-hour reporting, 48-hour review	Confidential enquiry into maternal death	Perinatal/child under-5 problem identification programme	Monitoring and response unit	Morbidity and mortality	Clinical audit/clinical governance
I. Surveillance process (What and How?)						
Matching to the elements for the functioning of DSR mechanisms	✓	✓	✓	✓	✓	✓
1. Continuous surveillance (Death auditing, review, communication and feedback)	✓	✓	✓	✓	✓	✓
2. Using cost-effective and evidence-based practices	✓	✓	✓	✓	✓	✓
3. No naming, no-blaming (confidentiality, non-punitive tone of the process)	✓	✓	✓	✓	✓	✓
4. Integrating learning and response, quality improvement, health system strengthening, and community education	✓	✓	✓	✓	✓	✓
5. Institutional support culture at all levels of the health system	✓	✓	✓	✓	✓	✓
Actors (Who?)						
6. Multidisciplinary teams			✓	✓	✓	✓
7. Integration across levels of care			✓	✓	✓	✓
8. Involvement and commitment of the managers to act on the findings			✓	✓	✓	✓
9. Community participation in review and response			✓	✓	✓	✓
II. Following a holistic approach to identifying modifiable causes						
Following a holistic approach to identifying modifiable causes	✓		✓	✓		
III. Actions (proactive and reactive)						
-Provider level	✓	✓	✓	✓	✓	✓
-System level		✓	✓	✓	✓	
-Community level					✓	

The tick (✓) implies that the element of the functioning was observed for the selected mechanism. DSR, death surveillance and response.

This ‘no-name, no-blame’ approach fostered a high level of commitment to the review meetings that resulted in a common understanding of individual and system challenges faced. It also fostered mutual support when people were proactively working as a team.

Before there was blaming, blaming, blaming [...] No-one is blaming anyone anymore because we do understand the challenges, we are part of the system, we are in the [same] basket [EMS manager].

Even though the meetings were never used to point fingers, or name or blame providers involved in the management of the case, the respondents raised the possibility of sanction if at any stage gross negligence was documented.

...We are taking every death very seriously. One death is too many deaths, we have to make sure that we follow up on our kids and also on our health care workers [at PHC] the entry point where the neonatal was first attended so that we can check on whether the child was attended according to protocol and if not then consequential management needs to be applied [Hospital CEO].

Policy documents formally claim that the CEMD also follows a ‘no-name, no-blame’ approach. However, based on interviews and observations in practice, the CEMD process in the study district was conducted and experienced very differently to the other DSR mechanisms. The CEMD process typically resulted in intense scrutiny of maternal death from higher-level management within the district and beyond, seeking to assign individual responsibility and frequently triggering reactive sanction and punitive action. Respondents reported suspensions, referrals to the labour office, litigations and court cases involving front-line professionals. This was one of the constraining factors of DSR functioning. These CEMD processes were managed through quality assurance structures (eg, adverse event committees) and were associated with a particular language of sanction—such as ‘consequence management’.

So the meetings that we usually have with the quality assurance and the maternity doctors and the sisters in charge [...] those [meetings] push us to be more accountable [...] it’s not like the perinatal meeting, [where] we don’t mention the doctors who did what, we just present the case. With those ones [quality assurance], it pushes you to be more accountable because the file is there, we all discuss what’s in the file. So, whoever was the attending doctor is more accountable, feels more accountable [Medical officer].

Integrating learning and institutional support from higher-level management

The DCST played a key role in providing clinical guidance, mentorship and in-service training related to modifiable factors identified in the DSR. The involvement of

a facilitator from the National Department of Health was also observed as one of the enabling factors in mobilising higher level management support, a factor unique to the study setting. By bringing together district and subdistrict actors, DSR meetings acted as a lever for more transparency between levels, in sharing frustrations and most especially the sharing of good practices.

I can say that [DSR meeting] is strengthening the communication between the sub-districts and the district and because of that I don’t see any problem that might hinder us to progress, because that is where we are sharing our frustrations and sharing our best practices [District programme manager].

Also important was the presence and commitment of key champions among middle managers and medical and nursing clinicians who created and nurtured a community of practice for sharing knowledge and learning.

In one subdistrict, participants expressed excitement at attending meetings, and the venues were sometimes overflowing with participants.

[I]: So why do you think that meeting is taken seriously?

[R]: *It’s the commitment of the medical managers, the commitment of the managers and also the operational managers in maternity wards and the doctors* [Manager, DO].

At these meetings, each step taken in the care pathway (from PHC to the referral hospital) was carefully scrutinised and improvement plans with timelines, monitoring and a responsible person were developed, facilitated by the involvement and commitment of the managers in the meeting:

Because when you put those quality [measures] you start from your ward, ...you put as well the responsible people because when you put some measures you need to monitor, to come and see if it’s working. And you need to give the timeline... you monitor if it’s going well, you sustain, if there is something you need to review or if it’s not going well [Clinical manager].

One of the key moments of the review meetings was to identify the modifiable causes of death and translating them into training and learning opportunities for front-line managers and providers, as well as system improvement and community education. The regular presence of DCST and programme managers in the review meetings created a sense of trust and space for empowering providers with knowledge and tools for better performance. Nurses were able to present cases and engage in discussions with doctors. In one instance, where a doctor was trying to dismiss a nurse’s opinion and impose his view during discussions, the DCST intervened and emphasised that everyone’s opinion counted.

The meeting is to highlight things, training, educational issues and to bring the people, the team together [DCST].

Another perceived core value of the DSR process was learning from the death events to come up with quality improvement strategies to prevent similar events in the future.

After we discuss we all come up with ... if I can say, opinions of what actually transpired or what could have happened for this baby to demise and what we could have done differently to help the baby. Maybe for the other babies who are coming in the near future who present the same way, what can we change to be able to help them [Medical Officer].

The learning and training were extended to primary healthcare facilities; minutes of the meetings and reminders of the guidelines were circulated; and regular visits to facilities were conducted by the district team, reinforcing what was shared in the meetings and allowing those who were absent from the meeting to be capacitated with needed skills.

DSR process institutionalised

DSR processes in this district were anchored into routines in all facilities, with standardised agendas and supportive supervision from the DCST and the MNCH district programme coordinators. The DSR processes were perceived not only to contribute to improving the quality of care and outcomes in facilities...

I think the perinatal meetings are there and they are there forever. It's like an auditing process, it's impossible to run maternity service without this [perinatal meeting] (DCST).

...but also to facilitate the integration of people and services

When we started MRU [...] we were blaming each other, but the more we discussed and saw how it fits, we feel now the problem is not within us, [but] with our resources [...] Now we feel we are part of the institution; before [MRU] we felt that EMS was not part of the hospital [EMS].

The perceived benefit and value of DSR processes, particularly the review and response meetings, were repeatedly emphasised by the respondents as a motivation to continue with and integrate them into the core activities of maternal and child in the district.

However, institutionalising appropriate DSR processes across all levels of the District was not an easy or completed task. DSR processes faced challenges at an individual level (blaming, sanctioning), institutional or service level (shortage of skilled personnel), or system levels (ineffective referral system). We also observed variations in the level of support and involvement of local leadership and primary healthcare facilities in DSR processes.

Actors: bringing together a multidisciplinary team of actors across levels

As indicated, DSR mechanisms were intended to be driven by a multidisciplinary team of actors including

medical, nursing and other professionals, and across levels (community, PHC and hospital). Indeed, a wide variety of actors participated in DSR processes, most prominently in the case of the CEMD, where in addition to the provincial assessors, the following actors from district and facility levels were involved: the district manager (or a representative), quality assurance manager, primary healthcare and hospital services manager, labour relations and corporate services, a member of the DCST, the hospital CEO, the nursing service and clinical managers, as well as the specific health providers directly involved in the maternal death.

Participants in the PPIP/CHIP review meetings tended to be hospital based clinicians with the support of district clinicians and, at times, primary healthcare managers; while the MRU meeting sought to expand participation to other stakeholders such as academic partners, non-governmental organisations, other government departments (notably the South African Social Security Agency) and community representatives.

In one particular subdistrict, the organisational culture and the leadership style of senior managers promoted collaboration between primary healthcare facilities and hospitals in DSR.

...we only receive the mother during the process of giving birth, and when the woman is now complicated with pre-eclampsia of which I think that this would have been prevented at the first place; so we are involving the primary health care level to come to the perinatal meetings so that they can hear exactly about the progress of the woman because, for us, as a hospital, we do not have the liberty of starting the woman on antenatal care, whereas the PHC are the ones who might have been able to pick up on some problems during the antenatal period. So, for them being involved in these perinatal meetings is quite vital [...] not coming is also is a transgression on its own [Hospital CEO].

In this subdistrict, where identified modifiable factors were related to the patient or community, hospital board chairpersons were contacted to facilitate the dialogues within the community and identify key actions together with the community leaders to address the identified problem. However, the community was not usually implicated directly in DSR processes.

It is important to note that this degree of functioning was not universal, and there was variation across facilities and subdistricts in the levels of team involvement, particularly of staff from PHC facilities and hospital actors. In instances where doctors and nurses, managers and providers, or PHC facilities and hospitals were not working as a solidified team, accountability mechanisms were flawed resulting in poor referral systems, 'blame games' and the deferring of responsibility in case of death events.

Excerpt 1 (From death surveillance and response meeting and discussion with respondents)*

Case 1: A pregnant patient who had never attended antenatal care presented to the hospital with severe complications and subsequently died. The main modifiable factor identified was the delay in deciding and seeking care.

Case 2: A young primigravida who was followed up since the early stage of the pregnancy, but died because of a failure to treat her high blood pressure. The modifiable factor identified was the delay in receiving adequate care.

Case 3: The patient was referred to a higher level hospital for a complication during labour, but the ambulance was delayed resulting in the death of the patient while still at the first level hospital. The modifiable factors identified were the lack of an effective referral system, adequate equipment and trained human resources.

Case 4: In a 'backstreet abortion', a patient was given misoprostol, used for medical termination of pregnancy. She developed complications and sought care at the hospital but could not be saved. One of the modifiable factors was that safe termination of pregnancy services were not sufficiently accessible.

*The 'three delays' approach was applied in the discussion of death cases to identify the modifiable factors associated with death events including patient or community factors (case 1), the provider (case 2) or the system (cases 3 and 4).

Following a holistic (three delays) approach to identifying and acting on modifiable factors

Review meetings were observed to follow the 'three delays' approach to identifying factors (especially modifiable factors—excerpt 1) associated with the occurrence of death events and to take collective responsibility and proactively setup key actions to prevent further events (tables 4 and 5). This was enabled by the presence of stakeholders across levels—from primary healthcare facilities to DCST and programme managers. Because of the managerial orientation of MRU, the three delays mostly focused on the system factors for action, while PPIP/CHIP meetings were clinically oriented towards provider and, to some extent, patient factors. In both cases, any matters related to community engagement were discussed with the board chairpersons to liaise with the community leadership.

Implementation of actions

Following the three delays model, the identified actions targeted the community (community education facilitated by the hospital board chairpersons and community leaders); the system (provision of resources); or the providers (skills building). Actions toward community were limited and only addressed by one DSR mechanism (MRU). We observed evidence of implementation of actions recommended from DSR processes which were perceived to result in improved MNCH outcomes. For instance, during the study period outreach training in surgical skills (caesarean section and anaesthesia) was organised by a provincial team of specialists; DCST members were actively involved in organising training and mentoring programmes; and the district paediatrician supported facilities to set up and ensure availability and functioning of the continuous positive airway pressure therapy machines for neonatal care.

DISCUSSION

While WHO guidelines outline the necessary steps in conducting DSR,⁶ there is little holistic guidance on how this is to be achieved in health systems. By collating elements from the literature into a conceptual

framework it was possible to explore the factors enabling or constraining DSR functioning in one district. This framework may be of value in other similar settings. It can be used by researchers or health service managers to explore the functioning of the DSR system, diagnose challenges and promote an inclusive organisational culture of holistic scrutiny into the causes of death.

Maternal, neonatal and child DSR is well established in the South African district health system. Across the five forms of DSR directly related to maternal and child deaths in the study district, we found a range of practices. The surveillance process routinely emphasised on the '4R's'. In most instances, the process followed the 'no name, no blame' approach as stipulated in the guiding documents. There were also holistic approaches to identifying causes of death, efforts to integrate training and support from higher levels, facilitation of multidisciplinary teams and elements of institutionalisation of DSR in the district. The latter requires a systemic supportive environment and organisational culture at all levels that are linked to annual planning and budgeting to support the implementation of evidence-based actions.⁴⁵ In this regard, the study District had clearly benefitted from the DSR system strengthening interventions implemented over a number of years.

In certain instances, however, the 'no name, no blame' approach was contradicted by an organisational culture of blame and punishment, particularly following maternal deaths. Here the emphasis was on identifying and sanctioning the persons responsible for death incidents and on curbing the institutional ramifications of the incident, instead of using it as an organisational learning event to prevent further incidents.⁴⁶ However, this level of scrutiny was not observed in instances of perinatal deaths, showing the difference between MPDSR processes. Such blame cultures in a healthcare organisation can be a source of an increased number of medical errors.⁴⁷

Death events, particularly maternal deaths, are considered to be a barometer of a health system's performance. In this regard, DSR processes can be constrained by the fear of revealing malpractice and poor health system performance, and DSR processes can become politicised and maternal deaths under-reported by bureaucrats unwilling to disclose system failures.⁴⁸ In our study

setting, DSR processes were facilitated by a high-level political commitment from the national government to compulsory and transparent reporting and reviewing of all cases of maternal or child deaths and implementation of measures to avoid future deaths from identified modifiable factors.

In this study, ‘no name, no blame’ approaches were observed to facilitate the active participation of various actors, especially those directly linked to death incidents and the possibility of embracing responsibility for the incident.⁴⁹ Thus, DSR processes can create a sense of interpersonal trust and trust in the healthcare organisation, key for generating learning and improvement. In contrast, as noted in Kenya, the lack of trust, the fear of blame or individualised disciplinary action conditioned front-line professionals to be reluctant in disclosing data on maternal death.¹⁷

As proposed by Deis *et al*,⁵⁰ DSR meetings can be transformed into instruments of system improvement using a systematic approach that incorporates the ‘three delays’ model for action including the providers, the health system and the communities in identifying and addressing modifiable factors related to death events. This means that DSR processes should not only seek to identify and correct front-line providers’ and managers’ practices but also health system and structural factors at the community level.²⁰ A holistic approach was made possible through the use of standardised protocols and guidelines for DSR that integrated reporting and feedback mechanisms.⁴⁶

Another important element of successful DSR observed was the inclusion and engagement of a multidisciplinary team of actors from various professional backgrounds and managers. This created a space to address not only health system-related problems⁵⁰ but also problems related to social structural factors (eg, social exclusion, poverty). Where these functioned effectively, DSR platforms intersected individual and collective competency and responsibility for MNCH, enabling a community of practice that recognised the contribution and value of all levels, from PHC facilities to district hospitals actors. Furthermore, the inclusion of various stakeholders into DSR processes can also facilitate social autopsies given that some maternal and child deaths occur outside of health facilities. Similarly, a study in four sub-Saharan African countries reported interdisciplinary teamwork with good communication among staff and active participation of staff as enablers of the DSR process.⁵¹ In contrast, where actors from PHC facilities and hospitals, or when doctors and nurses, managers and providers were disconnected, it resulted in a poor referral process, blame games and deferring of responsibility or avoidance of accountability. Melberg *et al*⁴⁸ referred to a ‘defensive referral’ as a result of fear of being blamed for maternal death incident.

When encouraged by leadership support, DSR processes can become a platform for common learning, knowledge sharing and quality improvement.⁴⁵ Effective DSR system, according to Kerber *et al*⁵² needs engaged leadership and

use of guidelines and protocols that ensure the complete cycle of the audit system.⁵³

Finally, DSR processes were able to systematically and proactively identify and plan actions based on the framework. Though tracking implementation of these actions can be limited in scope, this study nevertheless presented evidence of responsive action implemented as part of DSR.

Limitations

The statements of lived experiences of DSR processes by the respondents could have been what they thought to be the right answer reflecting a social desirability bias in their responses. Being observed, respondents could have behaved differently (‘Hawthorne effect’). We did indeed observe instances of where the absence of the national facilitator led to a slackening of meeting processes. Furthermore, respondents’ self-reports and accounts could have led to an overstatement of phenomena. We sought to minimise these biases by prolonged immersion in the field and supplementing formal interviews with observations and informal conversations.^{30 54}

This study was conducted in one district at a particular moment in time. While the forms of DSR are likely to be repeated elsewhere, the study findings related to the functioning of DSR are not generalisable given the management investments made. However, the findings have analytical relevance in illuminating DSR in best-case scenarios and the triangulated nature of the data provide confidence in the data collected.

CONCLUSION

The success of DSR processes resides in the intersection of many contextual factors such as the commitment of a multidisciplinary team of actors and support from district managers, the integration of primary healthcare and district hospitals, and the establishment of a space for mutual trust and learning anchored within the organisational culture of health facilities. A holistic approach is essential to address the modifiable factors identified, translate them into long-term organisational learning opportunities, and set up evidence-based, ‘real-time’ responses.

Twitter Fidele Kanyimbu Mukinda @fidelemukinda

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ORCID iD

Fidele Kanyimbu Mukinda <http://orcid.org/0000-0002-0764-6213>

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