

Witness Name: Dr Edile
Murdoch
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THIRLWALL INQUIRY

WITNESS STATEMENT OF DR EDILE MOHAMMED NUR MURDOCH

I, Dr Edile Mohammed Nur Murdoch, will say as follows: -

1. This is the second statement I have given to the Thirlwall Inquiry. It should be read in conjunction with my first witness statement, dated 10 July 2024 [INQ0106962].
2. The MBRRACE-UK team are not responsible for the development of MOSS and this statement is based on my understanding and the work of the joint MOSS and MBRRACE-UK working group, supplemented with updated information about the current functionality of the MBRRACE-UK Real Time Data Monitoring Tool from the MBRRACE-UK team.
3. The Inquiry has asked that the following matters be addressed:
 - a. Would it work to combine the work of MBRRACE-UK Real Time Data Monitoring Tool and MOSS systems to include premature babies (i.e. those less than 37 weeks' gestation)?
 - b. Are there limitations on the effectiveness of the data analysis in including premature babies as a separate group within any joint data analysis?
 - c. At what stage of development or implementation is the MBRRACE-UK Real Time Data Monitoring Tool?
 - d. In practice, what is the extent of any additional burden for clinicians and others using the MBRRACE-UK Real Time Data Monitoring Tool [and, once operational, MOSS] – e.g. what is the additional education/training, time spent interpreting or analysing, any administrative tasks such as note taking and record keeping?
4. Before turning to address these specific points, I wanted to briefly summarise some key principles and concepts.

What is a safety signal system?

5. Figure 1, below, illustrates what a safety signal system is. Essentially, safety signal systems monitor real time trends in data, prompting timely responses to prevent critical outcomes.
6. In order to build a signal system, the outcomes that need to be mitigated /improved need to be defined. Then the key contributory factors to these outcomes need to be identified, in order to understand the “critical safety system” that needs to be monitored. The outcomes that a signal system measures, need to be good indicators of the reliable delivery of the “critical safety system”.
7. A signal system needs to be sufficiently sensitive and specific to generate accurate signals about the “critical safety system” being monitored.
8. Complex high performance, high impact systems usually require several safety signal systems to monitor component parts. Different signal systems may need to be reviewed together.
9. Real time monitoring tools can have different purposes.

What real time monitoring tools are used in maternity and neonatal care?

10. In maternity and neonatal services there are now two real time monitoring tools¹: MOSS is in development and the MBRRACE-UK Real Time Data Monitoring Tool is in place.
11. The MOSS tool is designed to improve critical mother and baby outcomes at term through monitoring safety signals about the service and care and delivery of women in labour.
12. The MBRRACE-UK Real Time Data Monitoring Tool is designed to support improvements in perinatal mortality (including preterm death) through monitoring trends and analysing the epidemiology of perinatal death
13. Reducing perinatal mortality and critical outcomes at term are both important and require different tools with different purposes and sensitivities to enable optimal improvement. Combining tools reduces their effectiveness and impact. Complex services can require a number of real time monitoring tools.
14. The 2022 “Reading the signals” report by Dr Bill Kirkup identified avoidable critical maternity and neonatal outcomes that needed to be improved. Key contributory factors to these outcomes are critical standards of the care of women in labour not being met

¹ I explained in my first witness statement what ‘real time’ means in the context of these tools.
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(intrapartum care). These standards are predominantly delivered in areas where women in labour are cared for: labour wards, obstetric triage, birth centres and at home.

Figure 1

Problem	<ul style="list-style-type: none"> • Avoidable perinatal mortality and brain injury at term
Causes /Contributory factors	<ul style="list-style-type: none"> •Critical safety standards for women in labour not met
Service/system	<ul style="list-style-type: none"> •Areas where women in labour are cared for (labour ward, triage, birth centres)
Measure	<ul style="list-style-type: none"> •Outcomes where substandard care in labour is a significant contributory factor

15. MOSS is an example of a safety signal system and it is the first system of this nature to be developed for maternity care (in response to Recommendation 1 Reading the Signals report, as explained in detail in my first statement). It is designed to help improve critical mother and baby outcomes at term through monitoring outcomes that are indicators of the appropriate delivery of critical safety standards during intrapartum care. These standards can be considered as operational and governance guidance with a focus on; workforce, task and technology, organisational factors.
16. As I emphasised in my first statement, MOSS remains in development and continues to evolve and be refined. It is not yet in operation in maternity units but work has begun to commence the pilot phase of its implementation (October 2024), which is envisaged to continue through to June 2025. The MBRRACE-Real Time Data Monitoring Tool is an established real time monitoring tool to support the improvement in perinatal mortality. It is intended that the piloting of MOSS will include standardised use of both MOSS and the MBRRACE-Real Time Data Monitoring Tool for routine intrapartum critical safety care and perinatal mortality monitoring, within a common national governance framework (described further below).
17. The MBRRACE-UK Real Time Data Monitoring Tool provides real time monitoring of perinatal deaths and analysis of clinical and public health factors that contribute to the occurrence of perinatal deaths – such as gestation at birth, ethnicity, deprivation, congenital anomalies. It monitors deaths in babies from 20 weeks (see Figure 2 below). The Tool is customisable by the user, so that specific groups can be specified and data filtered accordingly. Different statistical analysis can be run on the data, again as set out

in summary below in Figure 2. The purpose of this data is to support national and local improvement programmes to reduce perinatal mortality.

18. These two types of data system are complementary and both provide and enable real-time trend monitoring to help improve outcomes by monitoring trends and indicate unusual changes in trends.

Summary: differences between MOSS and the MBRRACE-UK Real Time Data Monitoring Tool (“MBRRACE-UK RTDM”)

19. Figure 2, below, sets out in summary the differences between these two systems.

20. In paragraph 7 of my first witness statement, I included a definitions table. For ease I have replicated that below as Figure 3.

Figure 2: MOSS and MBRRACE-UK RTDM

Category	MOSS (subject to finalisation - pilot ongoing)	MBRRACE-UK RTDM
Outcome measures	<ul style="list-style-type: none"> • Term stillbirth • Term neonatal death <28 days • Term HIE at grade 2 or 3 	<ul style="list-style-type: none"> • All stillbirths • All neonatal deaths from 20 weeks • Late fetal losses at 22 to 23 weeks • Includes babies born at one NHS provider site but who died elsewhere as well as babies born at the provider site where they died, across all four UK nations
Charts used	Cumulative Sum Excess events Days between events Instantaneous rate	Days between deaths Statistical Process Control Run charts Histogram Customisable trend charts
Signal generation	Cumulative sum	Statistical Process Control Run charts
Filters	Organisation only	Various – including NHS provider/unit of birth or death; gestation; ethnicity; cause of death

Access	NHS Provider, Integrated Care Board, NHS England regional and national teams	NHS Provider level only (but permissions are being sought from the Health Research Authority Confidentiality Advisory Group for Integrated Care Board, regional and national team access).
Purpose	Improve critical maternity and neonatal outcomes at term by monitoring signals from real time outcome trends that prompt timely action	To support improvement in perinatal mortality through perinatal mortality surveillance across maternity and neonatal pathways. Monitoring of data quality and completeness to support improvement programmes to reduce perinatal mortality

Figure 3: Key Terms

Key Term	Definition
CUSUM	Cumulative Sum. This is a statistical analysis that plots changes in cumulative outcomes over time.
Critical Safety	Processes and measures that ensure systems avoid high impact outcomes or adverse outcomes.
Hypoxic-ischaemic encephalopathy ("HIE")	Brain injury that is caused by oxygen deprivation to the brain. It can happen before, during, or shortly after birth and can lead to developmental delay and neurodisability.
Intrapartum care	This term is used to describe care given to women during labour.
Neonatal	This term is explained in more detail in the body of my statement. In short, it describes the time from a live birth up to 28 days following birth. It includes both preterm and term babies.
MBRRACE-UK data real time monitoring tool	The tool developed by MBRRACE-UK for real-time monitoring of perinatal mortality including neonatal deaths. This tool has been operational since August 2019.
MOSS	Maternity Outcomes Signal System; the name of the tool that is being developed by the Maternity and Neonatal Outcomes Group to provide a method to identify potential critical safety issues in maternity care that may lead to adverse outcomes.

Perinatal	The period covering pregnancy from 24 weeks gestation up until the first 28 days following the birth of a baby.
PDS	Data from the Person Demographics Service (PDS) contains information on birth and death notifications, which indicate occurrences of stillbirth and neonatal death.
Pre-term	In the context of what I describe in my statement, this means babies born before 37 weeks gestation.
PMRT	The MBRRACE-UK perinatal mortality review tool, which has been in operation since 2019. The NHS England Maternity and Neonatal Outcomes Group was not involved in the development of the PMRT.
PQSM	This is the NHS England Perinatal Quality Surveillance Model, which was published in 2020 and has been in operation since 2020. It provides the governance and assurance around investigation, reporting and assurance of perinatal quality issues (with regional and national escalation and reporting).
Term	Babies born on or after the 37 th completed week of pregnancy.
Time between events analysis	The time between events chart shows the number of days between each event. For example, if an event occurred on 1 st January 2014 and another on 3 rd January 2014 a point would be plotted on 03/01/2014 with a value of 2 days. NHS England Statistical Process Control rules have been applied to this chart to identify variation in the number of days between events that is unusual.
VLAD	Variable Life Adjusted Display. A VLAD chart shows the cumulative number of excess events over time compared to what would be expected if the trust had the same rate as the national event reference rate.

21. The Inquiry has asked what stage of development or implementation is the MBRRACE-UK Real Time Data Monitoring Tool. As set out in Figure 2, above, the MBRRACE-UK RTDM measures neonatal deaths (from 20 weeks). Data reporting is enabled in all NHS Providers who are providing maternity and neonatal services (and has been since 2019). However, the routine use of the tool, response and escalation is not standardised.

22. There is further work being undertaken, currently in progress, to embed the governance around use and response to the MBRRACE-UK RTDM. I have described this below.

23. I am also aware that Dr Brearey made a number of points when he gave evidence about the analytical effectiveness of the MBRRACE-UK RTDM and benefits of an integrated system that brought together the MBRRACE-UK RTDM and MOSS. In summary, I understand that he suggested:

- a. An integrated platform that enabled signals for both preterm and term babies to be analysed together would be beneficial, rather than them running in parallel;
- b. The MBRRACE-UK RTDM does not have any statistical tools that allow one to interpret the data;
- c. The data is shown by unit of birth, even if the baby was transferred to another unit and subsequently died there (with the death attributed to the unit of birth);
- d. The data shows all deaths of babies and does not, for instance, distinguish between babies who are born with signs of life but who die shortly after birth (not on a neonatal unit) and those who die of a similar gestation on a neonatal unit.

24. I have responded to point (a) at paragraphs 26-30 below.

25. In terms of (b), (c) and (d), Figure 2 (above), sets out the MBRRACE-UK RTDM analytical tools that are available to use. These tools enable data to be filtered (e.g. by gestation/ethnicity/live or stillbirth) and different types of analytical interpretation (days between deaths, run charts and histograms, for example).

Could MOSS measure pre-term neonatal deaths and are there limitations on the effectiveness of the data analysis in including premature babies as a separate group within any joint data analysis?

26. The Inquiry has asked whether it would it work to combine the work of MBRRACE-UK Real Time Data Monitoring Tool and MOSS systems to include premature babies (i.e. those less than 37 weeks' gestation) and what the limitations would be on the effectiveness of the data analysis in including premature babies as a separate group within any joint data analysis. I have addressed these questions together because they are linked.

27. MOSS (deliberately) does not measure preterm deaths (or stillbirths) because it was designed to support the improvement in maternity and neonatal outcomes at term. Deficiencies in the delivery of intrapartum critical safety is not a key factor in premature neonatal deaths. In order to be effective as a safety signalling system, MOSS needs to remain sufficiently sensitive to generate accurate signals of the reliable delivery of intrapartum critical safety standards, which is a key cause of avoidable critical outcomes

in term babies. It would not be effective simply to expand the MOSS signals to apply to pre-term babies. Adding preterm neonatal death would reduce the sensitivity of MOSS.

28. As explained above, the MBRRACE-UK RTDM already exists and provides a tool to monitor preterm neonatal deaths.
29. It is common in other sectors to have a number of signalling systems and data monitoring tools operating concurrently. A simple analogy is to think about a car, where there are a number of targeted signals that have been designed to be specific to the safety issue they relate to (e.g. brakes, tyre pressures, or power steering). Provided the user knows what each signal relates to, it is more effective to have a number of specific signals than one generalised signal (i.e. a single red light on a dashboard which does not identify the underlying concern or problem).
30. In my first statement I described the importance of ensuring that governance systems and training are developed alongside any signalling tool. The governance that MOSS and the MBRRACE-UK RTDM will be grounded in is the Perinatal Quality Surveillance Model, which was established by NHS England and is described in the evidence of Duncan Burton, NHS England's Chief Nurse [see paragraphs 160-162 in particular, INQ...]. The NHS England Maternity and Neonatal Outcomes Group, which I chair, has been working with MBRRACE-UK to support the development of Standard Operating Procedures for the MBRRACE-UK RTDM. This will, in turn, inform the SOPs needed for the implementation of MOSS, once this signalling system has been finalised and is available for roll-out. It may be possible that a single SOP can be agreed that covers both the MBRRACE-UK RTDM and MOSS, but it is currently too early to be able to confirm this.

Burdens on clinicians

31. In terms of administrative burden on clinicians, the plan is that a single dashboard will be accessible to clinicians that will show the MOSS signal and include a link to access to MBRRACE-UK RTDM. The pilot scheme of the MOSS deployment will provide an opportunity to test functionality and enable further refinements and it is possible that future work could be done to integrate the interface of the two systems further as a result. As described above, the intention is to work towards consistent and, as far as possible, integrated SOPs and governance for both systems.
32. I also explained in my first witness statement the work that was being done to develop the Submit Perinatal Event Notification, which is intended to reduce the burden on clinicians of multiple data entries. I also explained the planning for implementation of MOSS. I have not repeated that content here.

Statement of Truth

I believe that the facts stated in this witness statement are true. I understand that proceedings may be brought against anyone who makes, or causes to be made, a false statement in a document verified by a statement of truth without an honest belief of its truth.

Signed: _____ Personal Data

Dated: _____ 22.12.24 _____