vehicle incidents [16%]) were far less lethal than US or global standards. Fourth, independent of structural classifications, diagnostic accuracy depends on how hospitals function and the availability of resources; facility capacity was not described. Fifth, the definitions of undertriage and overtriage were also structural. Finally, although pre-hospital care systems are required to comply with Dutch Institute of Ambulance Care protocols, guideline adherence to protocols was low, even for positive triage results.

Although it is interesting that the US-derived triage tools did not work in the Netherlands, it does not mean that these triage tools do not work. The low diagnostic accuracy observed could be due to poor protocol implementation, poor compliance, or the lack of relevance of the triage tools to the local context. This study importantly highlights that each region might need to define target undertriage and overtriage rates and either adapt existing protocols or develop new protocols to suit local trauma contexts.

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Neonatal risk adjustment in low-resource settings

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Risk adjustment is the process of sorting patients into different risk groups to permit fair comparisons of outcomes.[1] This is important because although randomisation in clinical trials evenly distributes risk among the comparison groups, this is not possible when comparing real-world outcomes among different hospitals or groups of patients. Consequently, risk adjustment is an indispensable tool for real-world comparisons of outcomes. These comparisons are essential for quality improvement because they permit valid examination of variations in outcomes. If particular practices are associated with unusually good or poor outcomes, then clinical trials can be done to find out which treatments are the cause. Many therapies are used on the basis of experience rather than randomised clinical trials, and effectiveness might differ when applied to different populations and combined with untested therapies. Thus, field effectiveness is as important to evaluate as experimental efficacy, and risk adjustment is an indispensable tool for comparative effectiveness studies, collaborative quality improvement, and policy research.

Most risk adjustment instruments use a combination of variables that measure biological risks (eg, respiratory distress syndrome, congenital anomalies), vulnerability (eg, birthweight), or that are proxies for other risks (eg, socioeconomic status), and the selection of variables is determined by the desired outcome. For neonatal mortality, several well validated and widely used risk adjustment scores exist, including Clinical Risk Index for Babies (CRIBS), Score for Neonatal Acute Physiology version II (SNAP-II), Neonatal Therapeutic Intervention Scoring System (NTISS), Transport Risk Index of Physiologic Stability version II (TRIPS-II), and the Simplified Age-Weight-Sex (SAWS).[2–6] So, why produce another neonatal risk adjustment score? Melissa Medvedev and colleagues[7] rightly point out that existing neonatal risk adjustment scores were mostly created for use in high-resource settings and require data that are not easy to collect in low-resource settings, which limits their usability. SAWS is an exception in that it was designed specifically for low-resource settings, but this score has been reported to have only moderate discrimination for in-hospital mortality.[6] Medvedev

and colleagues' new score, NMR-2000, is intended to fill this gap and to provide low-resource settings with a tool that can facilitate efforts in benchmarking, quality improvement, and research. This laudable goal might spur quality improvement efforts in low-resource settings that could lead to substantial system-wide improvements and better patient outcomes, as has been amply shown by existing networks in high-resource settings, such as the Vermont-Oxford Neonatal Network, California Perinatal Quality Care Collaborative, and the Canadian Neonatal Network.[8–10]

Medvedev and colleagues[7] used retrospective, observational data from the large UK National Neonatal Research Database (187 neonatal units) to derive the NMR-2000 score by including only variables that were considered easily available in low-resource settings. They then validated the score using data from the database (more than 55 000 neonates admitted to any unit between Jan 1, 2010 and Dec 31, 2017) and data from a Gambian cohort (550 neonates weighing less than 2000 g who were admitted to the Edward Francis Small Teaching Hospital, Banjul, The Gambia, between May 1, 2018, and Sept 30, 2019). Their approach is innovative because low-resource settings are often restricted by an absence of large cohorts with reliable data. The results showing that NMR-2000 compares favourably with other neonatal risk adjustment scores for prediction of mortality in both the UK (c-index of 0·8859–0·8930 and a Brier score of 0·0232–0·0271) and Gambian cohorts (c-index of 0·8170 and a Brier score of 0·1688) is heartening. However, it is perhaps not surprising, because the three variables selected were birthweight, admission oxygen saturation, and highest level of respiratory support during the first 24 h of admission.[7] Birthweight is the single most predictive variable of neonatal mortality, and respiratory status is the most common source of neonatal physiological instability. What is surprising is the choice of oxygen saturation as an eligible variable because many hospitals in low-resource settings might have no ready access to oxygen saturation monitors, which limits the usefulness of the NMR-2000. The TRIPS-II score might be more practical because it uses clinical observations that are easy to make without the need for instrumentation.[5] Additionally, because NMR-2000 uses measurements made over 24 h, interventions during the initial 24 h can influence the outcome and bias the results, whereas TRIPS-II is measured almost instantly, and can be used sequentially so that mortality risks can be revised as the condition of the infant changes. However, the TRIPS-II has not been validated in low-resource settings.

Medvedev and colleagues[7] should be commended because NMR-2000 might stimulate benchmarking and collaborative quality improvement efforts in countries where outcome improvements are badly needed at affordable costs, and the effect could be substantial. Indeed, such efforts should be encouraged and funding made available. However, it should be remembered that risk prediction models come with important caveats. Quality of care should consider not only mortality, but also factors such as morbidity, quality of life, access to care, and cost of care. In addition, even when risk prediction models based on routinely collected health data work well for populations, they do not reliably predict individual risks and should not be applied to individuals.

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