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LETTERS

WHO GUIDELINES ON FLUID RESUSCITATION IN CHILDREN

Authors' reply to Southall

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Southall made several points about our recent article.[1 2]

He suggests that "lethal hyperchloraemia" secondary to use of normal saline in FEAST (for boluses or maintenance) resulted in excess mortality. However, he did not comment on the key finding of the trial—that the increased 48 hour mortality was identical in both normal saline bolus (10.6%) and albumin bolus (10.6%) arms compared with the no bolus control group (7.3%).[3] Harm was shown for every age group, in every condition, at each of the six hospitals, regardless of degree of acidosis,[4] and for all definitions of shock.[5] Despite differences in physical properties of albumin and saline, the timing of excess mortality after administration was identical (Kaplan-Meier mortality curves),[3] making his hypothesis improbable.

With regard to maintenance fluids, use in the trial was pragmatic, given either as part of a quinine infusion (World Health Organization recommends 5% dextrose) or the local "standard of care" maintenance fluid, and stopped as soon as the child could retain oral fluids. The median volume of maintenance fluid received over 48 hours was 50 mL/kg (interquartile range 35.3-60) alongside quinine infusion or 51.8 mL/kg (26.1-83.2) as maintenance. The chief maintenance fluid was 5% dextrose (Uganda), 5% dextrose/0.9% saline (Teule), or 5% dextrose/0.45% saline (Kilifi). Data on fluid volumes are already in the public domain, published alongside the *New England Journal of Medicine* manuscript (table 3a supplementary files).[3] Details of the diagnoses of the deaths by arm are listed in supplementary files (table 2b: Endpoint review committee adjudication of deaths).

Finally, Southall indicates that all children in the FEAST trial were exposed to harm (whether from normal saline or hypotonic 5% dextrose), even though these are used widely across Africa. However, global mortality in FEAST (all three arms) was substantially better than predicted by previous studies, including the quinine arm of the AQUAMAT malaria trial (10.9%)[6] versus FEAST malaria subgroup bolus arms (9.2%) and control (5.7%).[5]

Most children in the bolus arms received only 20 mL/kg, lower than is currently recommended by WHO and other international guidelines. Even this relatively conservative volume of fluid boluses resulted in harm, which is why we are calling for WHO to reverse its liberal bolus guidance for febrile sick African children with shock not caused by fluid loss. Current WHO guidance is costly, difficult to implement (most African hospitals cannot accurately measure fluid boluses), and unsupported by evidence.

Competing interests: None declared.

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4 Maitland K, George EC, Evans JA, Kiguli S, Olupot-Olupot P, Akech SO, et al. Exploring mechanisms of excess mortality with early fluid resuscitation: insights from the FEAST trial. *BMC Med* 2013;11:68.
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