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Is accepting circular reasoning in shaken baby studies bad science or misconduct?

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Many of the comments on our systematic literature review on shaken baby syndrome (1) have focused on our criticism of how child protection teams' classification of study cases and controls are used as gold standard and the faulty circular reasoning associated with that (2,3). Some commentators have also questioned how reasonable it is to focus on the triad of retinal hemorrhages, subdural hematoma and encephalopathy (3,4). Lucas et al maintained that, without impact, the triad represented "a rhetorical fallacy known as a straw man" (4), despite the fact that it has been used for decades and is still used as a very strong indication that an infant has been violently shaken (5). Levin stated that the gold standard we suggested in order to avoid circular reasoning was "impossibly strict" (2). Narang et al found it generally odd that we cared about circular reasoning at all (3).

Although circular reasoning is not new, it is a rather well-known fallacy within rational scientific thinking and disregarding the issue of circularity might have resulted in bad science. Our argument, expanded below, is that it is a form of scientific misconduct to continue to carry out research as if circular reasoning is not an issue, despite being aware of it.

Accordingly, in order to clarify what circular reasoning actually entails, we would like to try to explain it more specifically. The point of departure of a child protection team is apparently subsequent logically deductive reasoning that comprises the subsequent structure presented in three stages. The first premise is the general assumption:

- a) Always when the triad is present (and no other acceptable explanation has been provided) the infant has been violently shaken.

The second premise contains the following observation:

- b) The triad is present in the actual infant (and no other acceptable explanation has been provided).

From the above premises the deductive conclusion is:

- c) The actual infant has been violently shaken.

Due to the logical structure of the inference, the conclusion is, by necessity, true if both premises (a and b) are true (6) and this is the way that many paediatricians might reason. However, the research question in our systematic review was whether or not the general assumption (a), was true. And to answer that question, we naturally could not use reports

that took it for granted that it was true. To do so would have been to accept as true what was to be questioned and such an approach results in circular reasoning.

Even if we were to accept that the general assumption (a) was true, the clause that “*if no other acceptable explanation has been provided*” needs to be clarified. Who is to decide whether or not an explanation is acceptable? To date, child protection teams have made this determination, but their decision-making is not independent of the general assumption. On the contrary, child protection teams have developed criteria on which their decisions are made and these criteria have consequences for the scientific classification of study cases and controls. These criteria are not solely based on medical observations, such as the presence of the triad or other medical conditions, but are also based on the supposed trustworthiness of the parent or guardian trying to provide the explanation for the presented symptoms. If they say that they do not know what happened, that nothing happened or that the infant suddenly became unconscious or dyspnoic, they are assumed, by default, to be lying. Accordingly, the lack of an “acceptable explanation” is taken to prove, according to the general assumption, that the infant must have been violently shaken.

Furthermore, if a parent or guardian admits to have shaken the infant after it became unconscious or dyspnoic, namely during an attempt to resuscitate them, the guardian or parent is also, by default, assumed to be lying. Accordingly, the explanation is not deemed “acceptable” and without an “acceptable explanation” the infant is considered, by default, to have been violently shaken, according to the general assumption. Such a case is then classified as a true shaken baby case in subsequent scientific studies. This obviously shows that using the classification used by child protection teams as the gold standard for

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classifying study cases and controls entails a high risk of bias and carries a risk that false positive cases are presented as true positive cases. A decrease in the number of false positive cases means that, all things being equal, the specificity (true negative/true negative plus false positive) and the positive predictive value (true positive/true positive plus false positive) will increase. Consequently, the diagnostic accuracy of any information obtained in this way might be misleading.

Parents of guardians might, of course, lie in order to protect themselves from accusations of child abuse, but they might also tell the truth. In fact, there may be other, not yet “acceptable”, explanations as to why the triad occurs spontaneously or after a minor trauma in an infant (7,8).

Narang et al found it odd that we did not embrace the traditional gold standard using child protection teams’ classifications. In our opinion, it is remarkable that few scientists in this research area have noticed the serious fallacy of circularity and its deleterious effects.

Although we do not believe that there has been any intention by the concerned researchers to mislead, our view is deliberately concealing false positive cases as true positive cases is not just bad science, it represents trimming of unreliable data, which is a form of scientific misconduct.

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