Table 1. Comparison of risk difference estimates in use of computed tomography when incorrect versus correct numbers are used.

	Original Cochrane Numbers and Estimates				Correct Numbers and Estimates			
Study	**Ultrasound n/N**	**No Ultrasound n/N**	**Risk Difference (95% CI)**		**Ultrasound n/N**	**No Ultrasound n/N**	**Risk Difference (95% CI)**	
Arrillaga	9/105	223/226	-0.90	(-0.96,-0.85)	9/105	223/226	-0.90	(-0.96,-0.85)
Boulanger	111/246	225/460	-0.04	(-0.12,0.04)	111/**460**	225/**246**	-0.67	(-0.73,-0.62)
Navarrete-Navarro	14/51	52/52	-0.73	(-0.85,-0.60)	14/51	52/52	-0.73	(-0.85,-0.60)
Rose	37/104	54/104	-0.16	(-0.30,0.03)	37/104	54/104	-0.16	(-0.30,0.03)
Total	171/506(34%)	554/842(66%)	-0.46	(-1.04,0.13)	171/720(24%)	554/628 (88%)	-0.62,	(-0.86,-0.39)
***Total (Without Navarrete-Navarro)**					**157/669 (23%)**	**502/576(87%)**	**-0.59,**	**(-0.88,-0.29)**

Correct numbers from the original studies are bolded in the table.

Table 2. Comparison of risk difference estimates in use of diagnostic peritoneal lavage when incorrect versus correct numbers are used.

	Original Cochrane Numbers and Estimates				Corrected Numbers and Estimates			
Study	**Ultrasound n/N**	**No Ultrasound n/N**	**Risk Difference (95% CI)**		**Ultrasound n/N**	**No Ultrasound n/N**	**Risk Difference (95% CI)**	
Arrillaga	3/105	15/226	-0.04	(-0.08,0.01)	3/105	15/226	-0.04	(-0.08,0.01)
Boulanger	5/246	21/460	-0.03	(-0.05,0.00)	5/**460**	21/**246**	-0.07	(-0.11,-0.04)
Navarrete-Navarro	31/51	5/52	0.51	(0.36,0.67)	31/51	5/52	0.51	(0.36,0.67)
Total	39/402(10%)	41/738(6%)	0.12	(-.04,0.28)	39/616 (6%)	41/524 (8%)	0.10,	(-0.07,0.27)
***Total (Without Navarrete-Navarro)**					**8/565(1%)**	**36/472(8%)**	**-0.06,**	**(-0.09,-0.02)**

Correct numbers from the original studies are bolded in the table.

William T. Hosek, MD
Melissa L. McCarthy, ScD
Department of Emergency Medicine
Johns Hopkins University
Baltimore, MD

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1. Stengel D, Bauwens K, Sehouli J, et al. Emergency ultrasound-based algorithms for diagnosing blunt abdominal trauma. The Cochrane Database of Systematic Reviews 2005, Issue 2. Art. No.: CD00446.pub2.DOI:10.1002/14651858.CD004446.pub2.
2. Boulanger BR, McLellan BA, Brenneman FD, et al. Prospective evidence of the superiority of a sonography-based algorithm in the assessmant of blunt abdominal injury. *Journal of Trauma*. 1999; 47:632-637.
3. Navarrete-Navarro P, Vazquez G, Bosch JM, et al. Computed tomography vs clinical and multidisciplinary procedures for early evaluation of severe abdomen and chest trauma-a cost analysis approach. *Intensive Care Medicine*. 1996;22:208-212.
4. Arrillaga A, Graham R, York JW, et al. Increased efficiency and cost-effectiveness in the evaluation of the blunt abdominal trauma patient with the use of ultrasound. *The American Surgeon*. 1999; 65:31-35.
5. Rose JS, Levitt MA, Porter J, et al. Does the pressence of ultrasound really affect computed tomographic scan use? A prospective randomized trial of ultrasound in trauma. *Journal of Trauma*. 2001;51:545-549.

In reply:

I would like to take this opportunity to thank the authors for their thorough analysis of the Cochrane database in regards to the review by Stengal et al entitled *Emergency Ultrasound-Based Algorithms for Diagnosing Blunt Abdominal Trauma*. Since receiving their letter, I have reviewed both the initial study by Boulanger et al, as well as the systematic review and indeed, the denominators were switched. In summarizing the review, I must admit that I did not detect this error. With this correction, the data does suggest a statistically significant decrease in computed tomographic usage. The statistically significant decrease in diagnostic peritoneal lavage is also noted, although somewhat expected, given the fact that the Focused Assessment with Sonography for Trauma (FAST) exam has largely replaced diagnostic peritoneal lavage in practice.

I would, however, like to reiterate my concern regarding decreased computed tomographic usage as a key outcome marker. Although many studies have reported this data, our clinical practice in the United States has been to use ultrasound as an adjunct to the primary trauma survey. Ideally, the FAST exam helps physicians to rapidly assess for the site of hemorrhage in a hemodynamically unstable patient and to expedite appropriate disposition based on the ultrasound findings. Clearly, the unstable patient with a positive FAST exam should go to laparotomy rather than to the computed tomography suite. However, the stable patient with blunt abdominal trauma and abdominal pain should not forego computed tomography based on a negative FAST exam. It is in these patients where isolated organ injuries are often found including contusions, low-grade liver and splenic lacerations without hemoperitoneum, and renal injuries. The FAST exam is an admittedly poor screening test in these types of injuries without intraabdominal free fluid. Therefore, it is not prudent to replace a highly sensitive diagnostic exam such as computed tomography with a much less sensitive FAST exam in this "low risk" population. This is precisely the "false sense of security" that Stengel et al were referring to in the Cochrane review.

I would like to again thank the authors for their careful review of the literature in this matter. I did correspond with Dr. Stengel regarding the authors' points, and his response follows this letter. We should continue to study the performance of FAST exam in the acutely traumatized patient, focusing on patient morbidity, mortality, and time to appropriate disposition as key outcome variables. Although the data regarding decreased computed tomography usage is interesting, I would contend that attempts to replace computed tomographic scanning in the hemodynamically stable patient with serial FAST exams puts patients and physicians at risk of missing clinically significant injuries.

Steve Vance, MD
Synergy Medical Education Alliance
Michigan State University Emergency Medicine Residency
Saginaw, MI

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In reply:

We read your evidence-based medicine review with great interest, and thank you for the opportunity of responding to the letter. We are thankful for the thorough reanalysis of the data, and indeed we have to admit that the denominators were mistakenly switched for the endpoints of computed tomography and DPL-use, and laparotomy rates in the Boulanger study. Corrections that will be sent to the Cochrane Library also give us the opportunity of updating the review by data from the SOAP trial.

One might argue with the inclusion of the trial of Navarrete-Navarro et al, and we had clearly stressed in our review that the primary aim of this study was to evaluate the efficacy of computed tomography. However, with a 2-sided test, possible advantages of an ultrasonography-based algorithm should have been detected regardless of the direction of the study hypothesis. Let's assume that this trial was beyond the scope of the review, and focus on the remaining studies.

In our review, we admitted that there was a marginal benefit with ultrasound-based pathways in reducing computed tomographic scans. Including the SOAP-trial increases the precision of the point estimate, now leading to a significant difference in favor of ultrasound-based pathways. So what? Given the low sensitivity of FAST to exclude intraabdominal injuries, is this really an advantage, or does it expose patients to additional harm by missing abdominal injuries?

From a European perspective, the reduction in DPL use is real, but clinically meaningless, since DPL has already been abandoned in most emergency departments.

We agree that laparotomy rates are dubious endpoints; however, they had been reported in the source trials, and may at least be regarded as patient-centered outcomes.

Of note, the SOAP trial is the only investigation suggesting a reduction in composite complication rates (0.27, 95% confidence interval 0.11 to 0.67). It must be stressed that in this trial only 217 of 525 patients screened for eligibility were included in the final analysis. Published data do not allow for cross-tabulation of mortality. However, the combined relative odds of death in the studies of Boulanger and Rose were estimated at 1.99 (95 % confidence interval 0.88 – 4.47) in favor of no-ultrasound-algorithms!

Altogether, ultrasound may reduce the number of computed tomographic scans and DPLs, which is a difficult to interpret surrogate measure. Although we thank the authors of the letter for pointing out the shift in denominators, we refuse their allegation of methodological flaws. After determining the diagnostic accuracy of FAST, we set out to identify all effectiveness studies on this popular screening method according to rigorous Cochrane Standards. Thus, the included studies still represent the best available evidence for health care decisions, and even the revised calculations neither affect the key messages of the original review, nor the evidence-based medicine review.

The statistically significant difference between study groups in the frequency of computed tomographic scans makes it even more difficult to determine the value of FAST. It is unclear whether the risk difference of 46% will translate to a number needed to treat or a number needed to harm of 2, since negative ultrasound-scans were not regularly verified by a reference test in the published effectiveness studies.

There is still no compelling evidence that the use of ultrasound has a benefit on patient-centered endpoints (eg, mortality). Unfortunately, with increasing utilization of contrast-enhanced, whole-body helical trauma computed tomography, it is unlikely that enough and sufficiently large randomized controlled trials on this topic will be conducted in the future to provide a conclusive answer.

Again, we thank you for the opportunity of correcting errors, and clarifying some open points.

Dirk Stengel, MD, PhD, MSc(Epi)
Center for Clinical Research
Department of Trauma and Orthopaedics
Unfallkrankenhaus Berlin
Berlin, Germany

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