



## Timing of Tertiary Survey in Multi-Trauma Patient: Before or After 24 Hours?

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### Abstract

The Tertiary Trauma survey has proven to reduce the incidence of missed injuries in the complex, multi-trauma patient. There is currently no clear guideline on when a TTS should be performed. Most guidelines suggest within 24 hours of admission; however there is currently no evidence on whether this is appropriate or whether this should be delayed till after 24 hours. We present a review of the current literature surrounding this issue.

### Introduction

Tertiary Trauma Survey (TTS) is a recognised tool in diagnosing injuries in a multitrauma patient that may be missed at primary or secondary survey [1]. First described by Enderson in 1990 [2], the TTS has become a standard of care in multitrauma patients. Evidence shows that rate of Delayed Diagnosis Injury (DDI) can occur in up to 65% of patients in select populations. This has been demonstrated to be reduced to 9-10% with the introduction of standardised TTS [2].

Controversy arises over the timing of this survey. Multiple trauma guidelines recommend that the TTS be performed within 24 hours of admission. However there is no general consensus [3]. We present a review of the current literature surrounding the timing of TTS to assess whether there is any evidence basis for conducting within or after the first 24 hours of admission.

### Method

A Medline search was conducted using search terms Tertiary Trauma Survey, Trauma Survey and Timing. Guidelines were sourced online from hospital guidelines in Australia, USA and the UK. Articles were excluded from analysis if they did not discuss the timing of tertiary survey, discussed specific conditions or injuries missed, discussed the role of specific interventions or injuries, or referred to tertiary centres rather than tertiary survey. Of 1262 articles, 16 articles were suitable for analysis.

### Results

Of the 16 suitable articles, only 11 discussed the timing of TTS. Of these 11, 6 assessed the benefit of TTS within 24 hours of admission, 1 mandated before ambulation or when regained consciousness, 1 advocated for multiple tertiary surveys, 2 combined the results of TTS within 24 hours with results of delayed survey while still an inpatient and 1 article discussed the employment of a standardised tertiary survey that is usually performed at 24 hours, but did not clarify if that was their practice. No study compared the rates of DDI between TTS conducted at <24 hours or after 24 hours.

Study populations were variable in size but the majority of studies consisted of mostly blunt trauma. Results of missed injuries were comparable across the studies, as were the definitions of tertiary survey, the components of the survey and the staff who carried out the survey.

### Discussion

Of the 16 articles that discussed the use of standardised tertiary survey, only 11 discussed the timing of the TTS. Most studies state

that a tertiary survey is carried out within 24 hours. Of note is that all the studies reviewed based their definitions and findings on a study by Enderson et al in 1990. Enderson's study of missed injuries in a trauma centre is the index article for the introduction of TTS and was referenced by all 16 articles found. Of interest is that Enderson's article does not advocate for the TTS within 24 hours [2]. The original study criteria was for the TTS to be carried out "before ambulation or, in the case of head injury, once the patient regains consciousness". There is mention later in the study of the TTS being performed at 24-48 hours after admission [2].

Soundappan et al. assessed a paediatric population for missed injury and the effectiveness of a tertiary survey in reducing the incidence of DDI. While they found that 66% of injuries missed initially were found within 24 hours. The focus of this article was to advocate for extended assessment of trauma patients. They contend that the tertiary survey should be an ongoing process and not a single point of assessment [4].

Keijzers et al reported results of tertiary surveys performed within 24 hours, however this data was combined with injuries found during the same admission. This article discussed three different sub categories of DDI: Type 1- Injury missed at initial assessment (primary and secondary survey and emergency intervention), but detected within 24 hours, before or through formal TTS. Type 2- Injury missed by TTS, detected in hospital after 24 hours. Type 3- injury found after hospital discharge [5].

Data was reported by combining Type 1 and 2 injuries, thus a conclusion on the effectiveness is unable to be drawn. The same authors designed a study protocol to assess the effectiveness of a more formal documentation process and a dedicated trauma service. In this protocol they predicted that with a more comprehensive TTS and ongoing assessment after the first 24 hours, Type 3 injuries would drop from

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14% to 9% and the combined Type 1 and 2 injuries would drop from 9% to 4%. This study is currently ongoing and will provide important data for determining the timing of TTS [6-15].

## Conclusion

Tertiary survey in trauma patients is an essential part of trauma management. The exact timing of when this should be carried out remains under debate and currently there are no studies to determine the most when a TTS would be most effective. Some studies indicate that if the resources are available, the TTS should be extended throughout the acute phase of admission to increase the likelihood of diagnosing a missed injury and reduced the DDI rates. Further studies are required in this area to assess whether TTS should be before or after 24 hours.

## References

1. Janjua KJ, Sugrue M, Deane SA (1998) Prospective evaluation of early missed injuries and the role of tertiary trauma survey. *J Trauma Inj Infect Crit Care* 44: 1000-1007.
2. Enderson BL, Reath DB, Meadors J, Dallas W, DeBoo JM, et al. (1990) The tertiary trauma survey: A prospective study of missed injury. *J Trauma* 30: 666-669.
3. Keijzers GB, Giannakopoulos GF, Del-Mar C, Bakker FC, Geeraedts LM (2012) The effect of tertiary surveys on missed injuries in trauma: A systematic review. *Scand J Trauma Resusc Emerg Med* 20: 77.
4. Soundappan SVS, Holland AJA, Cass DT (2004) Role of an extended tertiary survey in detecting missed injuries in children. *J Trauma* 57: 114-118.
5. Keijzers GB, Campbell D, Hooper J, Bost N, Crilly J, et al. (2011) Tertiary survey performance in a regional trauma hospital without a dedicated trauma service. *World J Surg* 35: 2341.
6. Keijzers GB, Del-Mar C, Geeraedts LMG, Byrnes J, Beller EM (2015) What is the effect of a formalised trauma tertiary survey procedure on missed injury rates in multi-trauma patients? Study protocol for a randomised controlled trial. *Trials* 16: 215.
7. Ferree S, Houwert RM, Van-Laarhoven JJ, Smeeing DP, Leenen LP, et al. (2016) Tertiary survey in polytrauma patients should be an ongoing process. *Injury* 47: 792-796.
8. Grossman MD, Born C (2000) Tertiary survey of the trauma patient in the intensive care unit. *Surg Clin North Am* 80: 805-824.
9. Biffi WL, Harrington DT, Cioffi WG (2003) Implementation of a tertiary trauma survey decreases missed injuries. *J Trauma Inj Infect Crit Care* 54: 38-44.
10. Tisherman SA, Forsythe RM, Kellum JA (2013) *Trauma intensive care*. Oxford University Press, USA.
11. Hajibandeh S, Hajibandeh S, Idehen N (2015) Meta-analysis of the effect of tertiary survey on missed injury rate in trauma patients. *Injury* 46: 2474-2482.
12. Thomson CB, Greaves I (2008) Missed injury and the tertiary trauma survey. *Injury* 39: 107-114.
13. Ogundele J, Ifesanya A, Oyewole O, Alonge T (2015) Tertiary trauma survey: Evaluation of missed injuries at a teaching hospital in the developing world. *East Cent Afr J Surg* 20: 34-38.
14. Stevens NM, Tejwani N (2018) Commonly missed injuries in the patient with polytrauma and the orthopaedist's role in the tertiary survey. *JBJS Rev* 6: 2.
15. Tammelin E, Handolin L, Soderlund T (2016) Missed injuries in polytrauma patients after trauma tertiary survey in trauma intensive care unit. *Scand J Surg* 105: 241-247.