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## ***Targets for Timing to Surgery in Hip Fracture Patients***

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I read with great interest the article by Sheehan et al. This study helps to emphasise that although there is a relationship between delay to surgery and increased risk of death following a hip fracture, such relationship may not be directly linear but more complex, as factors influencing both parameters exist.

It is unlikely that many would doubt that early surgery in elderly patients with hip fractures helps to reduce the harmful effects of prolonged bed immobilisation; hence, early surgery should be the sought-after norm. Indeed, in some healthcare systems, setting targets for timing to surgery in hip fracture patients have helped to focus minds and raise awareness of the beneficial effects of early surgery in this vulnerable patient group.

However, the study findings may also suggest that early surgery is not necessarily a substitute for adequate preoperative preparation, skilled intraoperative care, and effective postoperative management. Hence, targets for timing to surgery should empower clinicians and Management alike to develop systems and protocols that speed optimisation for surgery (such as reversal of anticoagulation and radiological imaging to aid operative planning) rather than simply promoting the practice of rushing to surgery in the pursuit of a preset target, even when such a target comes with financial incentives.

The study by Sheehan et al. also helps to remind us that certain patient subgroups may benefit more from early surgery than others, and it emphasizes that further investigation into these subgroups is needed. Hence, target directives should not replace clinical judgement, and one must not lose sight of the patient behind the target, or of the reasoning in setting up the target in the first place. For example, a patient with a history of chronic respiratory problems and a displaced intracapsular fracture who is difficult to be nursed due to lots of pain may well deserve priority over an otherwise healthy individual of similar age who walks into the Emergency Department with a stable, impacted intracapsular fracture, even if their time of

arrival at the Emergency Department dictates otherwise.

Conflict of Interest: None Declared

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## Article Author Response

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### *Article Author(s) to Letter Writer(s)*

We thank Dr. Charalambous for the response to our article. We agree that the dependency graph emphasizes the multifactorial nature of the putative association between time to surgery after hip fracture and hospital mortality.

The graph also provides an opportunity for strengthening the attribution of hospital death to surgical delays. The main limiting factor of observational research is the potential for bias, as one cannot be certain whether treatment and outcome are independent of each other. Indeed, our article identifies seven factors which could produce covariation in the absence of causation. We note these factors are “common” ancestors of both exposure (timing) and outcome (death). “Blocking” the influence of these factors would allow researchers to estimate the total effect (directly and following postoperative complications) of timing of hip fracture surgery on hospital death. (1)

One form of blocking is stratification, whereby the effect of timing on death is estimated in stratum defined by combinations of variable levels. For example, stratum 1) older men undergoing arthroplasty after admission to community hospitals from long-term care for a transcervical hip fracture in 2017, and stratum 2) women between the ages of 60 and 69 undergoing fixation after admission to teaching hospitals from home for intertrochanteric fractures in 2016. If we classified each of the seven factors into two categories, there would be 128 strata. Researchers may estimate the causal effect of timing on death by averaging the stratum-specific effect across all strata.

We agree with Dr. Charalambous that the dependency graph may also point to factors amenable to intervention. Some factors may be considered immutable, whereby interventions do not have the potential to change the factor level. However, the underlying mechanism for their association may be modifiable and a suitable target for intervention. For example, fracture type is immutable. However, surgery type is modifiable. A recent article by Perry and colleagues pointed to inequalities in the use of arthroplasty

following hip fracture. (2) Targeting this inequity for intervention could yield benefits for patients with transcervical hip fracture.

We appreciate the interest in our article, which depicted the existing literature in the form of a dependency graph. We hope it will trigger new developments in understanding the factors and their relationships to improve care for this vulnerable population.

Katie Jane Sheehan, PhD

Boris Sobolev, PhD

Pierre Guy, PhD

## References

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