36 ICU Management: General Management in the Elderly in ICU

Basil Andreas Hatz, Franziska Ziegenhain, and Kai Oliver Jensen

Learning Objectives

- Highlight the need for special SOP for elderly.
- Know about the therapeutic options on ICU.
- Value the need for debate the admission to ICU with the patient/relatives prior to surgery.

36.1 Background

36.1.1 Frailty

Different approaches to describe the vulnerability of the geriatric patient can be found in literature. The most frequently applied terms are "frailty" and "biological age" [1, 2]. Frailty refers to a loss of the ability of an individual to cope with external stressors due to preexisting conditions. Frailty is not primarily defined by age; nevertheless, older people tend to have a higher incidence for frailty. Different scores have been developed to estimate the frailty of patients [2–4]. Most of them include parameters like nutritional status, ability to care for oneself, mobility, and comorbidities [1, 5, 6]. Frail patients are considered to have a higher biological age and are more likely to have adverse outcomes [5, 7]. For elderly patients who are administered to the ICU, a high frailty is a negative predictor for survival [5].

36.1.2 Preexisting Conditions

The majority of elderly trauma patient suffers from comorbidities. These preexisting conditions tend to complicate diagnostic processes and therapeutic decisions. When deciding if a patient needs intensive care, these comorbidities should be taken into consideration. A patient with a severe renal insufficiency might need perioperative intensive care to enhance the chances of survival. Furthermore, regular medication might alter the ability of the body to cope with trauma. For example, reactive tachycardia might be absent due to beta blockers [8, 9]. The prevalence of different comorbidities varies between countries. Nevertheless, the most frequently found diseases are very similar and are listed in Table 36.1 [10–12].

B. A. Hatz · F. Ziegenhain · K. O. Jensen (✉)
Department of Trauma, University Hospital Zurich, Zurich, Switzerland
e-mail: franziska.ziegenhain@usz.ch; kaioliver.jensen@usz.ch

H.-C. Pape et al. (eds.), *Textbook of Polytrauma Management*,
https://doi.org/10.1007/978-3-030-95906-7_36

Table 36.1 Most frequent comorbidities in geriatric trauma patients

Most common preexisting conditions [13–15]
• Cardiovascular diseases
• Hypertension
• Diabetes mellitus
• Neurodegenerative diseases
• Cancer
• Arthritis
• Chronic pulmonary diseases

36.1.3 Trauma Mechanism

The trauma mechanism in elderly patients does not necessarily indicate the severity of the injury. In younger trauma patients, severe multiple injuries occur from high energy trauma mechanism such as traffic accidents or falls from more than 3 m. In elderly multiple injured patients, low energy trauma mechanisms such as falls from less than 3 m results in severe injuries [16–18]. Most of these are domestic falls from a standing height. This leads to other injuries being suspected in elderly polytrauma patients than the injuries found in young polytraumatized patients with similar severity of the injuries [19–21].

36.1.4 Injury Severity

Elderly trauma patients mostly suffers severe injuries from low energy trauma mechanism [22]. The comorbidities and slower protective reflexes of geriatric patients rises the risk for severe injuries from minor trauma like tripping domestic falls. Younger patients mostly do not have severe comorbidities and can compensate stumbling falls with their reflexes. This makes severe injuries unlikely from minor trauma. Elderly patient may in same cases sustain multiple fractures or severe traumatic brain injury after a same-level fall [8].

36.2 ICU Treatment for Geriatric Polytrauma

36.2.1 General Considerations

Physiological changes in elderly patients greatly affect critical care management. Physiological reserve decreases by aging and seems to be an explanation for the higher mortality and long-term outcomes compared to younger patients [23]. Elderly trauma patients need different treatment approaches and options. Specific geriatric treatment systems with high-volume of geriatric patients seems to improve to overall outcome [10, 16, 17, 21, 22, 24]. A high index of suspicion for injury may help to recognize further impairment. Preexisting comorbidities may worsen small injuries. Thoracic contusions with rib fractures worsening a reduced lung function and rises the risk for pneumonia [11]. In addition, the risk for solid organ injury when rib fractures are present seems to be higher. Considering these conditions in intensive care treatment by consequent treatment adaptations can improve the outcome of elderly multiple injured patients [11]. Ethical considerations should also be noticed. For example, due to the high probability of adverse outcomes, an ICU admission with maximum medical care in a severely injured, frail, and unwilling geriatric patient may be ethically contraindicated [11, 12].

However, many critically injured elderly patients benefit from intensive care, and this option should not be ruled out based on patient age alone. We therefore recommend initiating intensive care when indicated, while closely defining and then frequently reevaluating what therapeutic option is best for the patient. Whenever possible, these options should be discussed with the patient directly. If this is not possible due to the patient's condition, the medical team should act according to the patient's health care directive if available. Family members are also an important resource to help determine the presumed will of the patient. If none of these options are available, the medical team must reach consensus on the treatment objective. For these reasons, the development of an SOP for assessing ICU admission and intensive care treatment in elderly polytraumatized patients would in our opinion be of tremendous help in every institution. In summary, before treatment can be initiated in critically injured geriatric patients, an assessment should be made to underline the need for it and reach a consensus within the treatment team and the relatives.

36.2.2 Development of Consensus Group

An interdisciplinary team approach improves the outcome in treatment of severely injured trauma patients. Primarily, the goal is to develop evidence-based SOPs for the trauma care of critically ill elderly patients in the ICU. An interdisciplinary international consensus group comprised of traumatologists, orthopedic surgeons, intensivists, anesthesiologists, medical ethics experts, and geriatricians experienced in the treatment of severely injured geriatric patients, and with previous experience in guideline development was therefore created (Table 36.2). This taskforce of the German trauma association section for geronto-traumatology (Sektion Alterstraumatologie der DGU®) has now begun the development of a guideline for the ICU admission for severely injured geriatric patients.

At the same time, the DGU consensus group started to generate an SOP for the treatment of severely injured geriatric patients in the ICU. In order to create a guideline which is easy to follow and understand, the group decided to organize the SOP into organ-based rather than problem-based chapters (Table 36.3). Since ethics play an especially important role in geriatric care, ethical considerations with different therapeutic options based on those considerations form a substantial component of the SOP.

Table 36.3 SOP chapters for the treatment of severely injured geriatric patients in the ICU

SOP chapters	
CNS	Delirium
	Reduced brain volume
Cardiovascular system	Volume management
	Transfusions
	Catecholamines
	Cardiovascular diseases
Coagulation	
Pulmonary system	Ventilator-associated pneumonia
	Thoracic trauma
	Tracheotomy
	Pulmonary diseases
Nephrology	Dialysis
Liver	
Pharmacology and medication	
Infectiology/ immunologic system	
Gastrointestinal tract	Nutrition
	Digestion
Musculoskeletal system	Frailty/preexisting condition
	Physiotherapy/ergotherapy
Skin	Decubitus
Externa	Pacemakers
	Catheter
Ethical problems	Therapy limitations
	Reanimation
	Comfort therapy

36.2.3 Therapeutic Options

Therapeutic decisions are based on the patient's desired therapeutic goals and the burdens and risks of potential treatment options. Advanced care planning, designed to ensure that patients receive their desired emergency care in the event of a life-threatening crisis, has been further developed in recent years. In Germany, a one-paged sheet with detailed patient wishes in the setting of acute illness or injury, referred to as Physician Orders for Life-Sustaining Treatment (POLST or ÄNo, in German) can be added to an advanced directive [12]. Based on these choices, three treatment options exist:

Table 36.2 Participating subspecialties of the interdisciplinary international consensus group

Participating subspecialties
Traumatology
Geriatric medicine
Intensive care medicine
Anesthesiology
Orthopedic surgery
Medical ethics

36.2.3.1 Option A

Option A is the standard option for patients without a known advanced directive. This treatment plan has the aim to keep the patient alive with all the medical interventions that are necessary. Mechanical resuscitation, intubation, necessary escalation of the therapy as well as the treatment of complications are included. Maximum care

should be administered to patients in this treatment group [12].

36.2.3.2 Option B

Option B represents a restricted version of Option A. This means, that due to the patient's situation, medical conditions and personal wishes, certain restrictions are formulated. A common limitation is the prohibition of mechanical resuscitation while still allowing drug resuscitation. Surgeries with a high risk or mortality are normally not a valid option. Smaller procedures with a clear benefit for the patient might be a good option and should be taken into consideration.

The four major treatment options that are patient can exclude are cardiopulmonary resuscitation, invasive ventilation, and ICU admission. In palliative situations, some patients might also exclude a hospital admission [12].

36.2.3.3 Option C

This last option refers to patients who are in a palliative situation. The care that they receive should be designed to maximize the comfort and quality of life. Extending the remaining life span is not a primary goal. To ensure the best possible supportive care, an admission to the ICU might still be an option and should be discussed [12].

36.3 Summary

The rising age in multiple injured trauma patients requires adapted treatment patterns. The elderly polytrauma patient on the ICU has other requirements, starting with the trauma mechanism which may be very low energy with yet a high impact on the severity of the injury. Although mostly minor trauma leads to a high injury severity score, the accompanying comorbidities and the reduced reflexes enhance the effect of an accident. These physiological changes must be considered in the treatment of elderly polytrauma patients. Therapeutic options from "full intervention" to "no intervention" with deep ethical considerations have great importance especially on the ICU.

Key Concepts

- Preexisting conditions, frailty, and ethical aspects influence treatment decisions in geriatric patients a lot.
- Admission to ICU is worth to debate with patients/relatives prior to interventions.
- There are different therapeutic options for geriatric patients on ICU.

Take Home Messages

- Treatment in the ICU has shown to improve outcomes despite older age.
- The indication for admission to the ICU should be addressed prior to any surgery with patients and/or relatives.
- SOPs should be available.
- Most principles of organ support require more subtle treatment than in younger patients.

References

1. Clegg A, Young J, Iliffe S, Rikkert MO, Rockwood K. Frailty in elderly people. Lancet. 2013;381(9868):752–62.
2. Pijpers E, Ferreira I, Stehouwer CD, et al. The frailty dilemma. Review of the predictive accuracy of major frailty scores. Eur J Intern Med. 2012;23:118–23.
3. de Vries NM, et al. Outcome instruments to measure frailty: a systematic review. Ageing Res Rev. 2011;10(1):104–14.
4. Juma S, et al. Clinical frailty scale in an acute medicine unit: a simple tool that predicts length of stay. Can Geriatr J. 2016;19(2):34–9.
5. Flaatten H, et al. The impact of frailty on ICU and 30-day mortality and the level of care in very elderly patients (≥80 years). Intensive Care Med. 2017;43(12):1820–8.
6. Kim S, et al. Multidimensional frailty score for the prediction of postoperative mortality risk. JAMA Surg. 2014;149(7):633–40.
7. Chen CL, et al. Frailty is associated with an increased risk of major adverse outcomes in elderly patients following surgical treatment of hip fracture. Sci Rep. 2019;9(1):19135.
8. Luchette FA, Yelon JA. Geriatric trauma and critical care. 2nd ed. Cham: Spinger; 2017.

9. Peck KA, et al. The impact of preinjury anticoagulants and prescription antiplatelet agents on outcomes in older patients with traumatic brain injury. J Trauma Acute Care Surg. 2014;76(2):431–6.
10. Peterer L, Ossendorf C, Jensen KO, Osterhoff G, Mica L, Seifert B, Werner CML, Simmen HP, Pape HC, Sprengel K. Implementation of new standard operating procedures for geriatric trauma patients with multiple injuries: a single level I trauma centre study. BMC Geriatr. 2019;19(1):359.
11. Brooks SE, Peetz AB. Evidence - based care of geriatric trauma patients. Surg Clin North Am. 2017;97(5):1157–74.
12. Friedemann Nauck GM, Jürgen in der Schmitten. Behandlung im Voraus planen – Bedeutung für die Intensiv- und Notfallmedizin Einleitung Befähigung als konstitutives Element von Patientenselbstbestimmung Ein neues Konzept: Behandlung im Voraus planen (Advance Care Planning) Ungelöste Herausforderunge.
13. GBD 2016 Disease and Injury Incidence and Prevalence Collaborators. Global, regional, and national incidence, prevalence, and years lived with disability for 328 diseases and injuries for 195 countries, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016. Lancet (London, England). 2017;390(10100):1211–59.
14. NCD Countdown 2030 Collaborators. NCD Countdown 2030: worldwide trends in non-communicable disease mortality and progress towards Sustainable Development Goal target 3.4. Lancet (London, England). 2018;392(10152):1072–88.
15. Jaul E, Barron J. Age-related diseases and clinical and public health implications for the 85 years old and over population. Front Public Health. 2017;5:335.
16. Spering C, Lefering R, Bouillon B, et al. It is time for a change in the management of elderly severely injured patients! An analysis of 126,015 patients from the TraumaRegister DGU®. Eur J Trauma Emerg Surg. 2019; https://doi.org/10.1007/s00068-019-01229-8.
17. Wutzler S, Lefering R, Laurer HL, et al. Veränderungen in der Alterstraumatologie. Eine Analyse an 14.869 Patienten aus dem deutschen Traumaregister. [Changes in geriatric traumatology. An analysis of 14,869 patients from the German Trauma Registry]. Unfallchirurg. 2008;111(8):592–8. https://doi.org/10.1007/s00113-008-1448-2.
18. Ziegenhain F, Scherer J, Kalbas Y, Neuhaus V, Lefering R, Teuben M, Sprengel K, Pape HC, Jensen KO. The Trauma Register Dgu. Age-Dependent patient and trauma characteristics and hospital resource requirements-can improvement be made? an analysis from the german trauma registry. Medicina (Kaunas). 2021;57(4):330. https://doi.org/10.3390/medicina57040330. PMID: 33915888; PMCID: PMC8066778.
19. Sterling DA, O'Connor JA, Bonadies J. Geriatric falls: injury severity is high and disproportionate to mechanism. J Trauma Acute Care Surg. 2001;50(1):116–9.
20. Brown CV, Rix K, Klein AL, Ford B, Teixeira PG, Aydelotte J, Coopwood B, Ali S. A comprehensive investigation of comorbidities, mechanisms, injury patterns, and outcomes in geriatric blunt trauma patients. Am Surg. 2016;82(11):1055–62.
21. Kocuvan S, Brilej D, Stropnik D, Lefering R, Komadina R. Evaluation of major trauma in elderly patients – a single trauma center analysis. Wien Klin Wochenschr. 2016;128(Suppl 7):535–42.
22. Frohlich M, et al. Do elderly trauma patients receive the required treatment? Epidemiology and outcome of geriatric trauma patients treated at different levels of trauma care. Eur J Trauma Emerg Surg. 2019;46(6):1463–9.
23. Jensen KO, Lempert M, Sprengel K, Simmen HP, Pothmann C, Schlögl M, Bischoff-Ferrari HA, Hierholzer C, Pape HC, Neuhaus V. Is there any difference in the outcome of geriatric and non-geriatric severely injured patients?-a seven-year, retrospective, observational cohort study with matched-pair analysis. J Clin Med. 2020;9(11):E3544.
24. Grimshaw JM, Russell IT. Effect of clinical guidelines on medical practice: a systematic review of rigorous evaluations. Obstet Gynecol Surv. 1993;342(8883):1317–22.