



Impact of quantity and quality of ICU staff on outcome - SepsEast at a glance

ALAN ŠUSTIĆ, MD, PHD

FACULTY OF MEDICINE & FACULTY OF HEALTH STUDIES

UNIVERSITY OF RIJEKA, CROATIA

alan.sustic@uniri.hr

- **Outline**

Who is the staff at the ICU?

What is the optimal quantity (number) of ICU staff?

Impact of quantity on patient outcome

How to define the quality of ICU staff?

Impact of staff education on patient outcome

SepsEast (Central-Eastern European countries) at a glance

Conclusion

Who is the staff at the ICU?

„The critical care team is a group of specially trained caregivers who work in a special area of the hospital known as the intensive care unit.” (sccm.org)

1. Physician (intensivist)
2. Critical care nurse
3. Respiratory therapist
4. Physical therapist
5. Dietitian (Clinical nutritionist)
6. Pharmacist
7. Etc.

What is the optimal quantity (number) of ICU staff?

How to estimate it?

- Nurse / Patient ratio
- Physician / Patient ratio
- Respiratory therapist / Patient ratio

- Nurse / ICU bed ratio
- Physician / Nurse ratio
- Resident / Intensivist ratio

What is the optimal quantity (number) of ICU staff?

Nurse / Patient ratio

The Impact of Hospital and ICU Organizational Factors on Outcome in Critically Ill Patients: Results From the Extended Prevalence of Infection in Intensive Care Study*

Yasser Sakr, MD, PhD¹; Cora L. Moreira, MD¹; Andrew Rhodes, MBBS²; Niall D. Ferguson, MD³; Ruth Kleinpell, PhD, RN, FCCM⁴; Peter Pickkers, MD⁵; Michael A. Kuiper, MD, PhD, FCCM^{6,7}; Jeffrey Lipman, MD⁸; Jean-Louis Vincent, MD, PhD, FCCM⁹; on behalf of the Extended Prevalence of Infection in Intensive Care Study Investigators

Conclusions: In this international large cohort of ICU patients
Setting: All 1,265 ICUs in 75 countries that contributed to the 1-day point prevalence Extended Prevalence of Infection in Intensive Care study.

in large prospective studies that consider additional country-specific ICU practice variations. (*Crit Care Med* 2015; 43:519–526)

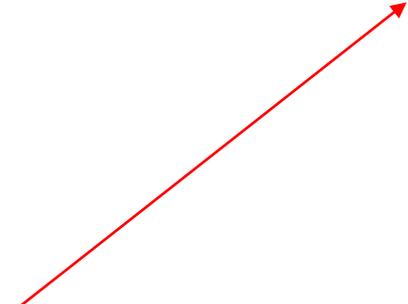
What is the optimal quantity (number) of ICU staff?

Nurse / Patient ratio

The Impact of Hospital and ICU Organizational Factors on Outcome in Critically Ill Patients: Results From the Extended Prevalence of Infection in Intensive Care Study*

Yasser Sakr, MD, PhD¹; Cora L. Moreira, MD¹; Andrew Rhodes, MBBS²; Niall D. Ferguson, MD³; Ruth Kleinpell, PhD, RN, FCCM⁴; Peter Pickkers, MD⁵; Michael A. Kuiper, MD, PhD, FCCM^{6,7}; Jeffrey Lipman, MD⁸; Jean-Louis Vincent, MD, PhD, FCCM⁹; on behalf of the Extended Prevalence of Infection in Intensive Care Study Investigators

two nurses : three patients!!



A nurse:patient ratio of more than **1:1.5** on the study day was independently associated with a lower risk of in-hospital death.

What is the optimal quantity (number) of ICU staff?

Physician / Patient ratio

Intensivist/Patient Ratios in Closed ICUs: A Statement From the Society of Critical Care Medicine Taskforce on ICU Staffing

Nicholas S. Ward, MD, FCCM¹; Bekele Afessa, MD²; Ruth Kleinpell, PhD, RN, FCCM³;
Samuel Tisherman, MD, FCCM⁴; Michael Ries, MD, FCCM⁵; Michael Howell, MD, MPH⁶;
Neil Halpern, MD, FCCM⁷; Jeremy Kahn, MD, MS⁸; for the Members of Society of Critical Care
Medicine Taskforce on ICU Staffing[†]

academic medical ICUs, there is evidence that intensivist/patient ratios less favorable than 1:14 negatively impact education, staff well-being, and patient care. (*Crit Care Med* 2013; 41:638–645)

What is the optimal quantity (number) of ICU staff?

Respiratory therapist / Patient ratio

Respiratory Therapy Organizational Changes Are Associated With Increased Respiratory Care Utilization

Ann M Parker MD, Xinggang Liu MD, Anthony D Harris MD MPH, Carl B Shanholtz MD,
Robin L Smith RRT, Dean R Hess PhD RRT FAARC,
Marty Reynolds, and Giora Netzer MD MSCE

[Respir Care 2013;58(3):438–449. © 2013 Daedalus Enterprises]

What this paper contributes to our knowledge

An increase in respiratory therapist-to-patient ratio in the ICU, from 1:14 to **1:10** coupled with a core staffing model and intensive orientation program, increased the utilization of daily spontaneous breathing trials, collection of lower respiratory tract cultures for diagnosis of ventilator-associated pneumonia, chest physical therapy, and inhaled nitric oxide. The cumulative impact on patient costs and outcomes was not assessed.

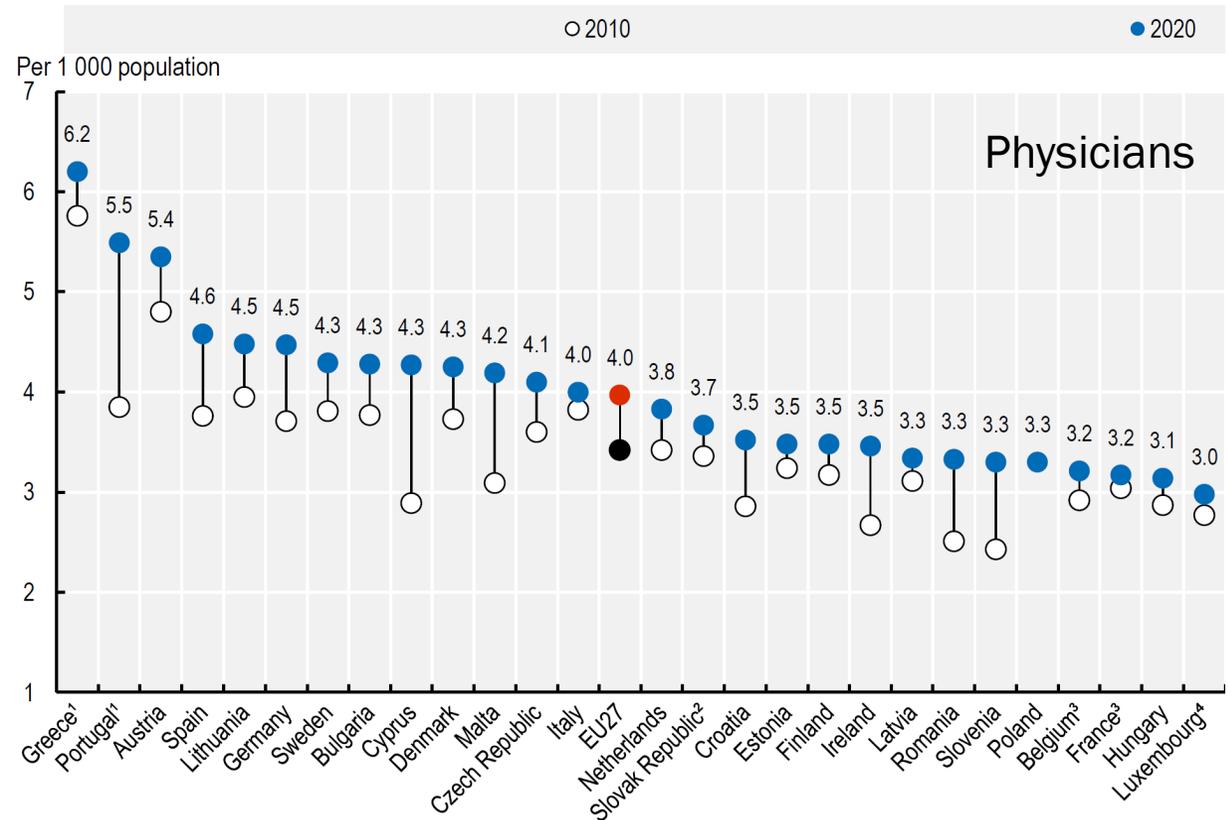
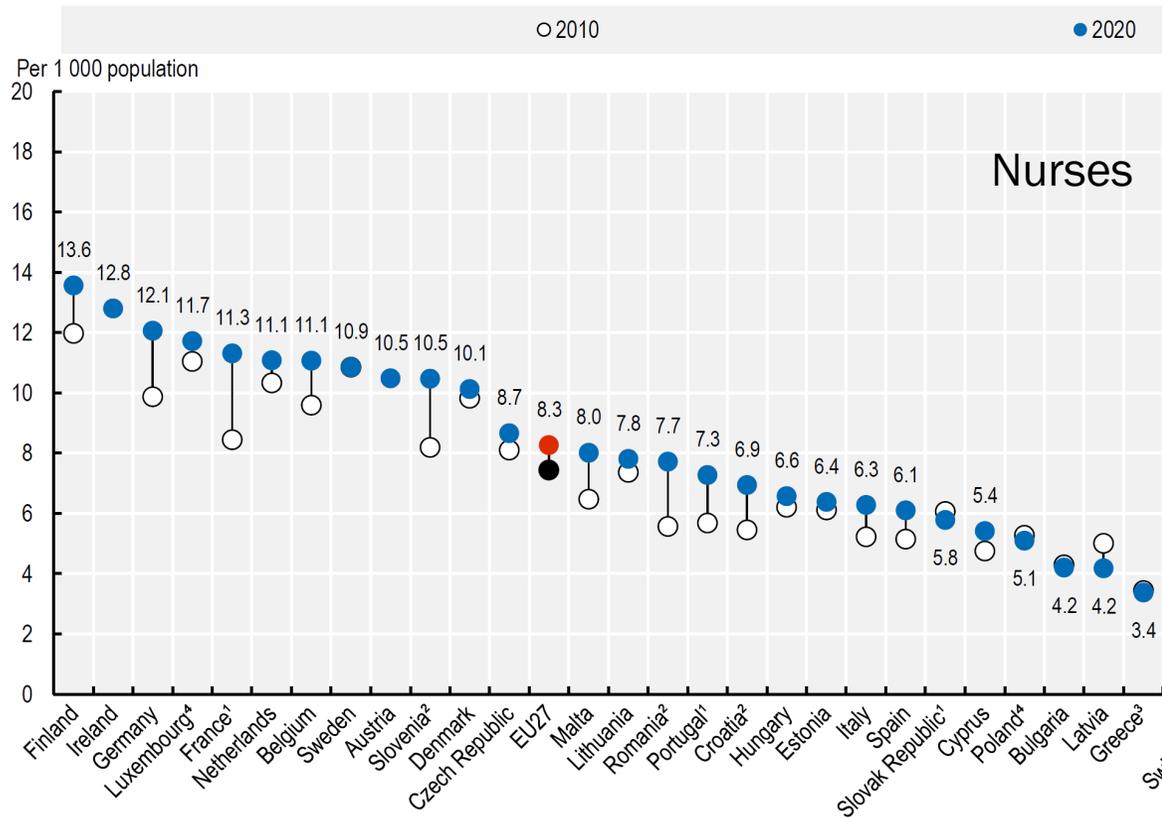
Impact of quantity on patient outcome

Nurse staffing and patient outcomes in critical care: A concise review

Daleen Aragon Penoyer, PhD, RN, CCRP, FCCM

***Conclusions:* Findings from this review demonstrate an association of nurse staffing in the intensive care unit with patient outcomes and are consistent with findings in studies of the general acute care population. A better understanding of nurse staffing needs for intensive care unit patients is important to key stakeholders when making decisions about provision of nurse resources. Additional research is necessary to demonstrate the optimal nurse staffing ratios of intensive care units. (Crit Care Med 2010; 38:1521–1528)**

Impact of quantity on patient outcome



Impact of quantity on patient outcome

Figure 7.17. Ratio of nurses to doctors, 2020 (or nearest year)

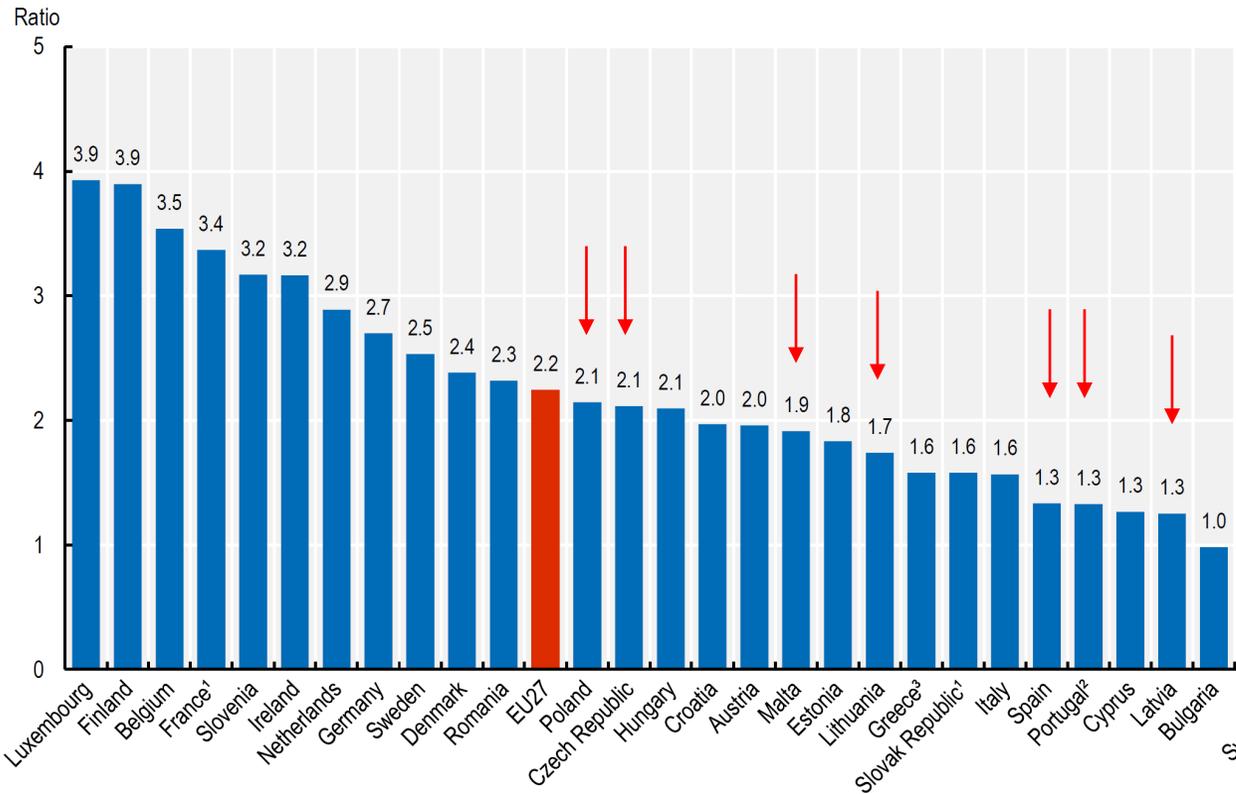
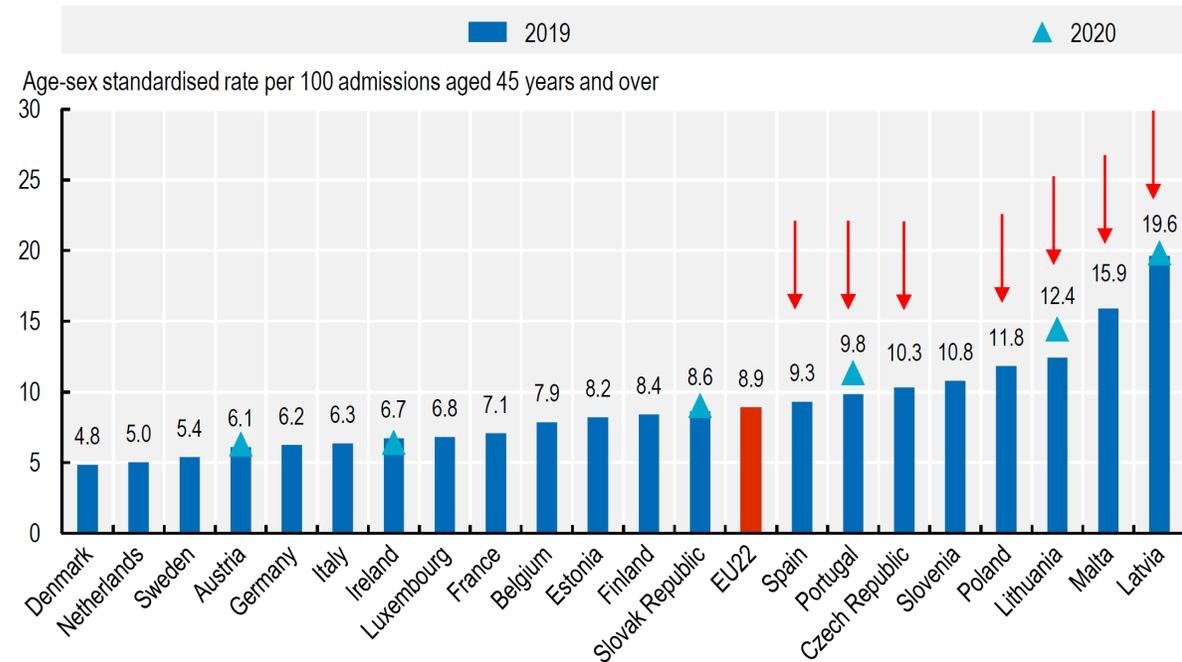


Figure 6.16. Thirty-day mortality after admission to hospital for ischaemic stroke 2019 (or nearest year) and 2020



How to define the quality of ICU staff?

Specially trained staff to work in the ICU environment:

Physician - intensivist

Nurse

- a registered nurse (RN) who is certified in critical care (CCRN).
- Master's degree in (Critical Care) Nursing (MSc).

Impact of staff education on patient outcome

Nurse:

THELANCET-D-13-06534

S0140-6736(13)62631-8

Embargo: February 26, 2014—00:01 (GMT)

Articles

NH

Version 1

This version saved: 10:49, 20-Feb-14

Findings An increase in a nurses' workload by one patient increased the likelihood of an inpatient dying within 30 days of admission by 7% (odds ratio 1.068, 95% CI 1.031–1.106), and every 10% increase in bachelor's degree nurses was associated with a decrease in this likelihood by 7% (0.929, 0.886–0.973). These associations imply that patients in hospitals in which 60% of nurses had bachelor's degrees and nurses cared for an average of six patients would have almost 30% lower mortality than patients in hospitals in which only 30% of nurses had bachelor's degrees and nurses cared for an average of eight patients.

Impact of staff education on patient outcome

Critical Care Nurse:

Published in final edited form as:

Crit Care Med. 2014 May ; 42(5): 1089–1095. doi:10.1097/CCM.000000000000127.

Impact of Critical Care Nursing on 30-Day Mortality of Mechanically Ventilated Older Adults

Deena M. Kelly, PhD, RN¹, Ann Kutney-Lee, PhD, RN², Matthew D. McHugh, PhD, JD, MPH, RN, CRNP, FAAN^{2,3}, Douglas M. Sloane, PhD², and Linda H. Aiken, PhD, FAAN, FRCN, RN²

Conclusions—Patients in hospitals with better critical care nurse work environments and higher proportions of critical care nurses with a bachelor’s degree in nursing experienced significantly lower odds of death.

Impact of staff education on patient outcome

Physician (intensivist)

Published in final edited form as:

Ann Intern Med. 2008 June 3; 148(11): 801–809.

Association between Critical Care Physician Management and Patient Mortality in the Intensive Care Unit

Mitchell M. Levy, MD, John Rapoport, PhD, Stanley Lemeshow, PhD, Donald B. Chalfin, MD, MS, Gary Phillips, MAS, and Marion Danis, MD

Brown University, Providence, Rhode Island; Mount Holyoke College, South Hadley, Massachusetts; Ohio State University College of Health, Columbus, Ohio; Albert Einstein College of Medicine, New York, New York; and National Institutes of Health, Bethesda, Maryland

Conclusion—In a large sample of ICU patients in the United States, the odds of hospital mortality were higher for patients managed by critical care physicians than those who were not. Additional studies are needed to further evaluate these results and clarify the mechanisms by which they might occur.



SepsEast at a glance

Physicians:

- mostly intensivists and usually equally educated as in other EU countries.

Nurses:

- no formal education for CCN (except Lithuania),
- there is no mandatory educational standard for ICU nurses and
- therefore, there is an excessive deficit of educated ICU nurses.

ICU staff:

- respiratory therapists, physiotherapists, clinical nutritionist and pharmacists are not full-time ICU employees.

SepsEast at a glance

Vincent et al. *Critical Care* (2022) 26:310
<https://doi.org/10.1186/s13054-022-04182-y>

Critical Care

PERSPECTIVE

Open Access

Ten areas for ICU clinicians to be aware of to help retain nurses in the ICU

Jean-Louis Vincent^{1*}, Carole Boulanger², Margo M. C. van Mol³, Laura Hawryluck⁴ and Elie Azoulay⁵



Recognition, respect, and value

Acknowledgment of important role; recognition of high levels of training, knowledge and skills, situational awareness and crisis management skills, and personal qualities and commitment/ dedication as individuals

Role and responsibility

Recognition of responsibilities in complex patient resuscitation and management, recognition of deterioration and patient safety events, involvement in complex decision-making

Intellectual stimulation and professional development

Encouragement, mentorship, and support in development of new knowledge, skills career opportunities and growth

Teaching opportunities

Encourage leadership role, mentor and support while creating teaching opportunities to other nurses, doctors..., at (inter)national meetings

Good leadership and management

Positive, constructive feedback to encourage development of new expertise, promote engagement and encourage in quality of care, patient safety and research

Team work/collaborative practice

Active involvement within team, participation in unit activities

Clinical discussion and exchange

Sharing, initiating education opportunities and formal/informal open discussions about pathophysiology of illnesses, patient care, and safety

Good work-life balance/wellness/rehumanizing the workplace

Explore, discuss acceptable working hours (part-time?), ensure supportive team structures to promote and allow safe workloads, adequate breaks and opportunities for self care

Psychological support

Normalize mental health impact of care, promote team debriefings and individual support, promote collegial support, promote access to professional support, access to wellness initiatives

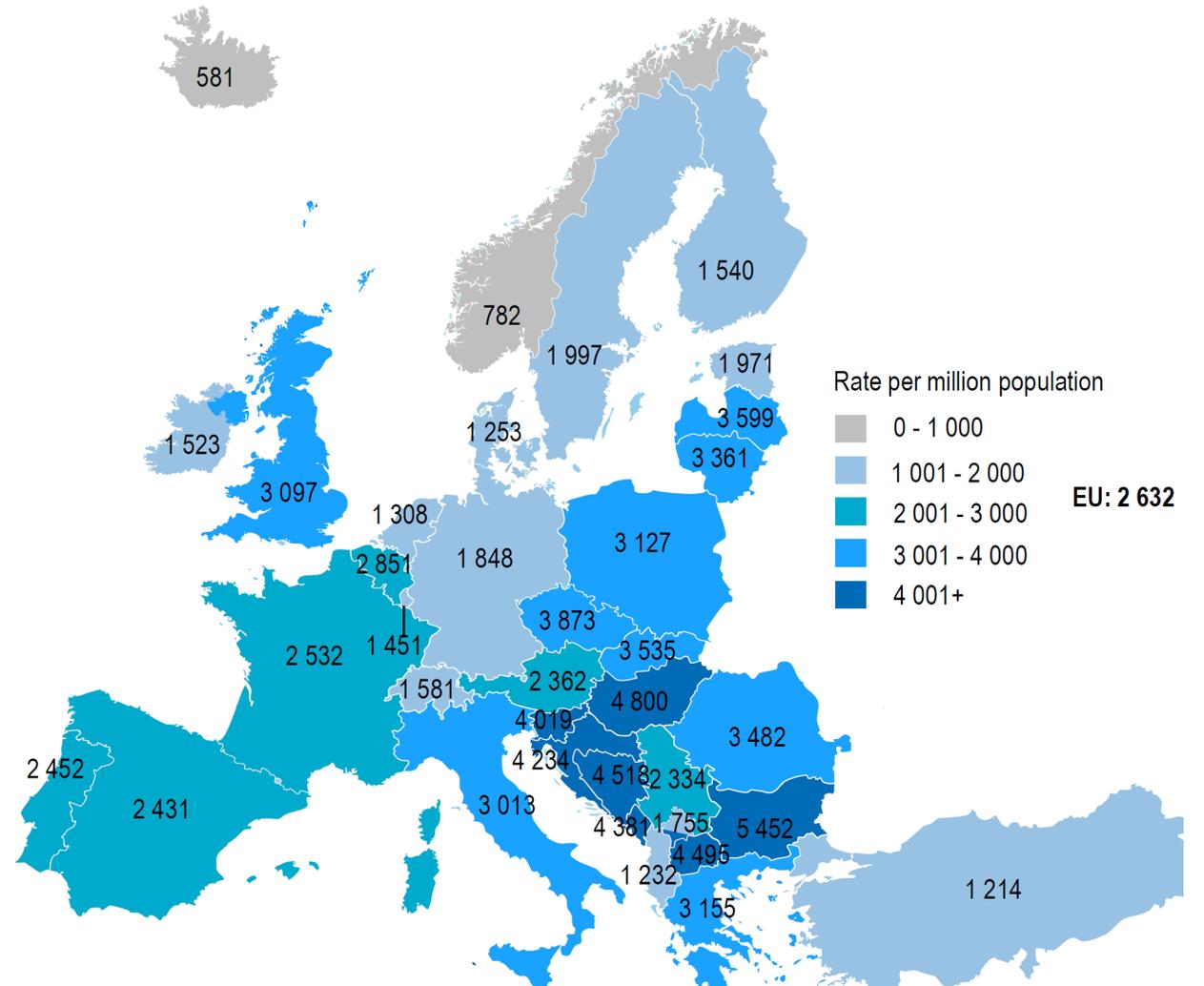
Humane care

Promote recognition of the person in patient and family care, promote participation in end-of-life discussions and team collaboration to understand the uniqueness of each situation/its impact on all involved and implications on communication and how the end-of-life should be approached to convey respect for patients/families in decision-making on treatment goals and limits, and during withholding/withdrawing of life-sustaining treatment or palliative care

SepsEast at a glance

COVID – 19 mortality

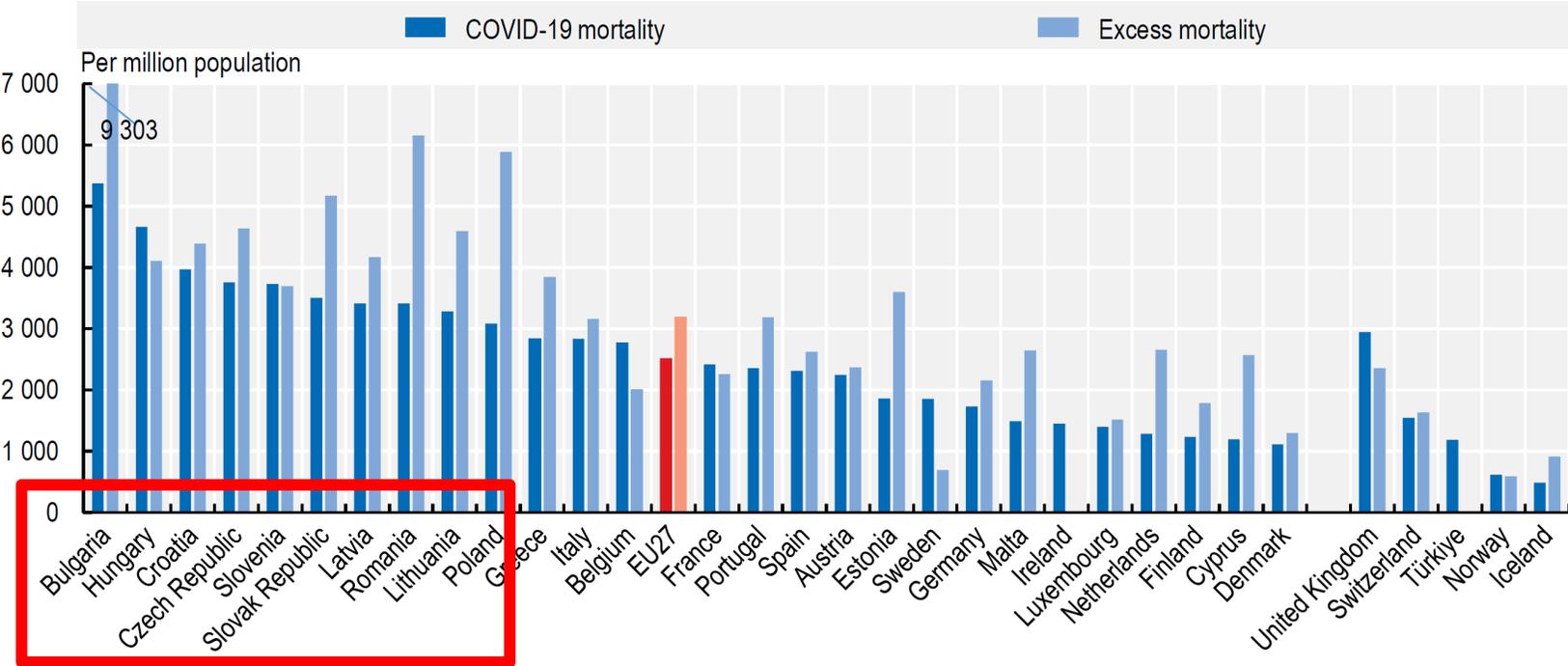
Figure 3.5. COVID-19 mortality, March 2020 to October 2022



SepsEast at a glance

COVID – 19 mortality

Figure 3.6. COVID-19 mortality and excess mortality, March 2020 to June 2022



scientific reports



OPEN

SepsEast Registry indicates high mortality associated with COVID-19 caused acute respiratory failure in Central-Eastern European intensive care units

Jan Benes^{1,2,3,23}, Miłosz Jankowski^{4,5,23}, Konstanty Szuldrzynski^{4,5}, Roman Zahorec⁶, Mitja Lainscak^{7,8}, Zoltán Ruskai⁹, Matej Podbregar^{8,10}, Jan Zatloukal^{1,2}, Jakub Kletecka^{1,2}, Krzysztof Kusza¹¹, Jakub Szrama¹¹, Estera Ramic¹², Katarina Galkova¹³, Stefan Krbila¹⁴, Josef Valky¹⁵, Jaka Ivanic¹⁶, Marko Kurnik¹⁰, Angéla Mikó⁹, Tamás Kiss¹⁷, Barbara Hetényi¹⁷, Peter Hegyi^{18,19,20}, Alan Sustic^{12,21} & Zsolt Molnar^{11,19,22}

COVID – 19 mortality: Switzerland

Established in 1871

Swiss Medical Weekly

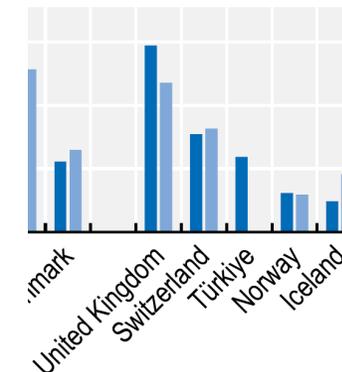
Formerly: Schweizerische Medizinische Wochenschrift
An open access, online journal • www.smw.ch

Original article | Published 20 June 2022 | doi:10.4414/SMW.2022.w30183
Cite this as: Swiss Med Wkly. 2022;152:w30183

Critical care staffing ratio and outcome of COVID-19 patients requiring intensive care unit admission during the first pandemic wave: a retrospective analysis across Switzerland from the RISC-19-ICU observational cohort

Marie-Madlen Jeitziner^{a*}, André Moser^{b*}, Pedro D Wendel-Garcia^c, Matthias Thomas Exl^a, Stefanie Keiser^c, Reto A. Schuepbach^c, Urs Pietsch^d, Sara Cereghetti^e, Filippo Boroli^e, Julien Marrel^f, Anne-Aylin Sigg^c, Hatem Ksouri^g, Peter Schott^h, Alexander Dullenkopfⁱ, Isabelle Fleisch^j, Antje Heise^k, Jean-Christophe Laurent^l, Stephan M. Jakob^a, Matthias P. Hilty^{c*}, Yok-Ai Que^{a*}, RISC-19-ICU Investigators for Switzerland^m

to-critical care staffing ratio. Median of daily patient-to-nurse ratio started at 1.0 [IQR 0.5–1.5; calendar week 9] and peaked at 2.4 [IQR 0.4–2.0; calendar week 16), while



Conclusion

Most likely, the main reason for the high mortality associated with COVID-19 caused acute respiratory failure in Central-Eastern European intensive care units is the insufficient number and inadequate training of nurses and other non-physician staff.

The lesson from the COVID-19 pandemic

In order to avoid such catastrophic outcomes in the future, adequate education of a sufficient number of nurses in intensive care medicine should be a priority for health policy makers in Central-Eastern European countries and should begin as soon as possible.



Thank you for attention!