

Carbapenem Resistant *Acinetobacter Baumannii* am USZ

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Centers for Disease
Control and Prevention

CARBAPENEM-RESISTANT **ACINETOBACTER**

THREAT LEVEL **URGENT**



8,500

Estimated cases
in hospitalized
patients in 2017



700

Estimated
deaths in 2017

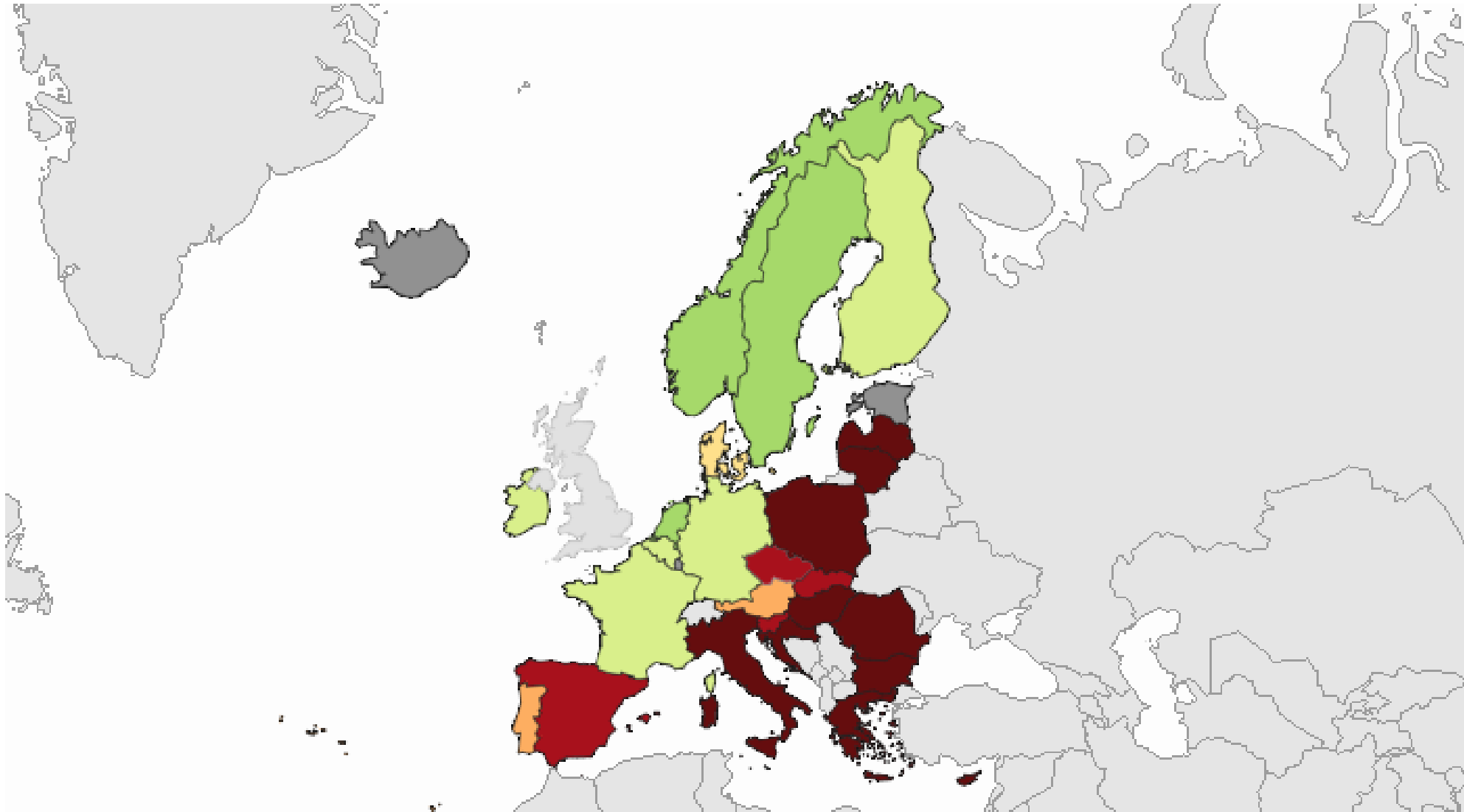


\$281M

Estimated attributable
healthcare costs in 2017

Acinetobacter bacteria can survive a long time on surfaces. Nearly all carbapenem-resistant *Acinetobacter* infections happen in patients who recently received care in a healthcare facility.

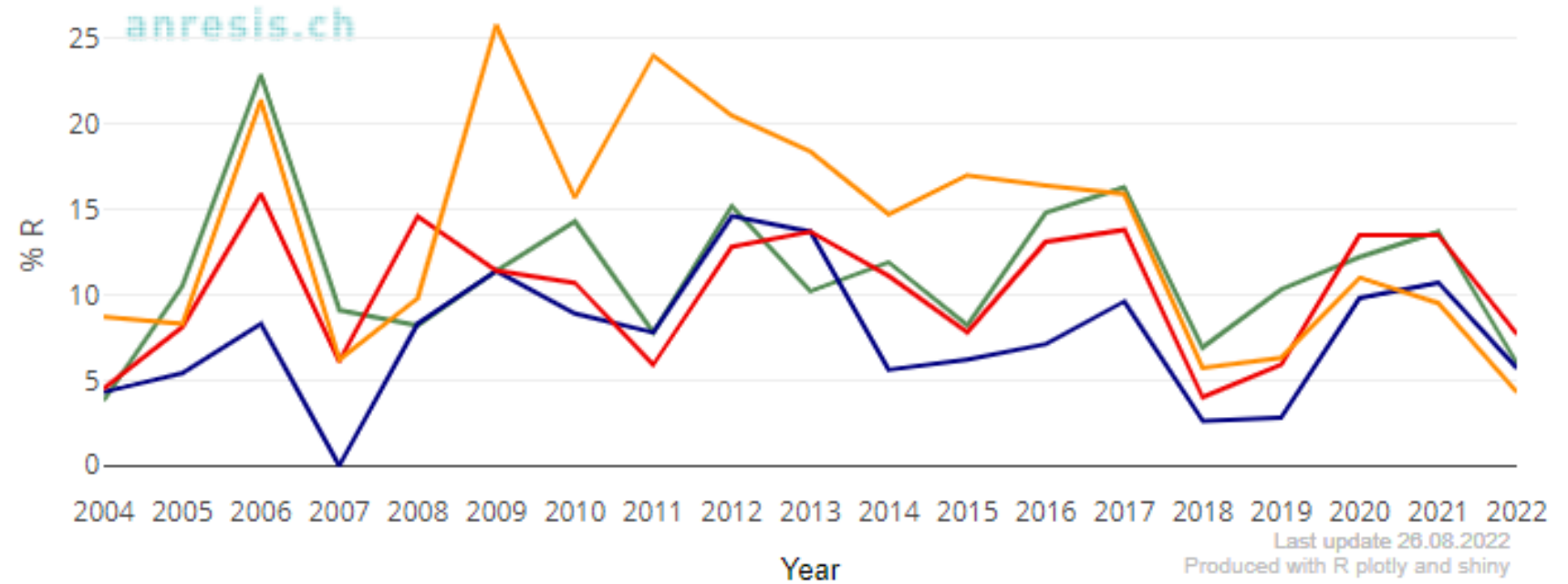
2021



Und in der Schweiz?

Select Antibiotics

- Aminoglycosides
- Carbapenems
- Ciprofloxacin
- Trimethoprim-sulfamethoxazole



Massnahmen I

- Bildung eines Outbreakteams
- Kontaktisolation kolonisierter/infizierter Patienten
- Räumliche Separierung/Kohortierung
- Dedicated nursing
- Trennung Hydrotherapie/OPs kolonisierte und nicht-kolonisierte Patienten
- Abteilungs-Screening der negativen Patienten 1x/Woche
- Beobachtungen von Arbeitsabläufen auf der Intensivstation als auch zugehörigen OP
- Information/Sensibilisierung aller auf der IPS vertretenen Berufsgruppen
- Intensivierung Reinigung/Desinfektion
- H₂O₂-Vernebelung im OP, multiple Räume Intensivstation

Massnahmen II

- Vermehrte Präsenz vor Ort auf Normalstation mit Verlegungen kolonisierter Patienten
- Kontaktisolation und Screening von Stationspatienten, die in der Hydrotherapie-Badewanne behandelt werden
- Schulungen zur Standardmassnahmen und Isolationsmassnahmen
- Förderung von Speaking up
- Wiederholter Aufnahmestopp für Nicht-Brandverletzte

Wie kam es zu den Übertragungen?

Kein Hinweis auf eine Übertragung ausgehend von einer Punktquelle in Umgebungsuntersuchungen

- High-touch Oberflächen
- Wassersysteme
- Hydrotherapie
- Luftproben in OP-Sälen
- Medical devices mit Einsatz bei mehreren Patienten z.B. Sonographie, Intubationshilfen, Visitenwagen

Propagated outbreak mit Übertragung via Hände und indirekt über Gegenstände, Übertragungen v.a. in Phasen

- mit hoher Patientenzahl
- ohne dedicated nursing von kolonisierten Patienten
- hohen Anteil an «Hilfspersonal» von anderen IPSen

Was haben andere zur outbreak control gemacht?

carbapenem resistant acinetobacter baumannii outbreak

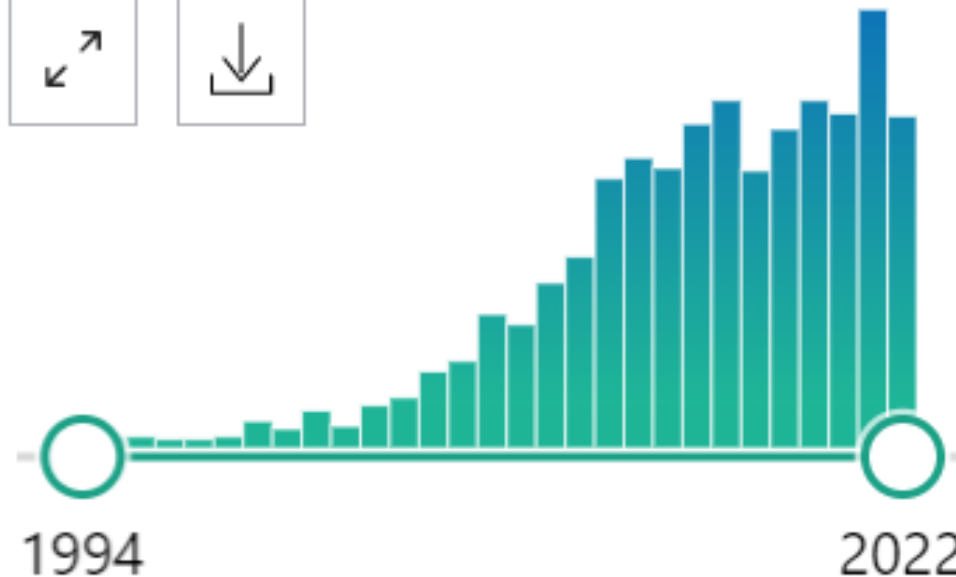
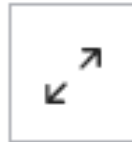


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RESULTS BY YEAR

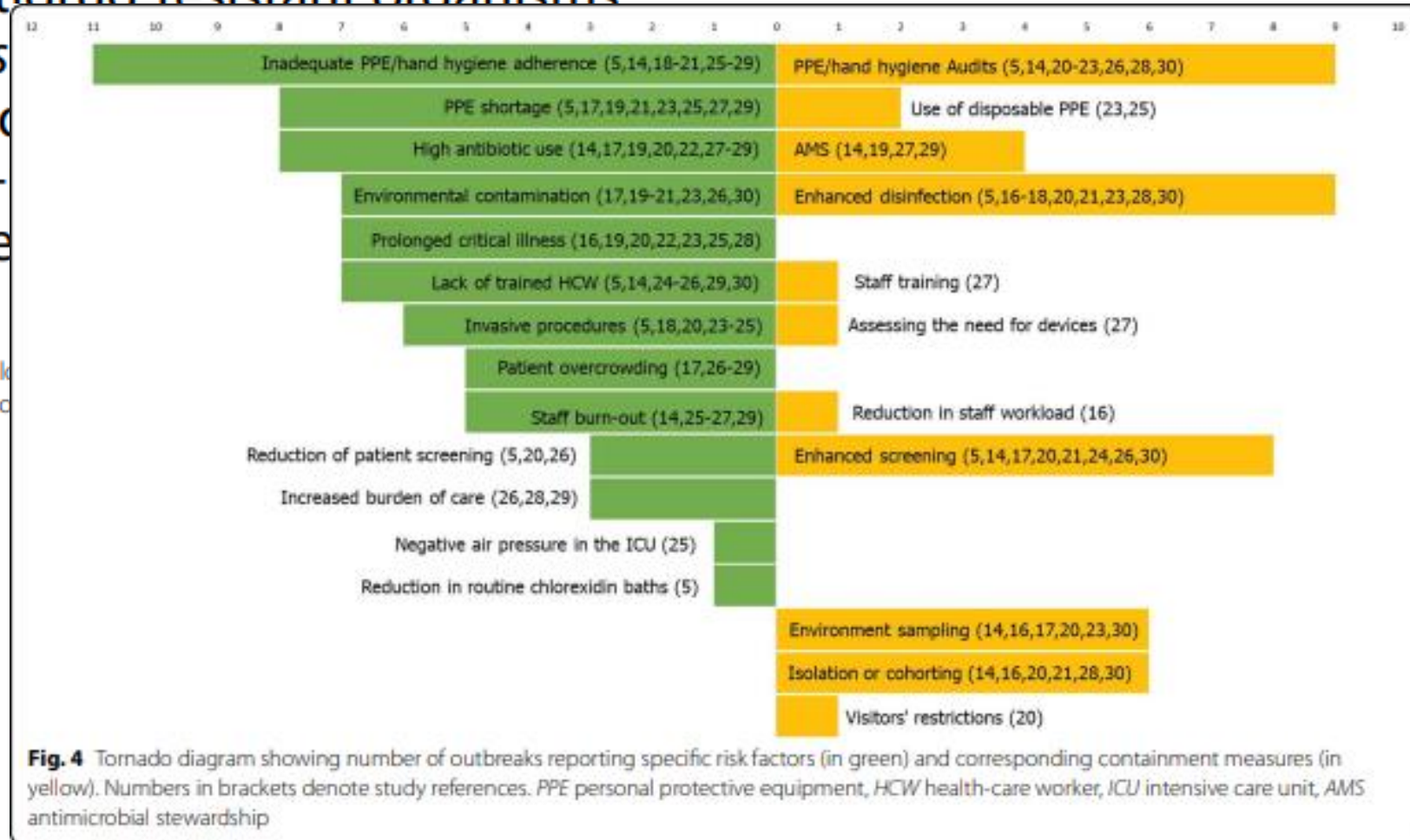


Was haben andere zur outbreak control gemacht?

The challenge of preventing and containing outbreaks of multidrug-resistant organisms

and *Candida auris* disease 2019 pandemic of a carbapenem-resistant *baumannii* outbreak of the literature

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Was



Review
Is It P
baum
Filippo Me
Gabriella C

Study	HH Compliance/AHR Consumption	Active Rectal Screening (Targeted/Universal)	Additional Active Screening Strategies	Contact Isolation /Alert Code	Daily Chlorhexidine Baths	Cohorting Staff/patients	Closure/Stop Admissions	Environmental Disinfection	Environmental Cultures	Monitoring of Environmental Cleaning	Genotyping	Antimicrobial Stewardship/Monitoring of Antibiotic Consumption	Training /Education	Outcome
Perez et al., 2020 [19]	Yellow	Red	Green	Green	Grey	Green	Grey	Green	Green	Green	Green	Grey	Green	Green
Cho et al., 2014 [26]	Yellow	Red	Green	Green	Grey	Green	Grey	Green	Green	Green	Green	Grey	Green	Green
Munoz-Price et al., 2014 [27]	Yellow	Red	Green	Green	Grey	Green	Grey	Green	Green	Green	Green	Grey	Green	Green
Valencia-Martin et al., 2019 [28]	Yellow	Red	Green	Green	Grey	Green	Grey	Green	Grey	Green	Green	Grey	Green	Green
Enfield et al., 2014 [29]	Yellow	Red	Green	Green	Grey	Green	Grey	Green	Grey	Green	Green	Grey	Green	Green
Karampatakis et al., 2018 [30]	Yellow	Green	Grey	Green	Grey	Green	Grey	Green	Green	Grey	Red	Green	Green	Red
Eckardt et al., 2022 [31]	Yellow	Green	Green	Green	Grey	Grey	Green	Green	Red	Green	Green	Green	Green	Green
Chung et al., 2015 [32]	Yellow	Green	Green	Green	Grey	Grey	Green	Green	Red	Green	Green	Green	Green	Green
Meschiari et al., 2020 [33]	Green	Red	Red	Green	Grey	Green	Grey	Green	Red	Red	Green	Green	Grey	Green
Zhao et al., 2019 [34]	Green	Red	Red	Green	Grey	Green	Grey	Green	Red	Red	Green	Green	Grey	Green
Ben-chetrit et al. [35]	Yellow	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Metan et al., 2019 [36]	Yellow	Green	Green	Green	Green	Green	Green	Green	Grey	Grey	Green	Grey	Grey	Green
All studies	Yellow	Yellow	Green	Green	Green	Green	Red	Green	Red	Green	Green	Green	Green	Green

Green	Measure implemented and described
Red	Measure not implemented
Yellow	Measure implemented but not described
Grey	Measure not described

USZ

Legend: AHR, alcohol-based hand rubs; BA, before and after study; BHI, brain–heart infusion medium; CMA, centered moving average; CRAB, carbapenem-resistant *Acinetobacter baumannii*; CRAB_ID CRAB, incidence density; CS, cross-sectional study; DDD, defined daily doses; ERIC-PCR, Enterobacterial repetitive intergenic consensus; HH, hand hygiene; ICU, intensive care unit; NA, not available; PGFE, pulsed-field gel electrophoresis; BA, before and after analysis; WGS, whole-genome sequencing.

Nurse-to-patient ratio and HAIs

Table 3. Association of Nurse Staffing and HAIs (*n* = 448 826)^a

Variables	HR (95% CI)	<i>P</i>
RN understaffing ^b (0 as reference group)		
1	1.00 (0.92–1.09)	0.98
2	1.15 (1.02–1.30)	0.024
NS understaffing (0 as reference group)		
1	1.05 (0.97–1.12)	0.226
2	1.11 (1.01–1.21)	0.031

Abbreviations: 95% CI, 95% confidence interval; HAI, healthcare associated infection; HR, hazard ratio; NS, nursing supporting staff; RN, registered nurse.

^aModel is controlled for patient individual risks such as demographics, comorbidity, medical procedures and treatments, unit patient turnover, unit types, and data year.

^bUnderstaffing and skill mix are both calculated by comparing with 80% of median in the unit and shift: 0 = neither day nor night shift was understaffed, 1 = 1 of the shifts was understaffed, and 2 = both shifts were understaffed.

Setting

- Hospital system with 3 campuses located in a large, metropolitan US city with more than 2000 beds and more than 100 000 patient discharges annually.
- Years 2007-2012
- 100 264 Patienten, 4390 HAIs

Statistical analysis

- Multivariable Cox proportional hazard model
- Staffing 2 days prior to HAI onset, treated as time-varying covariate
- Adjustment for unit types, patient turnover, year and patient individual risks

J Nurs Adm. 2019 May; 49(5): 260–265.

Nurse-to-patient and physician-to-patient ratio: mortality

TABLE 2. Characteristics of Shifts Without Any Death or With At Least One Death

	Shifts Without Death (n = 11,251)	Shifts With ≥ 1 Death (n = 415)	Unadjusted RR (95% CI)	Adjusted RR (95% CI)
Patients-to-nurse ratios (%)				
< 1:1	290 (2.6)	5 (1.2)	1	1
1:1–1.5:1	2,748 (24.4)	91 (21.9)	1.6 (0.8–2.9)	1.9 (0.7–4.6)
1.5:1–2:1	5,143 (45.7)	181 (43.7)	1.7 (0.9–3.1)	2.0 (0.8–5.0)
2:1–2.5:1	2,461 (21.9)	103 (24.8)	1.8 (0.9–3.2)	2.3 (0.9–5.8)
> 2.5:1	609 (5.4)	35 (8.4%)	2.2 (1.2–4.3)	3.5 (1.3–9.1) ^a
Patients-to-physician ratios (%)				
< 8	8,144 (72.4)	256 (61.7)	1	1
8:1–10:1	1,391 (12.4)	59 (14.2)	1.0 (0.8–1.3)	0.9 (0.7–1.3)
10:1–14:1	1,408 (12.5)	74 (17.8)	1.0 (0.8–1.3)	1.1 (0.8–1.5)
> 14:1	308 (2.7)	26 (6.3)	1.5 (1.0–2.1)	2.0 (1.3–3.2) ^a
Residents-to-physicians ratio (sd)	0.27 (0.26)	0.26 (0.25)	0.7 (0.4–1.1)	0.9 (0.5–1.5)
Mean patient turnover (sd) ^b	6.8 (9.2)	7.8 (11)	2.3 (1.1–4.7)	5.6 (2.0–15.0) ^c
Mean number of life-sustaining procedure (sd) ^d	1.3 (0.4)	1.4 (0.4)	4.4 (3.5–5.4)	5.9 (4.3–7.9) ^c
Mean proportion of men (sd)	0.6 (0.1)	0.6 (0.1)	1.6 (0.9–2.8)	1.8 (0.8–3.8)
Mean proportion of surgical cases (sd)	0.6 (0.3)	0.6 (0.3)	0.6 (0.4–1.0)	0.5 (0.2–1.1)
Mean Simplified Acute Physiology Score II ^e (sd)	50 (11)	52 (11)	1.5 (1.4–1.7)	1.5 (1.3–1.7) ^c
Mean number of comorbidities (sd) ^f	2.2 (0.6)	2.3 (0.6)	1.1 (0.9–1.3)	0.9 (0.8–1.1)

Setting

- Multicenter longitudinal in eight adult ICUs in France
- 1-year period with 5718 patients, 11666 shifts
- 851 (15%) deaths

Statistical analysis

- multilevel Poisson regression taking into account the clustering effect of patients within the ICU
- final multivariate model included the following variables: P/N, P/P and residents-to-physicians ratios, patient turnover, number of LSP, proportion of men, proportion of surgical cases, SAPSII, and number of comorbidities

Diskussion

- Erfahrungen anderorts
- Herausforderungen
 - Ownership der betroffenen Abteilung
 - Compliance mit Massnahmen insbesondere bei wiederholtem Aufnahmestop
 - Patientengut, fehlende Hautbarriere
 - Wechselnde Teams
 - Ökonomischer Druck vs. Anforderungen in der Infektionsprävention

**Vielen Dank für Ihre
Aufmerksamkeit**