

GiViTI

Gruppo Italiano per la Valutazione degli Interventi In Terapia Intensiva

**Report
PROSAFE project**

Year 2018

National report (7 ICUs)

SLOVENIA

PROSAFE project - National report (7 ICUs)

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The project

The PROSAFE project was conceived as an observational project for the continuous electronic collection of data on patients admitted to intensive care units (ICUs). The objectives of the project are to:

- standardize the procedures for collecting data on admitted patients;
- analyse the activity carried out in terms of both clinical results achieved and resources used;
- gather information on the collected case series for research and/or routine clinical management purposes;
- promote comparison among ICUs, on the basis of detailed epidemiological research work, with a view to improving the quality of the care provided.

In addition to these general objectives, the PROSAFE project provides a tool that serves as the operating base for all research projects undertaken by the individual ICUs, both under the umbrella of the GiViTI group and at local level. The PROSAFE program, by virtue of its modular structure, is designed to smoothly integrate the collection of basic data (the PROSAFE 'core') with the collection of specific data for research projects focused on various different topics (the PROSAFE 'petals').

The Petals functioning in 2018 in Italy were:

- the Infections Surveillance Petal, designed to describe the epidemiology of infections in ICUs in Italy, focusing specifically on the identification and study of the main risk and prognostic factors for infections, with a view to comparing the various ICUs in terms of incidence of infections and their severity, prevalent bacterial flora and multiresistant germs;
- the Cardiosurgical Petal, whose aim is to describe in detail the characteristics of patients admitted to the ICU and subject to cardiosurgical procedures;
- the StART Petal, whose objective is to assess the appropriateness of ICU bed utilization by comparing the level of care required by admitted patients with the level of care that can be provided using available resources.
- the CReACTIVE (Collaborative REsearch on ACute Traumatic brain Injury in intensiVe care medicine in Europe) and CAF (CreACTIVE Ambulatory Follow-up) Petals, that aim to collect relevant information to better characterize patients admitted to the ICU for a traumatic brain injury (european collaborative project FP7-HEALTH-2013-INNOVATION-1).
- the TUONO Petal, designed to permit comparison of chest ultrasound reports.
- the BIO-AX-TBI Petal, whose aim is to identify biological and imaging biomarkers that best characterize axonal injury in traumatic brain injury.

The information currently collected in the program 'core' refers to personal patient data, information on origin, reason for admission and whatever else GiViTI has, over the years, determined to be needed to best describe patients admitted to intensive care.

Data collection

The PROSAFE software is distributed free of charge to all ICUs taking part in the project. To date 293 ICUs collected data during 2018, 257 Italian and 36 foreign ICUs, for a total of 97069 patients registered in PROSAFE. Only the ICUs that collected valid data (233) for a period of over 4 months were included in the aggregate analyses. On the whole, therefore, the assessment was based on a total of 88248 patients admitted to intensive care during 2018.

The reports

The Coordinating Centre (GiViTI) produces the following reports (only for subgroups composed of at least 5 ICUs):

1. The (Italian) national report on the general (medical/surgical) ICUs. This first report includes the logistic regression model to assess performance in the various ICUs taking part in the project. The statistics for the most representative regions can be downloaded from the GiViTI website (www.giviti.marionegri.it).
2. The (Italian) national report on the surgical ICUs.
3. The (Italian) national report on the neurosurgical ICUs.
4. The personalized report for each individual centre, in Italian or English, which has different sections according to type of ICU and a similar structure to the national report, is designed to foster precise but user-friendly interpretation of the various values for predicting hospital mortality.

All reports (except for the personalized reports, sent to the project Contact person and the Director of the ICU) can be downloaded from the PROSAFE Project section of the GiViTI website (www.giviti.marionegri.it). The participating ICUs can access an online tool, the Analyzer (<http://givitiweb.marionegri.it/Analyzer/>), to perform analyses both on their own data and on the whole national dataset. An analysis application form is available on the GiViTI website to obtain more complex analyses.

Description of the statistics

Project participation

The table on page 17 summarizes the participation in the project of the 233 ICUs which collected valid data in 2018 for a period of at least 4 months.

Description of the hospitals and ICUs

This section presents the organizational-structural features of the ICUs included in the report. The information (except for the information shown on page 21, which is the result of joint analysis of structural data and those collected during the year via the software) is taken from the 'Structural Data' form (available on the GiViTI portal at <https://givitiweb.marionegri.it/>). Absolute numbers, percentages and the number of missing data are reported for the categorical variables; the mean, standard deviation, median and Q1 (first quartile: the value below which lie 25% of the population) and Q3 (third quartile: the value below which lie 75% of the population) serve as indicators for the continuous variables.

Below are a few tips on how to correctly interpret the statistics.

Number of accredited beds Number of beds officially accredited.

Number of available beds Number of beds actually available in ICU. This number is the sum of the beds declared in each single room ('Structural Data' form, section 'Icu rooms'). This number is used for computing utilization indicators.

ICU Structure We define as 'OPEN-SPACE' a ward where each room can be 'monitored' from any other. A room can be 'monitored' from another room when all the beds located in the other room can be visually and

instrumentally controlled.

Available beds per physician (average) e Available beds per nurse (average) The mean is computed taking into account the differences between daily shifts of personnel.

Indicators of utilization Data on the number of available beds, total admissions in 2018 and ICU stay days were used to calculate indicators of utilization, i.e. indicators able to measure utilization levels and healthcare facility activity levels.

- The bed **occupation rate** expresses bed occupancy as a percentage value, by dividing total ICU stay days recorded at a given time by the total number of days in the period in question multiplied by the number of staffed beds. The product corresponds to the ICU's total availability for admissions (daily number of available beds); the closer total ICU stay days are to total availability, the more the occupation rate tends towards 100%. Occupation rate can even exceed 100% when a new patient is admitted to a bed that became vacant on the same day.

$$\text{Occupation rate} = \frac{\text{ICU stay days}}{\text{Days} \times \text{Number of beds}} \quad (1)$$

- The **rotation index** expresses the mean number of patients 'staying' in a bed in one year. It is calculated by dividing the number of admissions by the number of beds. Data collected for less than one year have to be extrapolated.

$$\text{Rotation index} = \frac{\text{Number of patients}}{\text{Number of beds}} \quad (2)$$

- The **turnover interval** expresses the period of time in which a bed remains vacant between two consecutive patients. It is calculated by dividing the number of days with vacant beds by the number of patients admitted during the period in question, giving mean unoccupied time per bed. It is calculated by dividing the number of days with unoccupied beds by the number of patients admitted in the period in question. This gives the mean unoccupied time per bed. This indicator is expressed in hours.

$$\text{Turnover} = 24 \times \frac{(\text{Number of beds} \times \text{Days}) - \text{ICU stay days}}{\text{Number of patients}} \quad (3)$$

Occupied beds per physician (average) e Occupied beds per nurse (average) The mean is computed taking into account the differences between daily shifts of personnel. Daily occupied beds are considered in the calculations. This number is obtained by multiplying the average number of beds available per operator for the occupation rate (preliminarily divided by 100).

Study flow-chart

The flow chart, or tree diagram, on page 23 presents the various subgroups of analysed patients. PROSAFE has a very accurate indicator of the completeness and validity of the data entered on each patient, i.e. status.

The program envisages 5 status levels:

- status 1 - the patient record presents errors or unsolved warnings;
- status 2 - the record is incomplete, there are still missing data;

- status 3 - the patient has been discharged from the ICU, the clinical data are all entered and have undergone congruency checks; only hospital outcome is missing;
- status 4 - record complete and free of errors;
- status 5 - record free of errors but incomplete; the missing data are irretrievable.

Patients with status 1, 2 and 5 data are clearly incomplete.

It would be wrong to omit only patients with incomplete data (in status 1, 2 and 5) from the analyses since this could skew the estimates because of a so-called 'selection bias'. Patients with incomplete data may instead represent a special population subgroup. If only these patients were omitted from the analysed group, the statistics would no longer represent the whole group. It is plausible to assume, for example, that the majority of the patients for whom hospital outcome is missing were discharged alive from hospital, since it is much easier and quicker to retrieve information on hospital outcome when a patient has died. Calculating statistics on hospital mortality in the whole group of patients would result in mortality being incorrectly overestimated.

To address this problem it was decided to omit from each individual ICU's data any patients recruited during months when the validity percentages were below a high threshold (approximately 90%). Another check performed to reduce the risk of selection bias is to analyse the number of patients admitted per month. If the number of patients admitted in one or more months differs significantly from the mean number of monthly admissions (with a threshold arbitrarily set at a mean of ± 2 trimmed SD), or if the variability in the number of admissions is too high (variation coefficient above 40%), a warning message will appear asking for the entered data to be checked. To correctly participate in the PROSAFE project, all patients consecutively admitted to the ICU must be registered in the software on a continuous basis throughout the year; any marked swings in the number of admissions should suggest that there may be patient registration 'gaps'. It is, however, impossible to distinguish between registration 'gaps' and periods in which there is a real reduction/increase in admissions. Hence our objective is to draw attention to potential problems by asking each individual centre for feedback.

To more clearly illustrate the selection methods used in the choice of valid data, we present an extract from the data validity report of a randomly selected, anonymized ICU.

From January to December, Centre XX000 recruits a total of 619 patients. The first table and the bar graph show the number of monthly admissions to intensive care. In this case, a warning will appear at the bottom of the bar graph asking for confirmation of the entered data.

Centre XX000 - Year 2014

Data validity

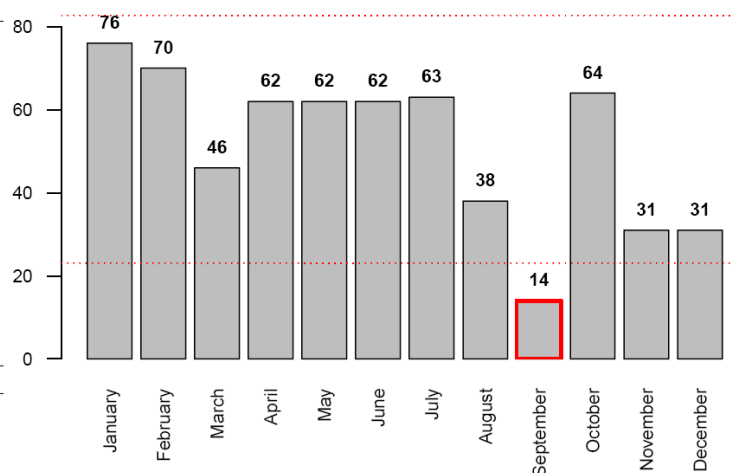
Patients admitted: 619

Admissions

Month	N	%
January	76	12.3
February	70	11.3
March	46	7.4
April	62	10.0
May	62	10.0
June	62	10.0
July	63	10.2
August	38	6.1
September	14	2.3
October	64	10.3
November	31	5.0
December	31	5.0

Admissions

Mean	51.6
Median	62.0
SD	19.1
VC	37.1



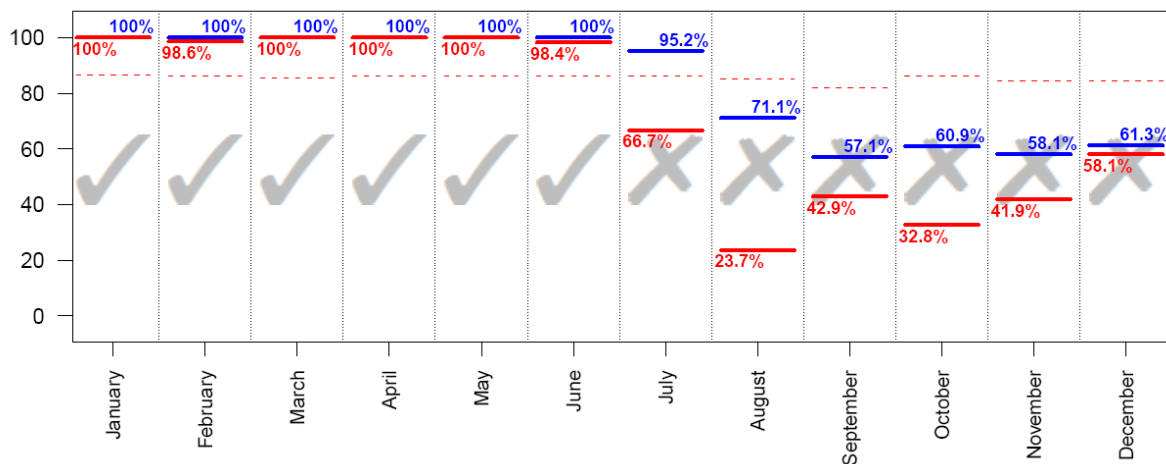
WARNING! The highlighted months have a number of patients quite different from the average. Please verify the correctness of the data and, particularly, that all consecutive patients have been registered in the Prosafe software.

The second table divides the recruited patients by admission month and form completion status. Overall, the ICU in question presents complete data for 485 patients. 134 patients still present incomplete data.

Month	Status (N)					Total	% Pts. in status 3/4	% Pts. in status 4
	1	2	3	4	5			
January	0	0	0	76	0	76	100.0	100.0
February	0	0	1	69	0	70	100.0	98.6
March	0	0	0	46	0	46	100.0	100.0
April	0	0	0	62	0	62	100.0	100.0
May	0	0	0	62	0	62	100.0	100.0
June	0	0	1	61	0	62	100.0	98.4
July	0	3	18	42	0	63	95.2	66.7
August	0	11	18	9	0	38	71.1	23.7
September	0	6	2	6	0	14	57.1	42.9
October	4	21	18	21	0	64	60.9	32.8
November	0	13	5	13	0	31	58.1	41.9
December	0	12	1	18	0	31	61.3	58.1
Total	4	66	64	485	0	619	88.7	78.4

The final graph shows level of data completeness in the various months. Percentages of patients with records in status 3 or 4 and in status 4 are shown in blue and red respectively.

According to our elimination criterion, the overall analysis will exclude those patients admitted in the months of August, September, October, November and December since they present a validity percentage below the defined threshold (dashed line). Accordingly, 441 patients have valid data for the analysis. Regarding analysis of hospital mortality, patients admitted in July will also be excluded (in that month the % of patients with record not in status 4 is still too high). Hence, the analysis on hospital outcome will involve 378 patients on 619 admitted.



Patients admitted in months with % of patients in status 3 or 4 over the threshold (drawn in the graph with a dashed line): **441**; patients in status 4: **378**.

Description of patients

These sections of the report present the results of the analyses conducted on the group of patients with valid data. This part presents patient characteristics at ICU admission and during ICU stay, severity scores, process indicators, and outcomes for the various patient subgroups.

Absolute number, percentage and number of missing data are reported for the categorical data, while mean, standard deviation, median, interquartile range (Q1-Q3) and minimum and maximum range are reported for continuous variables. The acronym 95% CI indicates the 95% confidence interval of the estimate.

Below are a few tips on how to correctly interpret the analyses.

BMI The calculation of Body Mass Index is based on weight and height values, with the following formula:

$$BMI = \frac{\text{weight (kg)}}{\text{height (m)}^2} \quad (4)$$

The categories of underweight, overweight and obese are determined according to the following criteria: underweight if BMI<20 (males) or BMI<19 (females); normal weight if 20<=BMI<=25 (males) or 19<=BMI<=24 (females); overweight if 25<BMI<=30 (males) or 24<BMI<=29 (females); obese if BMI>30 (males) or BMI>29 (females).

Stay before ICU Days spent between admission to hospital and admission to ICU.

Reason for transfer from other ICU The reported items refer to the following reasons:

- Specialist expertise -> specialist expertise within the hospital;
- Step-up care -> management of high complexity critical patient;
- Logistical/organizational reasons -> continuation of treatment in stabilized patient (transfer for logistic/ organizational reasons);
- Step-down care-> continuation of treatment in a non-specialist environment.

Surgical interventions on admission (top 10) This lists the top 10 surgical interventions, divided by elective surgery and emergency surgery patients, operated between 7 days prior to and one day after admission to the ICU. Each

single intervention (even more than one per patient) is counted.

Timing of surgical interventions on admission The timing of surgical interventions on admissions is specified. Each single intervention (even more than one per patient) is counted. It may happen that the percentages exceed the threshold of 100 % if patients underwent more than one intervention in the specified time periods.

Multiple trauma The category multiple trauma is defined by the presence of trauma in two or more regions.

SAPSII The score cannot be calculated if GCS (first 24 hours) is unassessable.

The SAPSII score for individual patients can become the probability of dying in hospital. This is performed by the following formula:

$$\text{Predicted hospital mortality} = \frac{e^{\text{Logit}}}{1 + e^{\text{Logit}}} \quad (5)$$

where

$$\text{Logit} = -7.763 + 0.074 \times \text{SAPSII} + 0.997 \times \ln(\text{SAPSII} + 1) \quad (6)$$

PELOD The PELOD score for individual pediatric patients can become the probability of dying in ICU. This is performed by the following formula:

$$\text{Predicted ICU mortality} = \frac{1}{1 + e^{7.64 - 0.30 \times \text{PELOD}}} \quad (7)$$

PIM 2/PIM 3 The PIM score for individual pediatric patients can become the probability of dying in ICU. This is performed by the following formula:

$$\text{Predicted ICU mortality} = \frac{e^{\text{PIM}}}{1 + e^{\text{PIM}}} \quad (8)$$

Severity evolution (of infections) The severity of infection on admission is shown in the rows. Maximum severity reached during ICU stay is indicated in the columns. The table reports the absolute numbers and row percentages by which to assess the evolution of infection severity. For example, in the case below, the severity of the infection did not worsen during ICU stay in 15 out of the 17 patients admitted with SEPSIS (15/17=88.2%). Conversely, the condition of SEPSIS developed into SEPTIC SHOCK in 2 patients (2/17=11.8%).

Severity evolution		During the stay				
		N (R %)	None	Infection without SEPSIS	SEPSIS	SEPTIC SHOCK
Admission	None	173 (93.0%)	9 (4.8%)	1 (0.5%)	3 (1.6%)	186
	Infection without SEPSIS	-	19 (95.0%)	0 (0.0%)	1 (5.0%)	20
	SEPSIS	-	-	15 (88.2%)	2 (11.8%)	17
	SEPTIC SHOCK	-	-	-	36 (100.0%)	36
	TOT	173	28	16	42	259

VAP Forms of pneumonia associated with invasive ventilation are defined as VAP (pneumonia onset after the 2nd day of ventilation or developing within 2 days of the end of ventilation).

Incidence of VAP Two different incidence rates are presented:

$$\text{Incidence of VAP} = \frac{\text{Number of patients with VAP during stay}}{\text{Mechanical ventilation days pre VAP}} \times 1000 \quad (9)$$

where the variable *mechanical ventilation days pre-VAP* corresponds to the total number of mechanical ventilation days pre-VAP of all patients admitted to the ICU. It is equal to the total duration of mechanical ventilation for patients who do not develop VAP and to the difference between the date of onset of VAP and the start date of mechanical ventilation for infected patients. The mechanical ventilation days in patients who were discharged or died within 2 days of the start of ventilation are excluded from the denominator.

$$\text{Incidence of VAP} = \frac{\text{Number of patients with VAP during stay}}{(\text{Mechanical ventilation days pre VAP})/8} \times 100 \quad (10)$$

The second rate is only a reworking of the previous one, to simplify interpretation of the data. It answers the question: 'Out of 100 patients ventilated for 8 days in the ICU, how many develop VAP?'. The 8-day cut off has been set by convention. The rates are accompanied by 95% confidence intervals.

Incidence of CR-BSI Just like VAP, two incidence rates are presented for catheter-related blood stream infections:

$$\text{Incidence of CRBSI} = \frac{\text{Number of patients with CRBSI during stay}}{\text{CVC days pre CRBSI}} \times 1000 \quad (11)$$

$$\text{Incidence of CRBSI} = \frac{\text{Number of patients with CRBSI during stay}}{(\text{CVC days pre CRBSI})/12} \times 100 \quad (12)$$

The second one responds to the question 'Out of 100 theoretical patients catheterized for 12 days in the ICU, how many will develop catheter-related blood stream infections?'.
'

Invasive ventilation (approach) The reported items refer to the following scenarios:

- Due to pulmonary failure -> invasive ventilation in a patient with hypoxic and/or hypercapnic respiratory failure;
- For airway maintenance -> invasive ventilation in a patient without respiratory failure, to support airways (e.g. coma patient);
- In weaning -> final part of invasive ventilation in a patient admitted for weaning from ventilation.

Non invasive ventilation (approach) The reported items refer to the following scenarios:

- Non invasive ventilation only -> non-invasive ventilation as the only ventilatory approach to the patient;
- Non invasive ventilation failed -> non-invasive ventilation immediately followed by patient intubation;
- For weaning -> non-invasive ventilation started within one day of the end of invasive ventilation.

Surgical interventions during stay (top 10) The surgical interventions performed from the second day of stay.

Reason of transfer to other ICU See the item 'Reason of transfer from other ICU'.

Hospital mortality Statistics on hospital outcome (indicated with an asterisk, where necessary) involve the subgroup of patients with valid data for this variable or patients admitted during the months when over a defined % of patients were in status 4, after excluding readmissions from another hospital ward.

Last hospital mortality For patients transferred to other ICU or to rehabilitation/high dependency care unit in other hospital, is the outcome at the last hospital discharge.

Readmissions Only readmissions from other hospital wards are considered.


ICU stay (days) Length of pre-ICU, post-ICU and hospital stay are simply calculated as the difference between dates. Calculation of ICU stay can be optimized by using time of patient admission and discharge. The difference between the discharge date and the admission date is calculated. 1 is added if the patient is admitted before 12:00 and discharged after this time. Conversely, 1 is subtracted if the patient is admitted after midday and discharged before midday. If the length of stay in the ICU is equal to 0, length of stay is entered as 1.

Analysis of mortality: This section presents indicators or graphs useful for a detailed analysis of mortality. The diagram lists the reference models used for the calculation of expected mortality according to the type of patients evaluated. All the predictive models involve the subgroup of patients admitted during the months when over a defined % of patients were in status 4. Analyses involving adult patients exclude cardiac surgery patients, patients admitted for diagnosis of death/organ donation and readmissions.

Patients	Model	Mortality
Adults non CS	GiViTI 2018	Last hospital mortality
Pediatric	PIM 2	ICU mortality
	PIM 3	ICU mortality
	PELOD	ICU mortality

Statistics

**National report - Year 2018
Project participation***

Nation	TYPE								Total
	General	Cardiosurgical	Surgical	Neurosurgical	Pediatrics	HDC	Other		
 Cyprus	2 ICUs 1115 patients								2 ICUs 1115 patients
 Greece	4 ICUs 944 patients				1 ICU 144 patients				5 ICUs 1088 patients
 Hungary				1 ICU 437 patients					1 ICU 437 patients
 Israel	1 ICU 519 patients				1 ICU 792 patients			1 ICU 449 patients	3 ICUs 1760 patients
 Italy	151 ICUs 51496 patients	19 ICUs 10771 patients	11 ICUs 6483 patients	11 ICUs 4712 patients	3 ICUs 1076 patients	4 ICUs 2358 patients	8 ICUs 3169 patients		207 ICUs 80065 patients
 Poland	6 ICUs 875 patients				2 ICUs 386 patients				8 ICUs 1261 patients
 Slovenia	1 ICU 323 patients		4 ICUs 1523 patients				2 ICUs 676 patients		7 ICUs 2522 patients
Total	165 ICUs 55272 patients	19 ICUs 10771 patients	15 ICUs 8006 patients	12 ICUs 5149 patients	7 ICUs 2398 patients	4 ICUs 2358 patients	11 ICUs 4294 patients		233 ICUs 88248 patients

*Are considered as adhering the ICUs with at least 4 months of valid compilation.

Description of hospitals (N=7) - Year 2018

Number of beds in hospital	N	%
< 300 beds	2	28.6
300 - 800 beds	4	57.1
> 800 beds	1	14.3
Missing	0	

Type of ICUs present in hospital	N	%
General	1	14.3
Medical	6	85.7
Surgical	6	85.7
Neurological/neurosurgical	1	14.3
Cardiosurgical	1	14.3
Burns	1	14.3
Post-transplantations	0	0.0
Other	1	14.3

Type of subICUs present in hospital	N	%
General	1	14.3
Surgical	5	71.4
Cardiological	3	42.9
Respiratory	0	0.0
Neurological (stroke unit)	2	28.6
Other	2	28.6

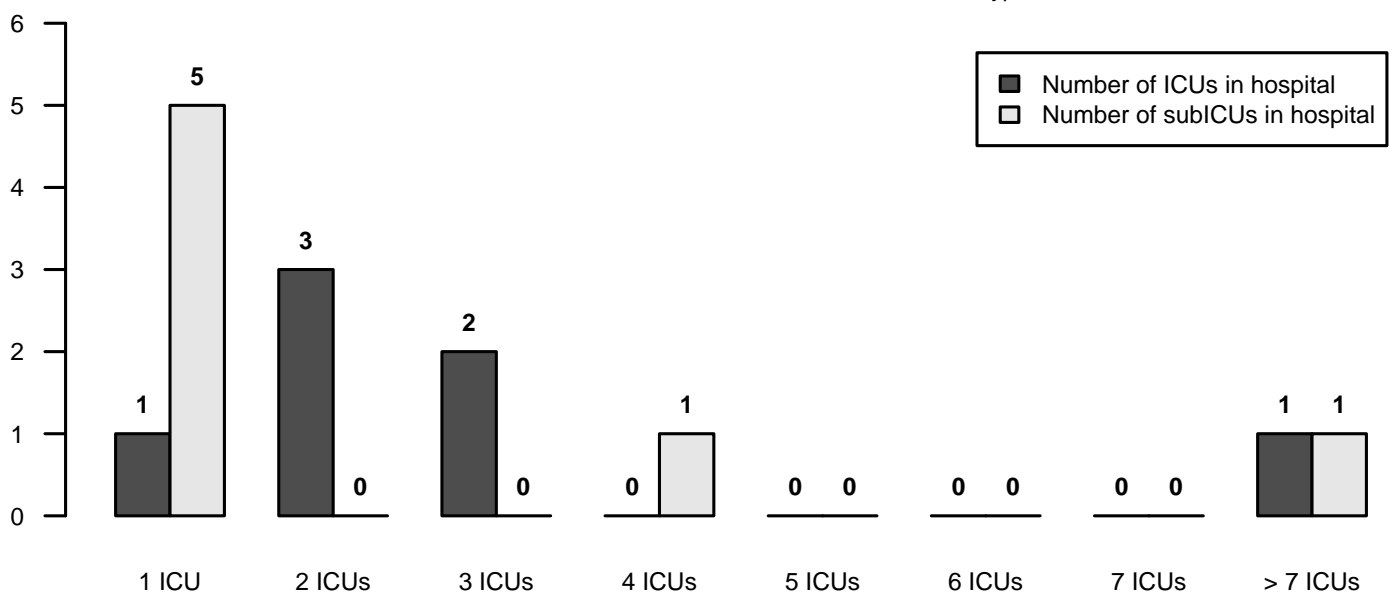
Non surgical specialties	N	%
Cardiology	6	85.7
Pulmonology	4	57.1
Nephrology	6	85.7
Infection disease	4	57.1
Pediatric	6	85.7
Neonatology	2	28.6
Neurology	6	85.7
Haematology	5	71.4
Emergency room	6	85.7
Traumatology	6	85.7
Emergency medical	5	71.4

Surgical specialties (independent ward)	N	%
Neurosurgery	1	14.3
Cardiosurgery	1	14.3
Major vascular surgery	5	71.4
Thoracic surgery	1	14.3
Pediatric surgery	3	42.9
Transplantation activities	1	14.3

Surgical specialties (procedures only)	N	%
Neurosurgery	6	85.7
Cardiosurgery	1	14.3
Major vascular surgery	1	14.3
Thoracic surgery	1	14.3
Pediatric surgery	4	57.1
Transplantation activities	2	28.6

Services/activities available in H (h24)	N	%
Neuroradiology	4	57.1
Interventional neuroradiology	2	28.6
Interventional vascular radiology	2	28.6
CT scan	7	100.0
MRI	5	71.4
Interventional hemodynamic	4	57.1
Endoscopy	7	100.0
Bronchoscopy	6	85.7
Hyperbaric chamber	0	0.0

Services/activities available in H (rep.)	N	%
Neuroradiology	1	14.3
Interventional neuroradiology	0	0.0
Interventional vascular radiology	2	28.6
CT scan	0	0.0
MRI	2	28.6
Interventional hemodynamic	1	14.3
Endoscopy	0	0.0
Bronchoscopy	1	14.3
Hyperbaric chamber	2	28.6



Description of ICUs (N=7) - Year 2018

Number of activable beds		
Mean (SD)	10.3	(4.8)
Median (Q1–Q3)	10	(7–11)
Missing	0	

Number of beds declared to hospital		
Mean (SD)	201.0	(271.4)
Median (Q1–Q3)	20	(10.5–320)
Missing	0	

University affiliation	N	%
Yes	4	57.1
No	3	42.9
Missing	0	

Square meter per bed		
Mean (SD)	25.6	(20.1)
Median (Q1–Q3)	21	(11.5–36.5)
Missing	0	

Clinical psychologist	N	%
No	4	57.1
For relatives	1	14.3
For patients	3	42.9
For personnel	0	0.0

ICU Structure	N	%
NON OPEN-SPACE	2	28.6
OPEN-SPACE (or alike)	5	71.4
Missing	0	

Physicians	N	%
Dedicated to ICU only	2	28.6
Dedicated to ICU on a rotation basis	1	14.3
Dedicated to ICU only and on a rotation basis	4	57.1
Missing	0	

Declared beds per physician (average)		
Mean (SD)	93.6	(120.1)
Median (Q1–Q3)	9.6	(5.9–166)
Missing	0	

Nurses	N	%
Dedicated to ICU only	4	57.1
Dedicated to ICU on a rotation basis	0	0.0
Dedicated to ICU only and on a rotation basis	3	42.9
Missing	0	

Declared beds per nurse (average)		
Mean (SD)	47.9	(60.6)
Median (Q1–Q3)	2.4	(1.8–91.7)
Missing	0	

Number of hours conceded for relatives' visits	N	%
1	5	71.4
2	1	14.3
3-4	1	14.3
5-12	0	0.0
13-20	0	0.0
>20	0	0.0
Missing	0	

Maximum number of visitors per patient	N	%
One	1	14.3
Two	6	85.7
Three or more	0	0.0
Missing	0	

Biomedical devices per declared bed	Median	Q1-Q3	<5 Years (mean %)
Total available monitors (excluding those dedicated to transport)	1.0	0.0–1.3	17.9
of which only for basic monitoring (without transducers detection of invasive pressure, pic, pvc, ...)	0.0	0.0–0.0	0.0
Invasive monitoring of cardiac output (Swan-Ganz)	0.0	0.0–0.0	0.0
Invasive monitoring of cardiac output (PiCCO)	0.0	0.0–0.1	25.0
Invasive monitoring of cardiac output (Vigileo)	0.0	0.0–0.3	34.4
Non-invasive monitoring of cardiac output (impedentiometry)	0.0	0.0–0.0	75.0
Defibrillators	0.1	0.0–0.1	0.0
Both invasive and non invasive ventilators	0.6	0.0–1.1	30.2
Non invasive ventilators	0.1	0.0–0.3	51.6
Syringe pumps	3.2	0.1–4.9	43.2
Peristaltic pumps	0.0	0.0–0.3	43.3

Biomedical equipment in ICU	N	%
Transoesophageal echo	3	42.9
Basic ultrasounds	7	100.0
Advanced ultrasounds	6	85.7
Blood-gas analyzer	5	71.4
Haemodialysis - Haemofiltration	6	85.7
Transport ventilator	7	100.0
Fiberscope	7	100.0
Extracorporeal circulation system	1	14.3

Routine microbiological surveillance cultures	N	%
Yes	7	100.0
No	0	0.0
Missing	0	

Description of ICUs (N=7) - Year 2018

Patients admitted

Mean (SD)	378.6 (190.1)
Median	418.1
Q1–Q3	276.9–519.8
Missing	3

Occupancy rate (%)

Mean (SD)	61.8 (11.0)
Median	65
Q1–Q3	59–67.9
Missing	3

Rotation index (patients/bed)

Mean (SD)	32.1 (10.5)
Median	29.8
Q1–Q3	25.9–36
Missing	3

Turnover (hours)

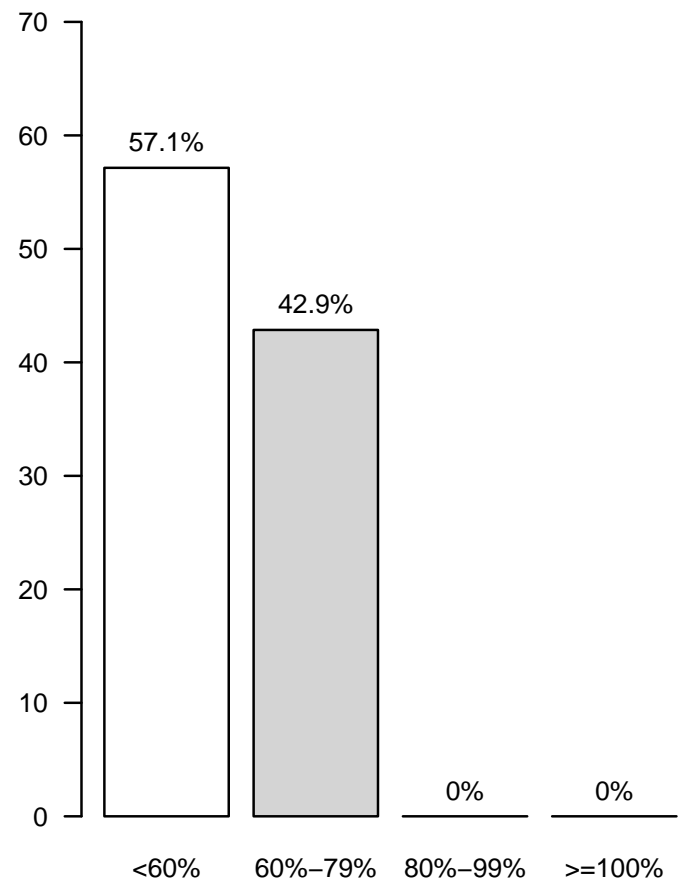
Mean (SD)	114.0 (63.6)
Median	93.7
Q1–Q3	82.6–125.1
Missing	3

Occupied beds per physician (average)

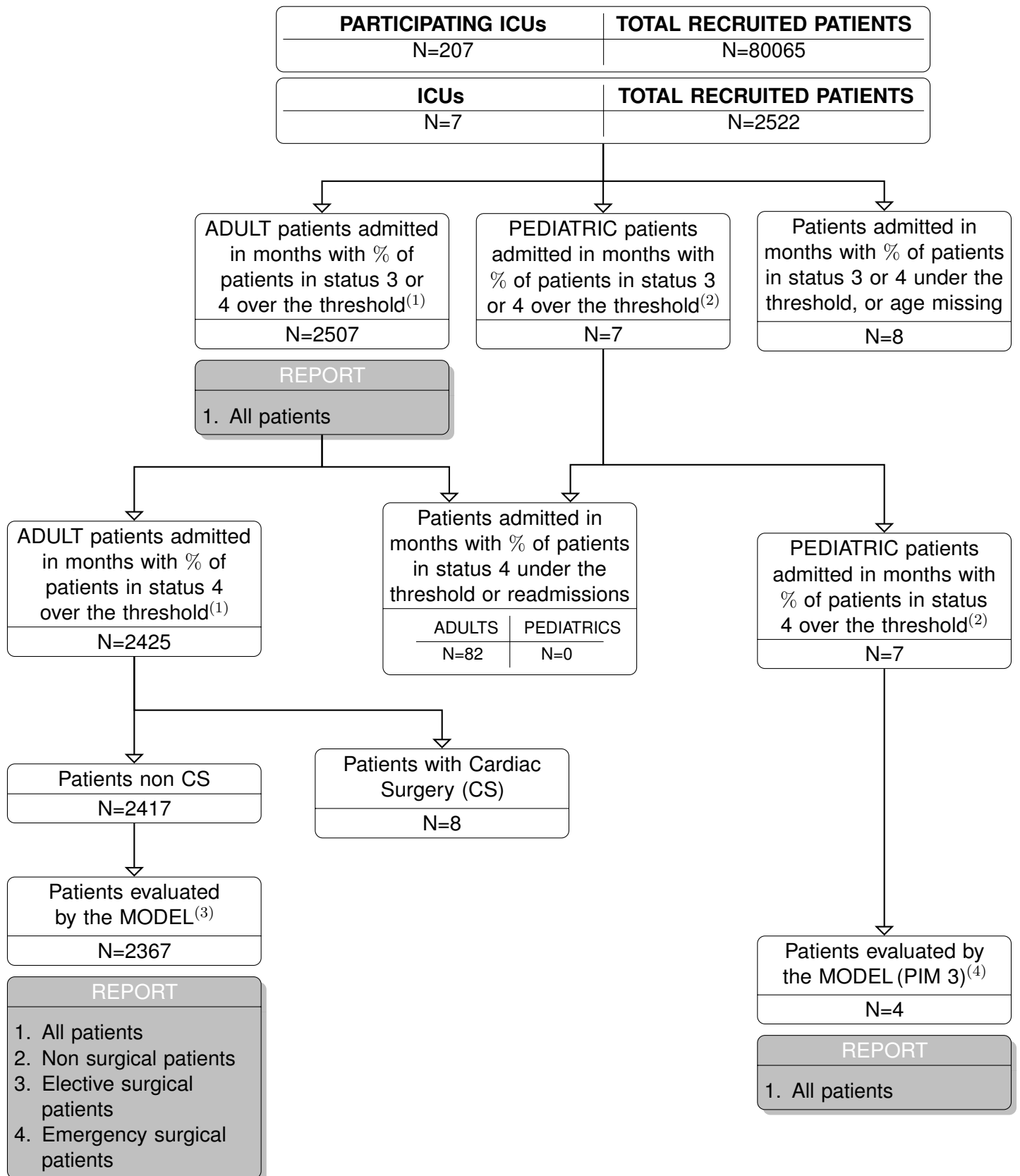
Mean (SD)	3.4 (0.9)
Median	3.3
Q1–Q3	2.7–4.1
Missing	0

Occupied beds per nurse (average)

Mean (SD)	1.3 (0.5)
Median	1.3
Q1–Q3	1–1.5
Missing	0

Occupancy rate (%)

National report (7 ICUs) - Year 2018
Study flow-chart



(1) Patients older than 17 years are considered ADULT patients.

(2) Patients under 17 years of age are considered PEDIATRIC patients.

(3) Patients evaluated by the GiViTI model of hospital mortality are those with all the variables of the model completed, including the hospital outcome. Patients admitted for diagnosis of death/organ donation and readmissions are excluded.

(4) Patients transferred to other ICU are excluded.

National report - Year 2018

Characteristics on admission - Adult patients

Patients (N): 2507

Sex	N	%
Male	1601	63.9
Female	906	36.1
Missing	0	

Age (years)	N	%
17-45	272	10.8
46-65	771	30.8
66-75	693	27.6
>75	771	30.8
Missing	0	
Mean	66.2	
SD	15.7	
Median	68	
Q1–Q3	58–78	
Min–Max	17–99	

Body mass Index (BMI)	N	%
Underweight	107	4.3
Normal	995	40.0
Overweight	912	36.6
Obese	476	19.1
Missing	17	

Pregnancy status	N	%
Females (N=906)		
Not fertile	466	51.4
Not pregnant/Unknown	430	47.5
Currently pregnant	2	0.2
Post partum	8	0.9
Missing	0	

Comorbidities	N	%
No	300	12.0
Yes	2206	88.0
Missing	1	

Comorbidities (top 10)	N	%
Hypertension	1401	55.9
Arrhythmia	460	18.4
NYHA class II-III	431	17.2
Any tumour without metastasis	415	16.6
Diabetes Type II without insulin tr.	336	13.4
Moderate or severe renal disease	334	13.3
Metastatic cancer	223	8.9
Moderate COPD	210	8.4
Peripheral vascular disease	198	7.9
Drug-induced coagulopathy	187	7.5
Missing	1	

Stay before ICU (days)	Mean	SD	Median	Q1–Q3	Missing
	4.4	10.4	1	0–4	3

Source of admission	N	%
Same hospital	2247	89.7
Other hospital	156	6.2
Long-term chronic care hospital	102	4.1
Directly from the community	1	0.0
Missing	1	

Ward of admission	N	%
Hospital (N=2403)		
Medical ward	360	15.0
Surgical ward	1295	53.9
Emergency room	585	24.3
Other ICU	91	3.8
High dependency care unit	72	3.0
Missing	0	

Reason for transfer from	N	%
Other ICU (N=91)		
Specialist expertise	16	17.6
Step-up care	21	23.1
Logistical/organizational reasons	50	54.9
Step-down care	4	4.4
Missing	0	

Ward of admission	N	%
Same hospital (N=2247)		
Medical ward	341	15.2
Surgical ward	1270	56.5
Emergency room	551	24.5
Other ICU	29	1.3
High dependency care unit	56	2.5
Missing	0	

Ward of admission	N	%
Other hospital (N=156)		
Medical ward	19	12.2
Surgical ward	25	16.0
Emergency room	34	21.8
Other ICU	62	39.7
High dependency care unit	16	10.3
Missing	0	

Scheduled admission	N	%
No	1916	76.5
Yes	590	23.5
Missing	1	

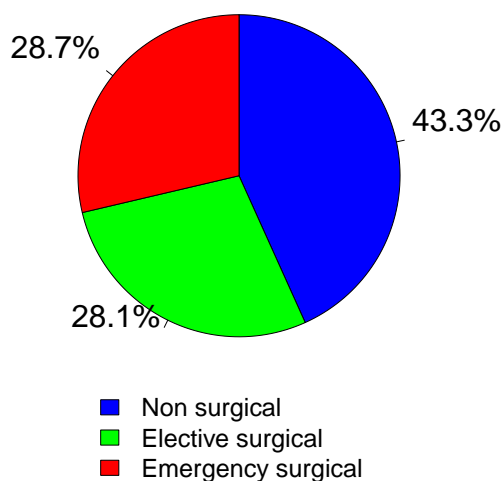
National report - Year 2018

Characteristics on admission - Adult patients

Trauma	N	%
No	2136	85.2
Yes	370	14.8
Multiple trauma	106	4.2
Missing	1	

Surgical status	N	%
Non surgical	1085	43.3
Elective surgical	703	28.1
Emergency surgical	718	28.7
Missing	1	

Surgical status



Source of admission	N	%
Surgical pt. (N=1421)		
Operating theatre of surgical ward	1034	72.9
Operating theatre of emergency room	79	5.6
Surgical ward	116	8.2
Other	190	13.4
Missing	2	

Surgical interventions (top 10)	N	%
Elective surgical (N=703)		
Gastrointestinal surgery	386	54.9
Nephro/Urological surgery	95	13.5
Peripheral vascular surgery	68	9.7
Orthopaedic surgery	38	5.4
Other surgery	32	4.6
Abdominal vascular surgery	25	3.6
Hepatic surgery	24	3.4
Pancreatic surgery	12	1.7
Thoracic surgery	12	1.7
Gynaecological surgery	11	1.6
Missing	0	

Timing	N	%
Elective surgical (N=703)		
From -7 to -3 days	23	3.3
From -2 to -1 days	27	3.8
On ICU admission day	703	100.0
The day after ICU admission	8	1.1
Missing	1	

Surgical interventions (top 10)	N	%
Emergency surgical (N=718)		
Gastrointestinal surgery	349	48.6
Neurosurgery	90	12.5
Orthopaedic surgery	67	9.3
Other surgery	46	6.4
Nephro/Urological surgery	32	4.5
Thoracic surgery	25	3.5
Peripheral vascular surgery	23	3.2
Biliary tract surgery	22	3.1
Abdominal vascular surgery	19	2.6
Splenectomy	16	2.2
Missing	29	

Timing	N	%
Emergency surgical (N=718)		
From -7 to -3 days	40	5.6
From -2 to -1 days	83	11.6
On ICU admission day	609	84.8
The day after ICU admission	37	5.2
Missing	2	

Non surgical interventions	N	%
None	2363	94.3
Elective	8	0.3
Emergency	135	5.4
Missing	1	

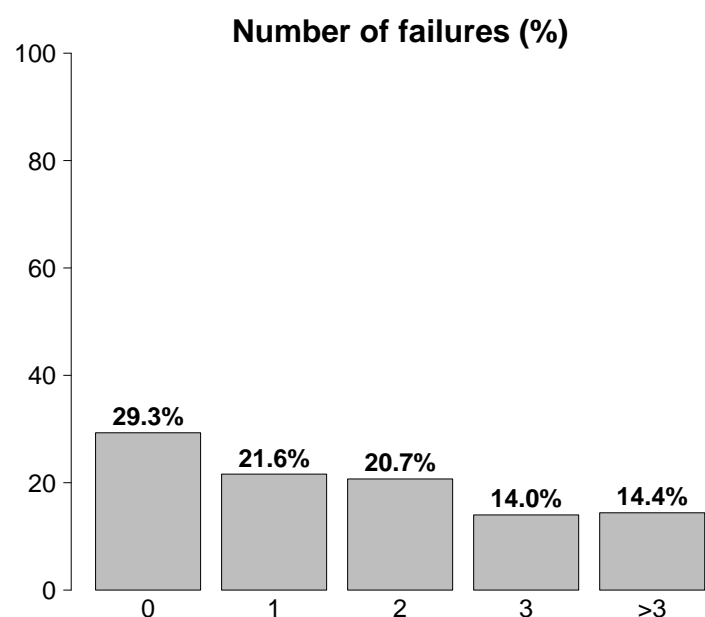
Non surgical interventions	N	%
Elective (N=8)		
Interventional radiology	3	37.5
Interventional cardiology	3	37.5
Interventional neuroradiology	0	0.0
Interventional endoscopy	0	0.0
Missing	2	

Non surgical interventions	N	%
Emergency (N=135)		
Interventional cardiology	66	48.9
Interventional endoscopy	45	33.3
Interventional radiology	18	13.3
Interventional neuroradiology	0	0.0
Missing	6	

National report - Year 2018

Characteristics on admission - Adult patients

Reason for admission	N	%
Monitoring/Weaning	979	39.1
Post surgical weaning	14	0.6
Surgical monitoring	571	22.8
Post interventional weaning	0	0.0
Interventional monitoring	65	2.6
Non surgical monitoring	325	13.0
Missing	4	
Admission for procedures/treatments	0	0.0
Intensive Treatment	1517	60.5
Only ventilatory support	506	20.2
Only cardiovascular support	238	9.5
Ventilatory and cardiovascular support	773	30.8
Missing	0	
Palliative Sedation	5	0.2
Diagnosis of death/Organ donation	5	0.2
Missing	1	



Failures on admission	N	%
No	735	29.3
Yes	1772	70.7
A: Respiratory failure	1279	51.0
B: Cardiovascular failure	1011	40.3
C: Neurological failure	216	8.6
D: Hepatic failure	33	1.3
E: Renal failure	932	37.2
F: Acute skin failure	4	0.2
G: Metabolic failure	639	25.5
H: Coagulation failure	74	3.0
Missing	0	

Failures on admission (top 10)	N	%
A	280	11.2
AB	222	8.9
ABEG	205	8.2
E	134	5.3
ABE	117	4.7
AE	84	3.4
B	79	3.2
BE	70	2.8
ABG	59	2.4
ABCEG	57	2.3
Missing	0	

Respiratory failure	N	%
None	1228	49.0
Only hypoxic failure	682	27.2
Only hypercapnic failure	93	3.7
Hypoxic-hypercapnic failure	102	4.1
Intubation for airway maint.	402	16.0
Missing	0	

Cardiovascular failure	N	%
None	1496	59.7
Without shock	342	13.6
Cardiogenic shock	100	4.0
Septic shock	337	13.4
Haemorrhagic/hypovolemic shock	108	4.3
Hypovolemic shock	22	0.9
Anaphylactic shock	5	0.2
Neurogenic shock	12	0.5
Other shock	38	1.5
Mixed shock	47	1.9
Missing	0	

Neurologic failure	N	%
None	1885	89.7
Cerebral coma	80	3.8
Metabolic coma	72	3.4
Postanoxic coma	45	2.1
Toxic coma	19	0.9
Missing or not evaluable	406	

Renal failure (AKIN)	N	%
None	1574	62.8
Mild	528	21.1
Moderate	222	8.9
Severe	182	7.3
Missing	1	

Metabolic failure	N	%
None	1867	74.5
pH <= 7.3, PaCO ₂ < 45 mmHg	343	13.7
Base deficit >= 5 mmol/L, lactate >1.5x	296	11.8
Missing	1	

National report - Year 2018

Characteristics on admission - Adult patients

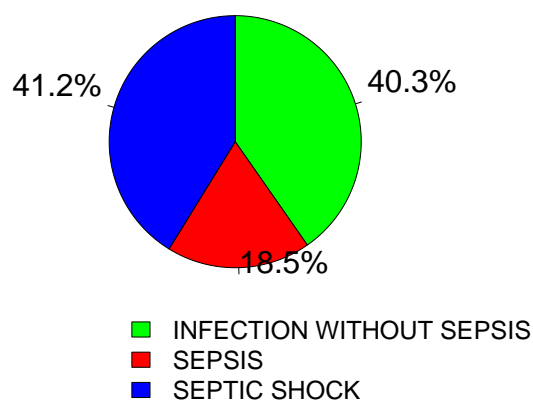
Clinical conditions on admission	N	%
Respiratory	387	15.4
Pleural effusion	110	4.4
Aspiration pneumonia	78	3.1
Atelectasis	45	1.8
Pneumothorax/Pneumomediastinum	38	1.5
Pulmonary embolism	37	1.5
Cardiovascular	548	21.9
Cardiac arrest	92	3.7
Peripheral vascular disease	79	3.2
Acute severe arrhythmia: tachycardias	77	3.1
Left heart failure without pulm. edema	73	2.9
Acute myocardial infarction	59	2.4
Neurological	170	6.8
Cerebral artery stroke	53	2.1
Metabolic/postanoxic encephalopathy	28	1.1
Seizures	28	1.1
Brain tumour	19	0.8
Spontaneous Intraparenchymal bleeding	16	0.6
Gastrointestinal and hepatic	768	30.6
Digestive tract malignancy	359	14.3
Gastrointestinal perforation	84	3.4
Intestinal occlusion	77	3.1
Paralytic Ileus	58	2.3
Gastrointestinal bleeding: upper tract	48	1.9
Trauma (anatomical districts)	370	14.8
Head	207	8.3
Pelvis/bone/joint & muscle	107	4.3
Chest	102	4.1
Spine	66	2.6
Abdomen	42	1.7
Major vessels injury	13	0.5
Miscellaneous	5	0.2
Other	787	31.4
Other disease	433	17.3
Nephrourologic disease	204	8.1
Metabolic disorder	110	4.4
Coagulation disorder	74	3.0
Acute intoxication	42	1.7
Post transplantation	34	1.4
Liver transplantation	24	1.0
Renal transplantation	6	0.2
Infections	977	39.0
Pneumonia	456	18.2
NON-surgical secondary peritonitis	96	3.8
Post-surgical peritonitis	85	3.4
NON-surgical urinary tract infection	79	3.2
Cholecystitis/cholangitis	41	1.6
Primary peritonitis	34	1.4
L.R.T.I. other than pneumonia	33	1.3
NON-surgical skin/soft tissue infection	31	1.2
Post-surgical skin/soft tissue infection	28	1.1
Clinical sepsis	27	1.1
Missing	1	

Trauma (anatomical districts)	N	%
Head	207	8.3
Traumatic Subdural haematoma	120	4.8
Traumatic subarachnoid haemorrhage	118	4.7
Cerebral contusion/laceration	93	3.7
Skull fracture	93	3.7
Maxillofacial fracture	49	2.0
Spine	66	2.6
Vertebral fracture, without deficit	43	1.7
Tetraplegia	14	0.6
Cervical injury, incomplete deficit	4	0.2
Chest	102	4.1
Other injuries of the chest	57	2.3
Traum. haemothorax/pneumothorax	56	2.2
Severe lung contusion/laceration	22	0.9
Abdomen	42	1.7
Spleen: Moderate-Severe laceration	17	0.7
Minor injuries of the abdomen	11	0.4
Bowel transection/perforation	7	0.3
Pelvis/bone/joint & muscle	107	4.3
Long bone fracture	88	3.5
Multiple fracture of the pelvis	23	0.9
Very severe or open fracture of the pelvis	4	0.2
Major vessels injury	13	0.5
Neck vessels: dissection/transection	6	0.2
Proximal limbs vessels: transection	3	0.1
Aorta: rupture/dissection	2	0.1
Miscellaneous	5	0.2
Burns (>30% BSA)	5	0.2
-	0	0.0
Missing	1	

Infection severity on admission	N	%
None	1529	61.9
INFECTION WITHOUT SEPSIS	379	15.3
SEPSIS	174	7.0
SEPTIC SHOCK	388	15.7
Missing	37	

Infection severity on admission

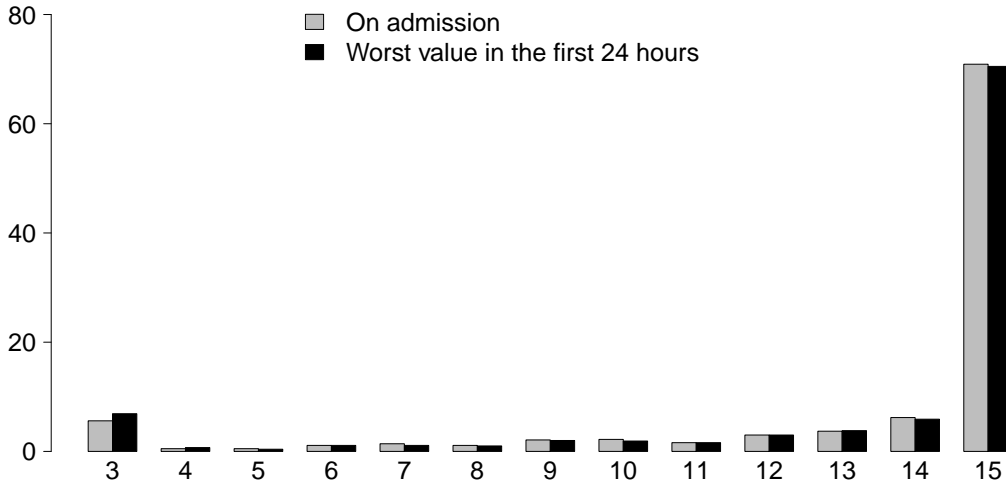
Patients infected (N=941)



National report - Year 2018

Severity scores - Adult patients

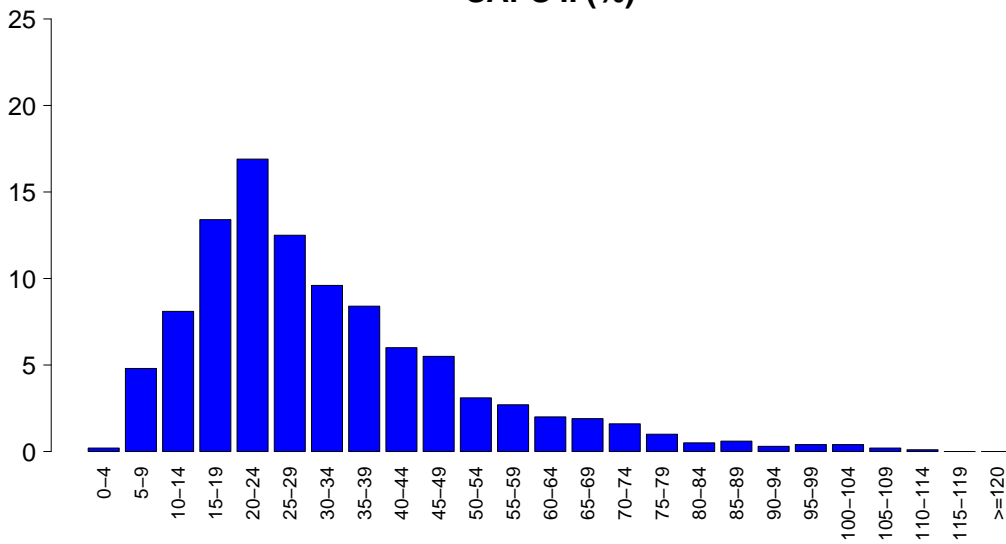
Glasgow Coma Scale (%)



GCS (admission)	
Median	15
Q1–Q3	14–15
Not evaluable	405
Missing	1

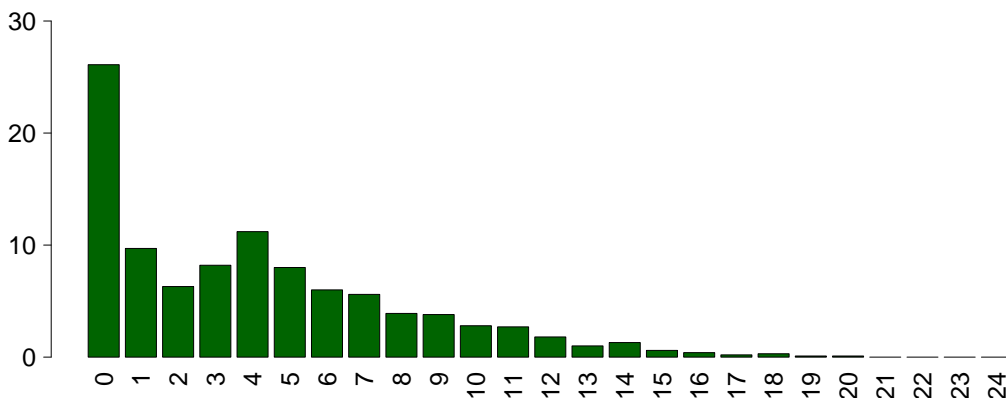
GCS (first 24 hours)	
Median	15
Q1–Q3	14–15
Not evaluable	583
Missing	1

SAPS II (%)



SAPSII	
Mean	31.7
SD	18.4
Median	27
Q1–Q3	18–40
Not evaluable	583
Missing	1

SOFA (%)



SOFA	
Mean	4.1
SD	4.0
Median	3
Q1–Q3	0–6
Not evaluable	583
Missing	1

National report - Year 2018

Characteristics during the stay - Adult patients

Complications during the stay	N	%
No	1503	60.0
Yes	1003	40.0
Missing	1	

Failures during the stay	N	%
No	2153	85.9
Yes	354	14.1
A: Respiratory failure	155	6.2
B: Cardiovascular failure	162	6.5
C: Neurological failure	27	1.1
D: Hepatic failure	41	1.6
E: Renal failure (AKIN)	136	5.4
F: Acute skin failure	1	0.0
G: Metabolic failure	54	2.2
H: Coagulation failure	20	0.8
Missing	0	

Failures during the stay (top 10)	N	%
A	62	2.5
B	54	2.2
E	47	1.9
AB	32	1.3
G	22	0.9
ABE	18	0.7
D	15	0.6
BE	13	0.5
AE	11	0.4
BEG	5	0.2
Missing	0	

Respiratory failure occurred	N	%
None	2351	93.8
Intubation for airway maint.	47	1.9
Hypoxic failure	93	3.7
Hypercapnic failure	47	1.9
Missing	1	

Cardiovascular failure occurred	N	%
None	2344	93.5
Cardiogenic shock	40	1.6
Hypovolemic shock	9	0.4
Haemorrhagic/hypovolemic shock	18	0.7
Septic shock	82	3.3
Anaphylactic shock	2	0.1
Neurogenic shock	0	0.0
Other shock	17	0.7
Missing	1	

Neurological failure occurred	N	%
None	2479	98.9
Cerebral coma	11	0.4
Metabolic coma	13	0.5
Postanoxic coma	3	0.1
Missing	1	

Renal failure occurred (AKIN)	N	%
None	2370	94.6
Mild	23	0.9
Moderate	25	1.0
Severe	88	3.5
Missing	1	

Complications during the stay	N	%
Respiratory	202	8.1
Pleural effusion	98	3.9
Atelectasis	49	2.0
Aspiration pneumonia	45	1.8
Pneumothorax/Pneumomediastinum	20	0.8
Severe ARDS	14	0.6
Cardiovascular	217	8.7
Acute severe arrhythmia: tachycardias	108	4.3
Cardiac arrest	53	2.1
Pulmonary edema	23	0.9
Acute severe arrhythmia: bradycardias	20	0.8
Acute myocardial infarction	17	0.7
Neurological	248	9.9
Drowsiness/agitation/delirium	160	6.4
Intracranial hypertension	46	1.8
Brain edema	32	1.3
Seizures	21	0.8
CrIMyNe	17	0.7
Gastrointestinal and hepatic	242	9.7
Paralytic Ileus	99	4.0
Liver Dysfunction Syndrome	35	1.4
Intrabdominal bleeding	31	1.2
Anastomotic dehiscence	27	1.1
Ascites	25	1.0
Other	219	8.7
Other disease	118	4.7
Metabolic disorder	54	2.2
Nephrourologic disease	54	2.2
Other skin and/or soft tissue pathology	9	0.4
Category/Stage II: Partial Thickness Skin Loss	4	0.2
Iatrogenic major vessels injury	3	0.1
Graft vascular thrombosis	2	0.1
Infections	392	15.6
Pneumonia	157	6.3
Post-surgical peritonitis	68	2.7
NON-surgical urinary tract infection	50	2.0
Post-surgical skin/soft tissue infection	28	1.1
Clinical sepsis	20	0.8
L.R.T.I. other than pneumonia	20	0.8
F.U.O. fever of unknown origin	18	0.7
NON-surgical secondary peritonitis	13	0.5
Other fungal infections	12	0.5
Upper respiratory tract infection	12	0.5
Missing	1	

National report - Year 2018

Characteristics during the stay - Adult patients

Infections	N	%
None	1253	50.0
Only on admission	861	34.4
On admission and during ICU stay	116	4.6
Only during ICU stay	276	11.0
Missing	1	

Maximum severity of infection	N	%
None	1253	51.1
INFECTION WITHOUT SEPSIS	518	21.1
SEPSIS	243	9.9
SEPTIC SHOCK	438	17.9
Missing	55	

Severity evolution

Severity evolution		During the stay				
		None	INFECTION WITHOUT SEPSIS	SEPSIS	SEPTIC SHOCK	TOT
Admission	None	1253 (83.2%)	178 (11.8%)	52 (3.5%)	23 (1.5%)	1506
	INFECTION WITHOUT SEPSIS	-	339 (89.4%)	35 (9.2%)	5 (1.3%)	379
	SEPSIS	-	-	155 (89.1%)	19 (10.9%)	174
	SEPTIC SHOCK	-	-	-	388 (100.0%)	388
	TOT	1253	517	242	435	2447

Ventil. Associat. Pneumonia (VAP)	N	%
No	2389	95.3
Yes	118	4.7
Missing	0	

Catheter Bacteraemia (CR-BSI)	N	%
No	2500	99.8
Yes	6	0.2
Missing	1	

Incidence of VAP

(Pts. with VAP/1000 days of VM pre-VAP)

Estimate	19.1
CI (95%)	15.8–22.9

Incidence of CR-BSI

(Pts. with CR-BSI/1000 days of CVC pre-CR-BSI)

Estimate	0.4
CI (95%)	0.2–1.0

Incidence of VAP

(Pts. with VAP/pts. ventilated for 8 days)

Estimate	15.3%
CI (95%)	12.6–18.3

Incidence of CR-BSI

(Pts. with CR-BSI/pts. catheterized for 12 days)

Estimate	0.5%
CI (95%)	0.2–1.2

National report - Year 2018
Process indicators - Adult patients

Procedures and/or treatments (Missing=1) Procedures (antibiotics excluded)	Use		On admission		On discharge		Length (days)		Days from admission			
	N	%	N	%	N	%	Median	Q1-Q3	Missing	Median	Q1-Q3	Missing
	2282	91.1										
Invasive ventilation	1061	42.3	677	27	204	8.1	3	1-9	0	0	0-1	0
Non invasive ventilation	545	21.7	87	3.5	95	3.8	2	1-4	0	0	0-1	0
Tracheostomy	121	4.8	18	0.7	100	4	8	4-15	0	15	9-21	0
iNO (inhaled nitric oxide)	46	1.8	8	0.3	10	0.4	2	1-7	0	1	0-3	0
Central Venous Catheter	1620	64.6	985	39.3	1260	50.3	5	3-9	0	0	0-0	0
PICC	231	9.2	56	2.2	175	7	4	2-7	0	0	0-1	0
Arterial Catheter	1874	74.8	1049	41.9	613	24.5	4	2-8	0	0	0-0	0
Vasoactive drugs	1440	57.5	695	27.7	174	6.9	2	1-5	0	0	0-0	0
Antiarrhythmics	278	11.1	46	1.8	68	2.7	2	1-5	0	2	0-4	0
IABP	2	0.1	0	0	0	0	4	3-4	0	1	0-2	0
Invasive monitoring of C.O.	156	6.2	22	0.9	26	1	4	2-8	0	0	0-2	0
Continuous monitoring of ScVO2	5	0.2	3	0.1	1	0	4	3-5	0	4	2-6	0
Temporary pacing	14	0.6	1	0	4	0.2	4	2-6	0	0	0-1	0
Ventricular assistance	0	0.0										
DC-shock	35	1.4								1	0-2	0
CPR	70	2.8								0	0-2	0
Massive blood transfusion	46	1.8								0	0-1	0
ICP monitoring without CSF drainage	83	3.3	70	2.8	11	0.4	10	5-15	0	1	0-2	0
ICP monitoring with CSF drainage	9	0.4	7	0.3	5	0.2	9	3-23	0	1	0-2	0
External ventricular drainage without ICP	5	0.2	1	0	2	0.1	8	3-11	0	12	8-17	0
Haemofiltration	6	0.2	0	0	1	0	1	1-2	0	5	3-6	0
Haemodialysis	176	7.0	28	1.1	58	2.3	5	1-12	0	1	0-5	0
ECMO	1	0.0	0	0	1	0	1	1-1	0	3	3-3	0
Hepatic clearance techniques	1	0.0										
Clearance techniques during sepsis	2	0.1	0	0	0	0	2	2-3	0	2	1-2	0
IAP (intra-abdominal pressure)	131	5.2										
Hypothermia	41	1.6	8	0.3	1	0	1	1-5	0	0	0-0	0
Enteral nutrition	782	31.2	95	3.8	447	17.8	5	2-11	0	1	1-2	0
Parenteral nutrition	1276	50.9	188	7.5	784	31.3	4	2-7	0	1	0-1	0
SDD (Topical, Topical and systemic)	1	0.0										
Patient restraint	132	5.3										
Peridural catheter	217	8.7	210	8.4	187	7.5	3	2-4	0	0	0-0	0
Electrical cardioversion	10	0.4								2	1-2	0
Vacuum therapy	15	0.6										
Antibiotics	1992	79.5										
Antibiotic prophylaxis	991	39.5	621	24.8	453	18.1	2	1-4	0	0	0-0	0
Empirical antibiotic therapy	862	34.4	375	15	343	13.7	3	2-5	0	0	0-2	0
Empirical antibiotic therapy in unconfirmed diagnosis	102	4.1	38	1.5	62	2.5	4	2-7	0	1	0-2	0
Targeted antibiotic therapy	656	26.2	148	5.9	452	18	6	3-11	0	3	2-6	0

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Process indicators - Adult patients

Invasive ventilation (N=1061)	N	%	Length (days)				
			Mean	SD	Median	Q1-Q3	Missing
Due to pulmonary failure	565	44.2	6.8	8.8	4	1-8	0
For airway maintenance	400	31.3	8.0	11.5	3	1-11	0
In weaning	23	1.8	0.4	0.5	0	0-1	0
Not evaluable	290	22.7	4.2	7.8	1	0.8-3.2	218
Reintubation within 48 hours	21	1.6	8.8	13.2	3	2-9	0

Non invasive ventilation (N=545)	N	%	Number of surgical interventions			N	%
Non invasive ventilation only	376	69.0	0	2342	93.5		
Non invasive ventilation failed	44	8.1	1	100	4.0		
For weaning	99	18.2	2	30	1.2		
Other	26	4.8	3	14	0.6		
Missing	0		>3	20	0.8		
			Missing	1			

Tracheostomy not present on admission (N=103)	N	%	Surgical interventions	
Surgical	21	20.4	Days from admission	
Percutwist	33	32.0	Mean	9.8
Ciaglia	3	2.9	SD	8.9
Monodil. Ciaglia	0	0.0	Median	7
Fantoni	0	0.0	Q1-Q3	4-13
Griggs	4	3.9	Missing	1
Other Kind	24	23.3		
Unknown	18	17.5		
Missing	0			

Tracheostomy - Days after the beginning of inv. vent. Not present on admission (N=102)	Mean	SD	Median	Q1-Q3	Missing
	14.8	8.0	15	9-20	0

Invasive monitoring of C.O. (N=156)	N	%	Surgical interventions (top 10)		N	%
Swan Ganz	6	3.8	Gastrointestinal surgery	163	6.5	
PICCO	72	46.2	Other surgery	54	2.2	
LIDCO	26	16.7	Orthopaedic surgery	12	0.5	
Vigileo-PRAM	0	0.0	Neurosurgery	12	0.5	
Other	52	33.3	Plastic surgery	10	0.4	
Missing	0		ENT surgery	9	0.4	
			Pancreatic surgery	7	0.3	
			Thoracic surgery	7	0.3	
			Maxillo-Facial surgery	5	0.2	
			Nephro/Urological surgery	4	0.2	
			Missing	1		

SDD (N=1)	N	%	Non surgical interventions		
Topical	1	100.0	Days from admission		
Topical and systemic	0	0.0	Mean	9.4	
Missing	0		SD	9.6	
			Median	6	
			Q1-Q3	3-13	
			Missing	1	

Antibiotic therapy Pt. infected in ICU only (N=276)	N	%	Non surgical interventions		
Only empirical	100	38.6	Days from admission		
Only targeted	63	24.3	Mean	9.4	
Targeted after empirical	81	31.3	SD	9.6	
Other	15	5.8	Median	6	
Missing	17		Q1-Q3	3-13	
			Missing	1	

Surgical interventions	N	%	Non surgical interventions	
No	2342	93.5	Days from admission	
Yes	164	6.5	Mean	9.4
Missing	1		SD	9.6
			Median	6
			Q1-Q3	3-13
			Missing	1

Surgical interventions	N	%	Non surgical interventions	
No	2342	93.5	Days from admission	
Yes	164	6.5	Mean	9.4
Missing	1		SD	9.6
			Median	6
			Q1-Q3	3-13
			Missing	1

Surgical interventions	N	%	Non surgical interventions	
No	2342	93.5	Days from admission	
Yes	164	6.5	Mean	9.4
Missing	1		SD	9.6
			Median	6
			Q1-Q3	3-13
			Missing	1

National report - Year 2018**Outcome indicators - Adult patients**

ICU outcome	N	%
Dead	338	13.6
Transferred to same hospital	1959	78.7
Transferred to other hospital	172	6.9
Discharged home	20	0.8
Disch. terminally ill	0	0.0
Missing	18	

Transferred to (N=2131)	N	%
Ward	1596	74.9
Other ICU	175	8.2
High dependency care unit	360	16.9
Rehabilitation	0	0.0
Day hospital or Long-term care	0	0.0
Missing	0	

Reason of transfer to Other ICU (N=175)	N	%
Specialist expertise	27	15.4
Step-up care	29	16.6
Logistical/organizational reasons	81	46.3
Step-down care	38	21.7
Missing	0	

Transferred to Same hospital (N=1959)	N	%
Ward	1517	77.4
Other ICU	104	5.3
High dependency care unit	338	17.3
Rehabilitation	0	0.0
Day hospital or Long-term care	0	0.0
Missing	0	

Transferred to Other hospital (N=172)	N	%
Ward	79	45.9
Other ICU	71	41.3
High dependency care unit	22	12.8
Rehabilitation	0	0.0
Day hospital or Long-term care	0	0.0
Missing	0	

ICU mortality	N	%
Alive	2151	86.4
Dead	338	13.6
Missing	18	

Timing of ICU mortality (N=338)	N	%
Daytime (08:00AM - 07:59PM)	202	59.8
Nighttime (08:00PM - 07:59AM)	136	40.2
Weekdays (Monday - Friday)	261	77.2
Weekend (Saturday - Sunday)	77	22.8
Missing	0	

Hospital mortality *	N	%
Alive	1918	79.7
Dead	489	20.3
Missing	18	

Timing of hosp. mortality * (N=489)	N	%
In ICU	329	67.3
Within 24 hours after ICU	10	2.0
24-47 hours after ICU	17	3.5
48-71 hours after ICU	9	1.8
72-95 hours after ICU	9	1.8
After 95 hours after ICU	115	23.5
Missing	0	

Timing of hosp. mortality (days from ICU disch.) * Discharged alive from ICU (N=160)		
Mean		22.2
SD		34.1
Median		11
Q1–Q3		3–29.2
Missing		0

* Statistics computed on patients admitted in months with % of patients in status 4 over the threshold (readmissions excluded) (N=2425).

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Outcome indicators - Adult patients

Last hospital mortality *	N	%
Alive	1899	78.9
Dead	508	21.1
Missing	18	

Readmission from ward	N	%
No	2451	97.8
Yes	55	2.2
Missing	1	

Number of readmissions (N=55)	N	%
1	52	94.5
2	2	3.6
>2	1	1.8
Missing	0	

Timing of readmission (N=55)	N	%
Within 48 hours	11	20.4
48-71 hours	6	11.1
72-95 hours	5	9.3
After 95 hours	32	59.3
Missing	1	

Timing readmission (days)	N	55
Mean	14.4	
SD	26.7	
Median	4.6	
Q1-Q3	2.2-16.5	

ICU stay (days)	Mean	6.6
	SD	9.7
	Median	3
	Q1-Q3	1-7
	Missing	3

ICU stay (days) Alive (N=2151)	Mean	6.3
	SD	8.9
	Median	3
	Q1-Q3	1-7
	Missing	2

ICU stay (days) Dead (N=338)	Mean	9.1
	SD	13.2
	Median	4
	Q1-Q3	1-10
	Missing	0

Stay after ICU (days) * Alive (N=2080)	Mean	14.3
	SD	22.4
	Median	7
	Q1-Q3	3-17
	Missing	18

Hospital stay (days) *	Mean	22.5
	SD	28.4
	Median	14
	Q1-Q3	7-27
	Missing	19

Hospital stay (days) * Alive (N=1918)	Mean	22.5
	SD	28.1
	Median	14
	Q1-Q3	8-27
	Missing	1

Hospital stay (days) * Dead (N=489)	Mean	22.4
	SD	29.6
	Median	13
	Q1-Q3	5-30
	Missing	0

* Statistics computed on patients admitted in months with % of patients in status 4 over the threshold (readmissions excluded) (N=2425).

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Characteristics on admission - Adult patients evaluated in the GiViTI model

Patients (N): 2367

Sex	N	%
Male	1507	63.7
Female	860	36.3
Missing	0	

Age (years)	N	%
17-45	261	11.0
46-65	737	31.1
66-75	645	27.2
>75	724	30.6
Missing	0	
Mean	66.0	
SD	15.8	
Median	68	
Q1–Q3	58–78	
Min–Max	17–99	

Body mass Index (BMI)	N	%
Underweight	98	4.1
Normal	953	40.3
Overweight	861	36.4
Obese	455	19.2
Missing	0	

Pregnancy status	N	%
Females (N=860)		
Not fertile	436	50.7
Not pregnant/Unknown	414	48.1
Currently pregnant	2	0.2
Post partum	8	0.9
Missing	0	

Comorbidities	N	%
No	290	12.3
Yes	2077	87.7
Missing	0	

Comorbidities (top 10)	N	%
Hypertension	1326	56.0
Arrhythmia	425	18.0
NYHA class II-III	399	16.9
Any tumour without metastasis	392	16.6
Diabetes Type II without insulin tr.	316	13.4
Moderate or severe renal disease	311	13.1
Metastatic cancer	211	8.9
Moderate COPD	196	8.3
Peripheral vascular disease	192	8.1
Drug-induced coagulopathy	170	7.2
Missing	0	

Stay before ICU (days)	Mean	SD	Median	Q1–Q3	Missing
	3.9	9.0	1	0–3	0

Source of admission	N	%
Same hospital	2129	89.9
Other hospital	138	5.8
Long-term chronic care hospital	100	4.2
Directly from the community	0	0.0
Missing	0	

Ward of admission	N	%
Hospital (N=2267)		
Medical ward	331	14.6
Surgical ward	1229	54.2
Emergency room	562	24.8
Other ICU	78	3.4
High dependency care unit	67	3.0
Missing	0	

Reason for transfer from	N	%
Other ICU (N=78)		
Specialist expertise	14	17.9
Step-up care	20	25.6
Logistical/organizational reasons	44	56.4
Step-down care	0	0.0
Missing	0	

Ward of admission	N	%
Same hospital (N=2129)		
Medical ward	314	14.7
Surgical ward	1207	56.7
Emergency room	530	24.9
Other ICU	25	1.2
High dependency care unit	53	2.5
Missing	0	

Ward of admission	N	%
Other hospital (N=138)		
Medical ward	17	12.3
Surgical ward	22	15.9
Emergency room	32	23.2
Other ICU	53	38.4
High dependency care unit	14	10.1
Missing	0	

Scheduled admission	N	%
No	1787	75.5
Yes	580	24.5
Missing	0	

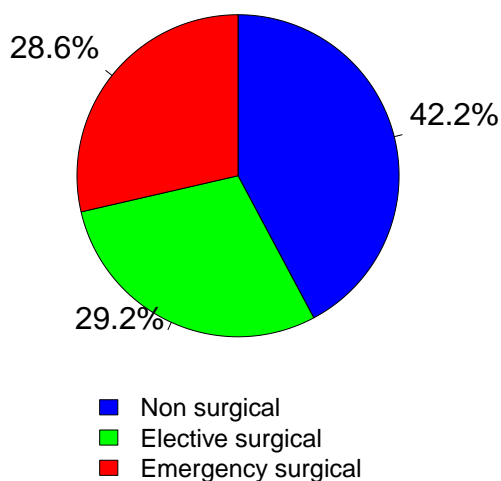
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Characteristics on admission - Adult patients evaluated in the GiViTI model

Trauma	N	%
No	2012	85.0
Yes	355	15.0
Multiple trauma	105	4.4
Missing	0	

Surgical status	N	%
Non surgical	998	42.2
Elective surgical	691	29.2
Emergency surgical	678	28.6
Missing	0	

Surgical status



Source of admission	N	%
Surgical pt. (N=1369)		
Operating theatre of surgical ward	1005	73.5
Operating theatre of emergency room	77	5.6
Surgical ward	104	7.6
Other	182	13.3
Missing	1	

Surgical interventions (top 10)	N	%
Elective surgical (N=691)		
Gastrointestinal surgery	378	54.7
Nephro/Urological surgery	93	13.5
Peripheral vascular surgery	67	9.7
Orthopaedic surgery	38	5.5
Other surgery	32	4.6
Abdominal vascular surgery	25	3.6
Hepatic surgery	24	3.5
Pancreatic surgery	12	1.7
Thoracic surgery	12	1.7
Gynaecological surgery	11	1.6
Missing	0	

Timing	N	%
Elective surgical (N=691)		
From -7 to -3 days	22	3.2
From -2 to -1 days	27	3.9
On ICU admission day	692	100.1
The day after ICU admission	8	1.2
Missing	1	

Surgical interventions (top 10)	N	%
Emergency surgical (N=678)		
Gastrointestinal surgery	325	47.9
Neurosurgery	85	12.5
Orthopaedic surgery	66	9.7
Other surgery	44	6.5
Nephro/Urological surgery	31	4.6
Thoracic surgery	24	3.5
Peripheral vascular surgery	22	3.2
Biliary tract surgery	22	3.2
Abdominal vascular surgery	19	2.8
Splenectomy	16	2.4
Missing	24	

Timing	N	%
Emergency surgical (N=678)		
From -7 to -3 days	36	5.3
From -2 to -1 days	79	11.7
On ICU admission day	577	85.1
The day after ICU admission	35	5.2
Missing	2	

Non surgical interventions	N	%
None	2232	94.3
Elective	7	0.3
Emergency	128	5.4
Missing	0	

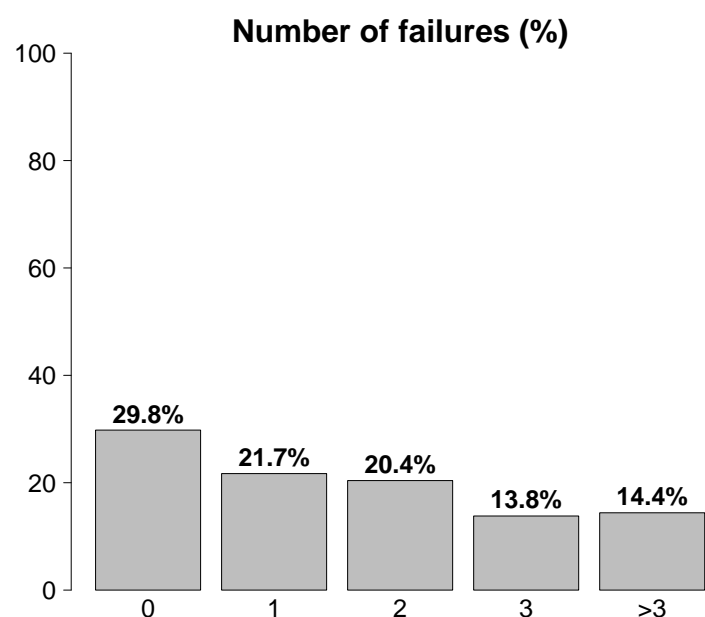
Non surgical interventions	N	%
Elective (N=7)		
Interventional radiology	3	42.9
Interventional cardiology	2	28.6
Interventional neuroradiology	0	0.0
Interventional endoscopy	0	0.0
Missing	2	

Non surgical interventions	N	%
Emergency (N=128)		
Interventional cardiology	63	49.2
Interventional endoscopy	42	32.8
Interventional radiology	17	13.3
Interventional neuroradiology	0	0.0
Missing	6	

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Characteristics on admission - Adult patients evaluated in the GiViTI model

Reason for admission	N	%
Monitoring/Weaning	941	39.8
Post surgical weaning	14	0.6
Surgical monitoring	548	23.2
Post interventional weaning	0	0.0
Interventional monitoring	64	2.7
Non surgical monitoring	311	13.2
Missing	4	
Admission for procedures/treatments	0	0.0
Intensive Treatment	1426	60.2
Only ventilatory support	471	19.9
Only cardiovascular support	221	9.3
Ventilatory and cardiovascular support	734	31.0
Missing	0	
Palliative Sedation	0	0.0
Diagnosis of death/Organ donation	0	0.0
Missing	0	



Failures on admission	N	%
No	705	29.8
Yes	1662	70.2
A: Respiratory failure	1205	50.9
B: Cardiovascular failure	955	40.3
C: Neurological failure	186	7.9
D: Hepatic failure	31	1.3
E: Renal failure	869	36.7
F: Acute skin failure	4	0.2
G: Metabolic failure	597	25.2
H: Coagulation failure	70	3.0
Missing	0	

Failures on admission (top 10)	N	%
A	270	11.4
AB	213	9.0
ABEG	196	8.3
E	124	5.2
ABE	111	4.7
AE	78	3.3
B	74	3.1
BE	65	2.7
ABG	55	2.3
BEG	52	2.2
Missing	0	

Respiratory failure	N	%
None	1162	49.1
Only hypoxic failure	638	27.0
Only hypercapnic failure	83	3.5
Hypoxic-hypercapnic failure	90	3.8
Intubation for airway maint.	394	16.6
Missing	0	

Cardiovascular failure	N	%
None	1412	59.7
Without shock	327	13.8
Cardiogenic shock	91	3.8
Septic shock	313	13.2
Haemorrhagic/hypovolemic shock	104	4.4
Hypovolemic shock	21	0.9
Anaphylactic shock	4	0.2
Neurogenic shock	12	0.5
Other shock	37	1.6
Mixed shock	46	1.9
Missing	0	

Neurologic failure	N	%
None	1798	90.6
Cerebral coma	70	3.5
Metabolic coma	60	3.0
Postanoxic coma	40	2.0
Toxic coma	16	0.8
Missing or not evaluable	383	

Renal failure (AKIN)	N	%
None	1498	63.3
Mild	495	20.9
Moderate	206	8.7
Severe	168	7.1
Missing	0	

Metabolic failure	N	%
None	1770	74.8
pH \leq 7.3, PaCO ₂ $<$ 45 mmHg	322	13.6
Base deficit \geq 5 mmol/L, lactate $>$ 1.5x	275	11.6
Missing	0	

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Characteristics on admission - Adult patients evaluated in the GiViTI model

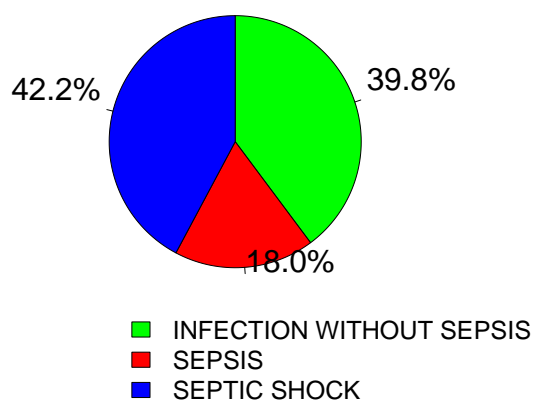
Clinical conditions on admission	N	%
Respiratory	350	14.8
Pleural effusion	97	4.1
Aspiration pneumonia	69	2.9
Atelectasis	41	1.7
Pneumothorax/Pneumomediastinum	37	1.6
Pulmonary embolism	32	1.4
Cardiovascular	513	21.7
Cardiac arrest	81	3.4
Peripheral vascular disease	76	3.2
Acute severe arrhythmia: tachycardias	69	2.9
Left heart failure without pulm. edema	67	2.8
Acute myocardial infarction	56	2.4
Neurological	154	6.5
Cerebral artery stroke	52	2.2
Seizures	26	1.1
Metabolic/postanoxic encephalopathy	20	0.8
Brain tumour	18	0.8
Spontaneous Intraparenchymal bleeding	16	0.7
Gastrointestinal and hepatic	733	31.0
Digestive tract malignancy	351	14.8
Gastrointestinal perforation	78	3.3
Intestinal occlusion	73	3.1
Paralytic Ileus	50	2.1
Gastrointestinal bleeding: upper tract	44	1.9
Trauma (anatomical districts)	355	15.0
Head	196	8.3
Pelvis/bone/joint & muscle	105	4.4
Chest	100	4.2
Spine	65	2.7
Abdomen	42	1.8
Major vessels injury	13	0.5
Miscellaneous	4	0.2
Other	743	31.4
Other disease	409	17.3
Nephrourologic disease	197	8.3
Metabolic disorder	105	4.4
Coagulation disorder	70	3.0
Acute intoxication	37	1.6
Post transplantation	34	1.4
Liver transplantation	24	1.0
Renal transplantation	6	0.3
Infections	890	37.6
Pneumonia	409	17.3
NON-surgical secondary peritonitis	95	4.0
Post-surgical peritonitis	75	3.2
NON-surgical urinary tract infection	73	3.1
Cholecystitis/choolangitis	38	1.6
Primary peritonitis	33	1.4
NON-surgical skin/soft tissue infection	29	1.2
L.R.T.I. other than pneumonia	28	1.2
Clinical sepsis	25	1.1
Post-surgical skin/soft tissue infection	23	1.0
Missing	0	

Trauma (anatomical districts)	N	%
Head	196	8.3
Traumatic Subdural haematoma	111	4.7
Traumatic subarachnoid haemorrhage	111	4.7
Skull fracture	91	3.8
Cerebral contusion/laceration	89	3.8
Maxillofacial fracture	48	2.0
Spine	65	2.7
Vertebral fracture, without deficit	43	1.8
Tetraplegia	13	0.5
Cervical injury, incomplete deficit	4	0.2
Chest	100	4.2
Traum. haemothorax/pneumothorax	56	2.4
Other injuries of the chest	56	2.4
Severe lung contusion/laceration	21	0.9
Abdomen	42	1.8
Spleen: Moderate-Severe laceration	17	0.7
Minor injuries of the abdomen	11	0.5
Bowel transection/perforation	7	0.3
Pelvis/bone/joint & muscle	105	4.4
Long bone fracture	86	3.6
Multiple fracture of the pelvis	23	1.0
Very severe or open fracture of the pelvis	4	0.2
Major vessels injury	13	0.5
Neck vessels: dissection/transection	6	0.3
Proximal limbs vessels: transection	3	0.1
Aorta: rupture/dissection	2	0.1
Miscellaneous	4	0.2
Burns (>30% BSA)	4	0.2
-	0	0.0
Missing	0	

Infection severity on admission	N	%
None	1477	63.3
INFECTION WITHOUT SEPSIS	341	14.6
SEPSIS	154	6.6
SEPTIC SHOCK	362	15.5
Missing	33	

Infection severity on admission

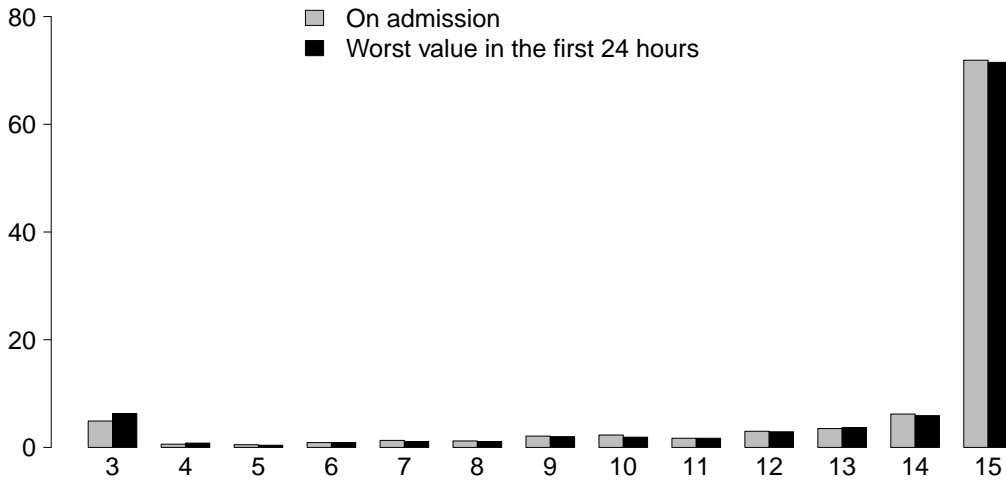
Patients infected (N=857)



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Severity scores - Adult patients evaluated in the GiViTI model

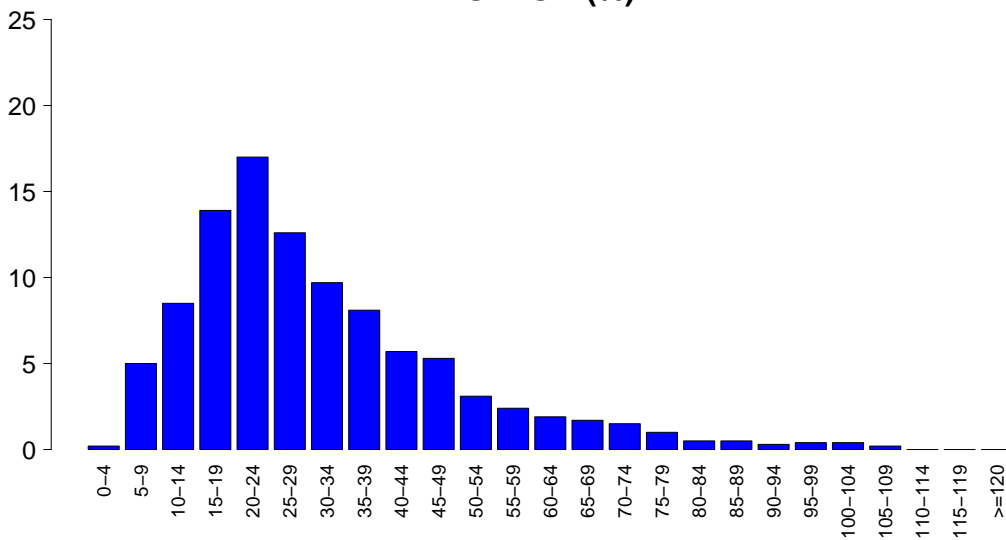
Glasgow Coma Scale (%)



GCS (admission)	
Median	15
Q1–Q3	14–15
Not evaluable	383
Missing	0

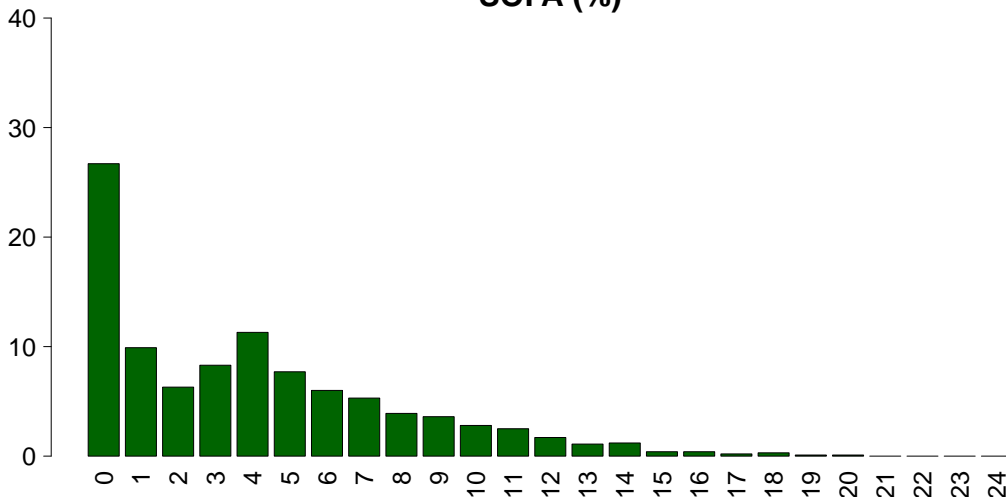
GCS (first 24 hours)	
Median	15
Q1–Q3	14–15
Not evaluable	551
Missing	0

SAPS II (%)



SAPSII	
Mean	31.2
SD	18.3
Median	26
Q1–Q3	18–39
Not evaluable	551
Missing	0

SOFA (%)



SOFA	
Mean	4.0
SD	4.0
Median	3
Q1–Q3	0–6
Not evaluable	551
Missing	0

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Characteristics during the stay - Adult patients evaluated in the GiViTI model

Complications during the stay	N	%
No	1425	60.2
Yes	942	39.8
Missing	0	

Failures during the stay	N	%
No	2040	86.2
Yes	327	13.8
A: Respiratory failure	141	6.0
B: Cardiovascular failure	149	6.3
C: Neurological failure	25	1.1
D: Hepatic failure	41	1.7
E: Renal failure (AKIN)	126	5.3
F: Acute skin failure	1	0.0
G: Metabolic failure	52	2.2
H: Coagulation failure	19	0.8
Missing	0	

Failures during the stay (top 10)	N	%
A	55	2.3
B	48	2.0
E	44	1.9
AB	30	1.3
G	21	0.9
D	15	0.6
ABE	14	0.6
BE	13	0.5
AE	11	0.5
BEG	5	0.2
Missing	0	

Respiratory failure occurred	N	%
None	2226	94.0
Intubation for airway maint.	46	1.9
Hypoxic failure	83	3.5
Hypercapnic failure	40	1.7
Missing	0	

Cardiovascular failure occurred	N	%
None	2218	93.7
Cardiogenic shock	36	1.5
Hypovolemic shock	8	0.3
Haemorrhagic/hypovolemic shock	17	0.7
Septic shock	77	3.3
Anaphylactic shock	2	0.1
Neurogenic shock	0	0.0
Other shock	15	0.6
Missing	0	

Neurological failure occurred	N	%
None	2342	98.9
Cerebral coma	11	0.5
Metabolic coma	12	0.5
Postanoxic coma	2	0.1
Missing	0	

Renal failure occurred (AKIN)	N	%
None	2241	94.7
Mild	21	0.9
Moderate	25	1.1
Severe	80	3.4
Missing	0	

Complications during the stay	N	%
Respiratory	187	7.9
Pleural effusion	89	3.8
Atelectasis	45	1.9
Aspiration pneumonia	43	1.8
Pneumothorax/Pneumomediastinum	18	0.8
Severe ARDS	14	0.6
Cardiovascular	202	8.5
Acute severe arrhythmia: tachycardias	101	4.3
Cardiac arrest	47	2.0
Pulmonary edema	21	0.9
Acute severe arrhythmia: bradycardias	19	0.8
Acute myocardial infarction	15	0.6
Neurological	231	9.8
Drowsiness/agitation/delirium	148	6.3
Intracranial hypertension	44	1.9
Brain edema	30	1.3
Seizures	20	0.8
CrIMyNe	17	0.7
Gastrointestinal and hepatic	228	9.6
Paralytic Ileus	90	3.8
Liver Dysfunction Syndrome	35	1.5
Intrabdominal bleeding	29	1.2
Ascites	25	1.1
Gastrointestinal bleeding: lower tract	24	1.0
Other	209	8.8
Other disease	111	4.7
Metabolic disorder	52	2.2
Nephrourologic disease	52	2.2
Other skin and/or soft tissue pathology	9	0.4
Category/Stage II: Partial Thickness Skin Loss	4	0.2
Iatrogenic major vessels injury	3	0.1
Graft vascular thrombosis	2	0.1
Infections	376	15.9
Pneumonia	148	6.3
Post-surgical peritonitis	65	2.7
NON-surgical urinary tract infection	50	2.1
Post-surgical skin/soft tissue infection	28	1.2
L.R.T.I. other than pneumonia	19	0.8
Clinical sepsis	18	0.8
F.U.O. fever of unknown origin	17	0.7
NON-surgical secondary peritonitis	13	0.5
Other fungal infections	12	0.5
Upper respiratory tract infection	12	0.5
Missing	0	

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Characteristics during the stay - Adult patients evaluated in the GiViTI model

Infections			Maximum severity of infection		
	N	%		N	%
None	1211	51.2	None	1211	52.3
Only on admission	780	33.0	INFECTION WITHOUT SEPSIS	480	20.7
On admission and during ICU stay	110	4.6	SEPSIS	216	9.3
Only during ICU stay	266	11.2	SEPTIC SHOCK	410	17.7
Missing	0		Missing	50	

Severity evolution

Severity evolution		During the stay				
		N (R %)	None	INFECTION WITHOUT SEPSIS	SEPSIS	SEPTIC SHOCK
Admission	None	1211 (83.2%)	173 (11.9%)	49 (3.4%)	22 (1.5%)	1455
	INFECTION WITHOUT SEPSIS	-	306 (89.7%)	30 (8.8%)	5 (1.5%)	341
	SEPSIS	-	-	136 (88.3%)	18 (11.7%)	154
	SEPTIC SHOCK	-	-	-	362 (100.0%)	362
	TOT	1211	479	215	407	2312

Ventil. Associat. Pneumonia (VAP)	N	%
No	2254	95.2
Yes	113	4.8
Missing	0	

Incidence of VAP

(Pts. with VAP/1000 days of VM pre-VAP)

Estimate	19.9
CI (95%)	16.4–23.9

Incidence of VAP

(Pts. with VAP/pts. ventilated for 8 days)

Estimate	15.9%
CI (95%)	13.1–19.1

Catheter Bacteraemia (CR-BSI)	N	%
No	2362	99.8
Yes	5	0.2
Missing	0	

Incidence of CR-BSI

(Pts. with CR-BSI/1000 days of CVC pre-CR-BSI)

Estimate	0.4
CI (95%)	0.1–0.9

Incidence of CR-BSI

(Pts. with CR-BSI/pts. catheterized for 12 days)

Estimate	0.5%
CI (95%)	0.2–1.1

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Process indicators - Adult patients evaluated in the GiViTI model

Procedures and/or treatments (Missing=0) Procedures (antibiotics excluded)	Use		On admission		On discharge		Length (days)		Days from admission			
	N	%	N	%	N	%	Median	Q1-Q3	Missing	Median	Q1-Q3	Missing
	2152	90.9										
Invasive ventilation	983	41.5	634	26.8	193	8.2	3	1-9	0	0	0-1	0
Non invasive ventilation	522	22.1	83	3.5	90	3.8	2	1-4	0	0	0-1	0
Tracheostomy	109	4.6	17	0.7	90	3.8	8	4-15	0	15	9-21	0
iNO (inhaled nitric oxide)	43	1.8	8	0.3	10	0.4	2	2-8	0	1	0-3	0
Central Venous Catheter	1514	64.0	923	39	1190	50.3	5	3-9	0	0	0-0	0
PICC	222	9.4	53	2.2	168	7.1	4	2-7	0	0	0-1	0
Arterial Catheter	1759	74.3	999	42.2	581	24.5	4	2-8	0	0	0-0	0
Vasoactive drugs	1357	57.3	659	27.8	167	7.1	2	1-5	0	0	0-0	0
Antiarrhythmics	264	11.2	46	1.9	64	2.7	2	1-5	0	2	0-4	0
IABP	2	0.1	0	0	0	0	4	3-4	0	1	0-2	0
Invasive monitoring of C.O.	146	6.2	22	0.9	26	1.1	4	2-8	0	0	0-2	0
Continuous monitoring of ScVO2	4	0.2	2	0.1	1	0	4	4-5	0	4	2-6	0
Temporary pacing	14	0.6	1	0	4	0.2	4	2-6	0	0	0-1	0
Ventricular assistance	0	0.0										
DC-shock	32	1.4								0	0-2	0
CPR	62	2.6								0	0-2	0
Massive blood transfusion	44	1.9								0	0-0	0
ICP monitoring without CSF drainage	80	3.4	69	2.9	11	0.5	10	5-15	0	1	0-2	0
ICP monitoring with CSF drainage	8	0.3	6	0.3	5	0.2	7	2-12	0	1	0-2	0
External ventricular drainage without ICP	5	0.2	1	0	2	0.1	8	3-11	0	12	8-17	0
Haemofiltration	6	0.3	0	0	1	0	1	1-2	0	5	3-6	0
Haemodialysis	161	6.8	25	1.1	55	2.3	4	1-11	0	1	0-5	0
ECMO	1	0.0	0	0	1	0	1	1-1	0	3	3-3	0
Hepatic clearance techniques	1	0.0										
Clearance techniques during sepsis	2	0.1	0	0	0	0	2	2-3	0	2	1-2	0
IAP (intra-abdominal pressure)	128	5.4										
Hypothermia	36	1.5	6	0.3	1	0	1	1-4	0	0	0-0	0
Enteral nutrition	727	30.7	83	3.5	418	17.7	5	2-11	0	1	1-2	0
Parenteral nutrition	1213	51.2	175	7.4	745	31.5	4	2-7	0	1	0-1	0
SDD (Topical, Topical and systemic)	1	0.0										
Patient restraint	118	5.0										
Peridural catheter	215	9.1	208	8.8	185	7.8	3	2-4	0	0	0-0	0
Electrical cardioversion	10	0.4								2	1-2	0
Vacuum therapy	14	0.6										
Antibiotics	1875	79.2										
Antibiotic prophylaxis	961	40.6	603	25.5	438	18.5	2	1-4	0	0	0-0	0
Empirical antibiotic therapy	805	34.0	349	14.7	321	13.6	3	2-5	0	0	0-2	0
Empirical antibiotic therapy in unconfirmed diagnosis	91	3.8	32	1.4	55	2.3	4	2-6	0	1	0-2	0
Targeted antibiotic therapy	601	25.4	132	5.6	416	17.6	6	3-11	0	3	2-6	0

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Process indicators - Adult patients evaluated in the GiViTI model

Invasive ventilation (N=983)	N	%	Length (days)				
			Mean	SD	Median	Q1-Q3	Missing
Due to pulmonary failure	511	43.1	6.8	9.0	3	1–8	0
For airway maintenance	393	33.1	8.0	11.5	3	1–11	0
In weaning	21	1.8	0.4	0.5	0	0–1	0
Not evaluable	261	22.0	4.6	7.9	1	1–4	204
Reintubation within 48 hours	19	1.6	8.1	12.9	3	2–8.5	0

Non invasive ventilation (N=522)	N	%	Number of surgical interventions			N	%
Non invasive ventilation only	363	69.5	0	2223	93.9		
Non invasive ventilation failed	43	8.2	1	87	3.7		
For weaning	93	17.8	2	29	1.2		
Other	23	4.4	3	13	0.5		
Missing	0		>3	15	0.6		
			Missing	0			

Tracheostomy not present on admission (N=92)	N	%	Surgical interventions	
Surgical	20	21.7	Days from admission	
Percutwist	28	30.4	Mean	10.1
Ciaglia	3	3.3	SD	9.1
Monodil. Ciaglia	0	0.0	Median	7
Fantoni	0	0.0	Q1–Q3	4–13.5
Griggs	4	4.3	Missing	1
Other Kind	21	22.8		
Unknown	16	17.4		
Missing	0			

Tracheostomy - Days after the beginning of inv. vent. Not present on admission (N=91)	Mean	SD	Median	Q1–Q3	Missing
	14.6	7.7	15	9–20	0

Invasive monitoring of C.O. (N=146)	N	%	Surgical interventions (top 10)		N	%
Swan Ganz	6	4.1	Gastrointestinal surgery	139	5.9	
PICCO	70	47.9	Other surgery	48	2.0	
LIDCO	25	17.1	Orthopaedic surgery	11	0.5	
Vigileo-PRAM	0	0.0	Plastic surgery	10	0.4	
Other	45	30.8	Neurosurgery	10	0.4	
Missing	0		Pancreatic surgery	7	0.3	
			Thoracic surgery	7	0.3	
			Maxillo-Facial surgery	5	0.2	
			Nephro/Urological surgery	4	0.2	
			ENT surgery	4	0.2	
			Missing	0		

SDD (N=1)	N	%	Non surgical interventions		N	%
Topical	1	100.0	No	2293	96.9	
Topical and systemic	0	0.0	Yes	74	3.1	
Missing	0		Missing	0		

Antibiotic therapy Pt. infected in ICU only (N=266)	N	%	Non surgical interventions		N	%
Only empirical	98	39.2	Days from admission			
Only targeted	61	24.4	Mean	9.7		
Targeted after empirical	76	30.4	SD	9.7		
Other	15	6.0	Median	6		
Missing	16		Q1–Q3	3–13.8		
			Missing	1		

Surgical interventions	N	%	Non surgical interventions		N	%
No	2223	93.9	Days from admission			
Yes	144	6.1	Mean	9.7		
Missing	0		SD	9.7		
			Median	6		
			Q1–Q3	3–13.8		
			Missing	1		

Surgical interventions	N	%	Non surgical interventions		N	%
No	2223	93.9	Days from admission			
Yes	144	6.1	Interventional endoscopy	37	1.6	
Missing	0		Interventional cardiology	25	1.1	
			Interventional radiology	18	0.8	
			Interventional neuroradiology	3	0.1	
			Missing	0		

National report - Year 2018**Outcome indicators - Adult patients evaluated in the GiViTI model**

ICU outcome	N	%
Dead	315	13.4
Transferred to same hospital	1861	79.1
Transferred to other hospital	161	6.8
Discharged home	17	0.7
Disch. terminally ill	0	0.0
Missing	13	

Transferred to (N=2022)	N	%
Ward	1507	74.5
Other ICU	169	8.4
High dependency care unit	346	17.1
Rehabilitation	0	0.0
Day hospital or Long-term care	0	0.0
Missing	0	

Reason of transfer to Other ICU (N=169)	N	%
Specialist expertise	27	16.0
Step-up care	29	17.2
Logistical/organizational reasons	78	46.2
Step-down care	35	20.7
Missing	0	

Transferred to Same hospital (N=1861)	N	%
Ward	1435	77.1
Other ICU	100	5.4
High dependency care unit	326	17.5
Rehabilitation	0	0.0
Day hospital or Long-term care	0	0.0
Missing	0	

Transferred to Other hospital (N=161)	N	%
Ward	72	44.7
Other ICU	69	42.9
High dependency care unit	20	12.4
Rehabilitation	0	0.0
Day hospital or Long-term care	0	0.0
Missing	0	

ICU mortality	N	%
Alive	2039	86.6
Dead	315	13.4
Missing	13	

Timing of ICU mortality (N=315)	N	%
Daytime (08:00AM - 07:59PM)	189	60.0
Nighttime (08:00PM - 07:59AM)	126	40.0
Weekdays (Monday - Friday)	242	76.8
Weekend (Saturday - Sunday)	73	23.2
Missing	0	

Hospital mortality	N	%
Alive	1894	80.0
Dead	473	20.0
Missing	0	

Timing of hosp. mortality (N=473)	N	%
In ICU	315	66.6
Within 24 hours after ICU	10	2.1
24-47 hours after ICU	17	3.6
48-71 hours after ICU	9	1.9
72-95 hours after ICU	9	1.9
After 95 hours after ICU	113	23.9
Missing	0	

Timing of hosp. mortality (days from ICU disch.) Discharged alive from ICU (N=158)		
Mean		22.2
SD		34.3
Median		11
Q1–Q3		3–29.8
Missing		0

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Outcome indicators - Adult patients evaluated in the GiViTI model

Last hospital mortality			ICU stay (days)		
	N	%			
Alive	1876	79.3	Mean	6.5	
Dead	491	20.7	SD	9.6	
Missing	0		Median	3	
			Q1–Q3	1–7	
			Missing	2	
ICU stay (days)			ICU stay (days)		
Alive (N=2039)			Alive (N=2039)		
			Mean	6.1	
			SD	8.7	
			Median	3	
			Q1–Q3	1–7	
			Missing	2	
ICU stay (days)			ICU stay (days)		
Dead (N=315)			Dead (N=315)		
			Mean	9.3	
			SD	13.5	
			Median	4	
			Q1–Q3	1–10.5	
			Missing	0	
Stay after ICU (days)			Stay after ICU (days)		
Alive (N=2039)			Alive (N=2039)		
			Mean	14.2	
			SD	22.2	
			Median	7	
			Q1–Q3	3–17	
			Missing	1	
Hospital stay (days)			Hospital stay (days)		
Alive (N=2039)			Alive (N=2039)		
			Mean	22.6	
			SD	28.3	
			Median	14	
			Q1–Q3	7–27	
			Missing	1	
Hospital stay (days)			Hospital stay (days)		
Alive (N=1894)			Alive (N=1894)		
			Mean	22.5	
			SD	28.0	
			Median	15	
			Q1–Q3	8–27	
			Missing	1	
Hospital stay (days)			Hospital stay (days)		
Dead (N=473)			Dead (N=473)		
			Mean	23.0	
			SD	29.8	
			Median	13	
			Q1–Q3	5–31	
			Missing	0	

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Characteristics on admission - Adult non surgical patients evaluated in the GiViTI model

Patients (N): 998

Sex	N	%
Male	649	65.0
Female	349	35.0
Missing	0	

Age (years)	N	%
17-45	113	11.3
46-65	311	31.2
66-75	263	26.4
>75	311	31.2
Missing	0	
Mean	66.0	
SD	16.0	
Median	68	
Q1–Q3	58–78	
Min–Max	17–99	

Body mass Index (BMI)	N	%
Underweight	33	3.3
Normal	404	40.5
Overweight	358	35.9
Obese	203	20.3
Missing	0	

Pregnancy status	N	%
Females (N=349)		
Not fertile	180	51.6
Not pregnant/Unknown	164	47.0
Currently pregnant	0	0.0
Post partum	5	1.4
Missing	0	

Comorbidities	N	%
No	123	12.3
Yes	875	87.7
Missing	0	

Comorbidities (top 10)	N	%
Hypertension	557	55.8
NYHA class II-III	209	20.9
Arrhythmia	203	20.3
Moderate or severe renal disease	147	14.7
Diabetes Type II without insulin tr.	137	13.7
Moderate COPD	92	9.2
Diabetes Type II with insulin treatment	88	8.8
Any tumour without metastasis	78	7.8
Alcohol addiction	76	7.6
Myocardial infarction	71	7.1
Missing	0	

Stay before ICU (days)	Mean	SD	Median	Q1–Q3	Missing
	3.9	10.3	0	0–3	0

Source of admission	N	%
Same hospital	807	80.9
Other hospital	92	9.2
Long-term chronic care hospital	99	9.9
Directly from the community	0	0.0
Missing	0	

Ward of admission	N	%
Hospital (N=899)		
Medical ward	271	30.1
Surgical ward	120	13.3
Emergency room	430	47.8
Other ICU	50	5.6
High dependency care unit	28	3.1
Missing	0	

Reason for transfer from	N	%
Other ICU (N=50)		
Specialist expertise	6	12.0
Step-up care	9	18.0
Logistical/organizational reasons	35	70.0
Step-down care	0	0.0
Missing	0	

Ward of admission	N	%
Same hospital (N=807)		
Medical ward	255	31.6
Surgical ward	108	13.4
Emergency room	414	51.3
Other ICU	9	1.1
High dependency care unit	21	2.6
Missing	0	

Ward of admission	N	%
Other hospital (N=92)		
Medical ward	16	17.4
Surgical ward	12	13.0
Emergency room	16	17.4
Other ICU	41	44.6
High dependency care unit	7	7.6
Missing	0	

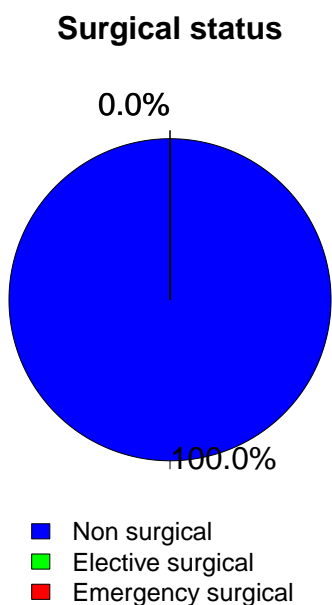
Scheduled admission	N	%
No	996	99.8
Yes	2	0.2
Missing	0	

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Characteristics on admission - Adult non surgical patients evaluated in the GiViTI model

Trauma	N	%
No	836	83.8
Yes	162	16.2
Multiple trauma	45	4.5
Missing	0	

Surgical status	N	%
Non surgical	998	100.0
Elective surgical	0	0.0
Emergency surgical	0	0.0
Missing	0	



Timing	N	%
Elective surgical (N=0)		
From -7 to -3 days	0	0.0
From -2 to -1 days	0	0.0
On ICU admission day	0	0.0
The day after ICU admission	0	0.0
Missing	0	

Surgical interventions (top 10)	N	%
Emergency surgical (N=0)		
-	0	0.0
-	0	0.0
-	0	0.0
-	0	0.0
-	0	0.0
-	0	0.0
-	0	0.0
-	0	0.0
-	0	0.0
Missing	0	

Timing	N	%
Emergency surgical (N=0)		
From -7 to -3 days	0	0.0
From -2 to -1 days	0	0.0
On ICU admission day	0	0.0
The day after ICU admission	0	0.0
Missing	0	

Source of admission	N	%
Surgical pt. (N=0)		
Operating theatre of surgical ward	0	0.0
Operating theatre of emergency room	0	0.0
Surgical ward	0	0.0
Other	0	0.0
Missing	0	

Non surgical interventions	N	%
None	893	89.5
Elective	4	0.4
Emergency	101	10.1
Missing	0	

Surgical interventions (top 10)	N	%
Elective surgical (N=0)		
-	0	0.0
-	0	0.0
-	0	0.0
-	0	0.0
-	0	0.0
-	0	0.0
-	0	0.0
-	0	0.0
-	0	0.0
Missing	0	

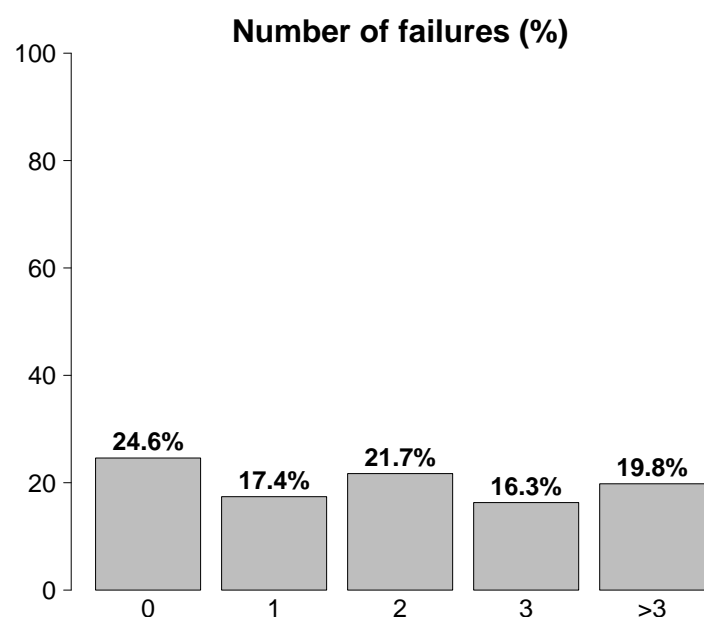
Non surgical interventions	N	%
Elective (N=4)		
Interventional radiology	2	50.0
Interventional cardiology	2	50.0
Interventional neuroradiology	0	0.0
Interventional endoscopy	0	0.0
Missing	0	

Non surgical interventions	N	%
Emergency (N=101)		
Interventional cardiology	60	59.4
Interventional endoscopy	31	30.7
Interventional radiology	10	9.9
Interventional neuroradiology	0	0.0
Missing	0	

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Characteristics on admission - Adult non surgical patients evaluated in the GiViTI model

Reason for admission	N	%
Monitoring/Weaning	377	37.8
Post surgical weaning	0	0.0
Surgical monitoring	0	0.0
Post interventional weaning	0	0.0
Interventional monitoring	62	6.2
Non surgical monitoring	311	31.3
Missing	4	
Admission for procedures/treatments	0	0.0
Intensive Treatment	621	62.2
Only ventilatory support	199	19.9
Only cardiovascular support	104	10.4
Ventilatory and cardiovascular support	318	31.9
Missing	0	
Palliative Sedation	0	0.0
Diagnosis of death/Organ donation	0	0.0
Missing	0	



Failures on admission	N	%
No	246	24.6
Yes	752	75.4
A: Respiratory failure	517	51.8
B: Cardiovascular failure	422	42.3
C: Neurological failure	143	14.3
D: Hepatic failure	16	1.6
E: Renal failure	494	49.5
F: Acute skin failure	1	0.1
G: Metabolic failure	333	33.4
H: Coagulation failure	22	2.2
Missing	0	

Failures on admission (top 10)	N	%
ABEG	107	10.7
A	72	7.2
E	71	7.1
AB	56	5.6
BE	45	4.5
ABE	43	4.3
ABCEG	40	4.0
AEG	36	3.6
AE	35	3.5
EG	32	3.2
Missing	0	

Respiratory failure	N	%
None	481	48.2
Only hypoxic failure	287	28.8
Only hypercapnic failure	66	6.6
Hypoxic-hypercapnic failure	43	4.3
Intubation for airway maint.	121	12.1
Missing	0	

Cardiovascular failure	N	%
None	576	57.7
Without shock	127	12.7
Cardiogenic shock	77	7.7
Septic shock	138	13.8
Haemorrhagic/hypovolemic shock	22	2.2
Hypovolemic shock	10	1.0
Anaphylactic shock	3	0.3
Neurogenic shock	6	0.6
Other shock	16	1.6
Mixed shock	23	2.3
Missing	0	

Neurologic failure	N	%
None	706	83.2
Cerebral coma	48	5.7
Metabolic coma	49	5.8
Postanoxic coma	33	3.9
Toxic coma	13	1.5
Missing or not evaluable	149	

Renal failure (AKIN)	N	%
None	504	50.5
Mild	276	27.7
Moderate	126	12.6
Severe	92	9.2
Missing	0	

Metabolic failure	N	%
None	665	66.6
pH \leq 7.3, PaCO ₂ < 45 mmHg	202	20.2
Base deficit \geq 5 mmol/L, lactate >1.5x	131	13.1
Missing	0	

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Characteristics on admission - Adult non surgical patients evaluated in the GiViTI model

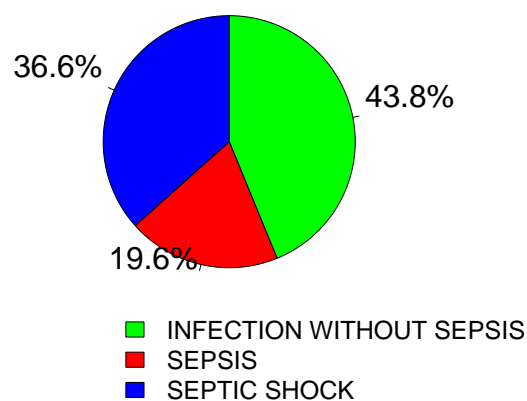
Clinical conditions on admission	N	%
Respiratory	198	19.8
Pleural effusion	53	5.3
Aspiration pneumonia	32	3.2
Pneumothorax/Pneumomediastinum	28	2.8
Atelectasis	24	2.4
Upper respiratory tract disease	21	2.1
Cardiovascular	308	30.9
Cardiac arrest	68	6.8
Acute myocardial infarction	49	4.9
Acute severe arrhythmia: tachycardias	42	4.2
Left heart failure with pulmonary edema	38	3.8
Acute ischaemia	37	3.7
Neurological	111	11.1
Cerebral artery stroke	45	4.5
Seizures	20	2.0
Metabolic/postanoxic encephalopathy	14	1.4
Brain tumour	11	1.1
Spontaneous Intraparenchymal bleeding	9	0.9
Gastrointestinal and hepatic	109	10.9
Gastrointestinal bleeding: upper tract	29	2.9
Ascites	19	1.9
Paralytic Ileus	14	1.4
Liver Dysfunction Syndrome	11	1.1
Intrabdominal bleeding (non traumatic)	8	0.8
Trauma (anatomical districts)	162	16.2
Head	107	10.7
Chest	45	4.5
Pelvis/bone/joint & muscle	31	3.1
Spine	28	2.8
Abdomen	14	1.4
Miscellaneous	3	0.3
Major vessels injury	1	0.1
Other	223	22.3
Other disease	90	9.0
Metabolic disorder	62	6.2
Nephrourologic disease	36	3.6
Acute intoxication	33	3.3
Coagulation disorder	22	2.2
Post transplantation	2	0.2
Bone marrow transplantation	1	0.1
Heart transplantation	1	0.1
Infections	469	47.0
Pneumonia	302	30.3
NON-surgical urinary tract infection	55	5.5
L.R.T.I. other than pneumonia	21	2.1
Upper respiratory tract infection	18	1.8
Clinical sepsis	13	1.3
Gastroenteritis	13	1.3
NON-surgical skin/soft tissue infection	12	1.2
Post-surgical peritonitis	8	0.8
Post-surgical skin/soft tissue infection	8	0.8
NON-surgical bone and joint infection	7	0.7
Missing	0	

Trauma (anatomical districts)	N	%
Head	107	10.7
Traumatic subarachnoid haemorrhage	64	6.4
Traumatic Subdural haematoma	55	5.5
Skull fracture	51	5.1
Cerebral contusion/laceration	45	4.5
Traumatic intraparenchymal bleeding	22	2.2
Spine	28	2.8
Vertebral fracture, without deficit	24	2.4
Cervical injury, incomplete deficit	2	0.2
Tetraplegia	2	0.2
Chest	45	4.5
Other injuries of the chest	25	2.5
Traum. haemothorax/pneumothorax	21	2.1
Severe lung contusion/laceration	7	0.7
Abdomen	14	1.4
Spleen: Moderate-Severe laceration	6	0.6
Minor injuries of the abdomen	6	0.6
Kidney: Rupture/laceration	4	0.4
Pelvis/bone/joint & muscle	31	3.1
Long bone fracture	22	2.2
Multiple fracture of the pelvis	13	1.3
Extremity compartment syndrome	1	0.1
Major vessels injury	1	0.1
Neck vessels: dissection/transection	1	0.1
-	0	0.0
-	0	0.0
Miscellaneous	3	0.3
Burns (>30% BSA)	3	0.3
-	0	0.0
Missing	0	

Infection severity on admission	N	%
None	529	53.8
INFECTION WITHOUT SEPSIS	199	20.2
SEPSIS	89	9.1
SEPTIC SHOCK	166	16.9
Missing	15	

Infection severity on admission

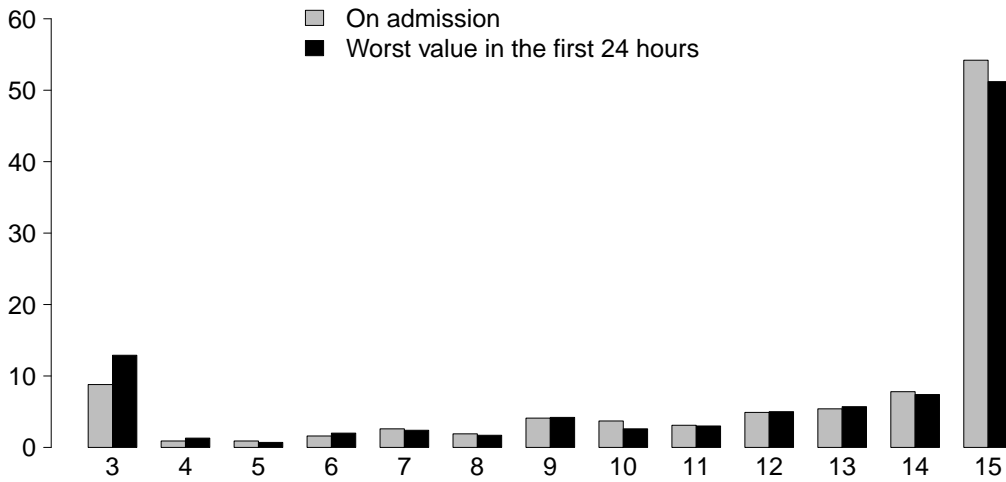
Patients infected (N=454)



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Severity scores - Adult non surgical patients evaluated in the GiViTI model

Glasgow Coma Scale (%)



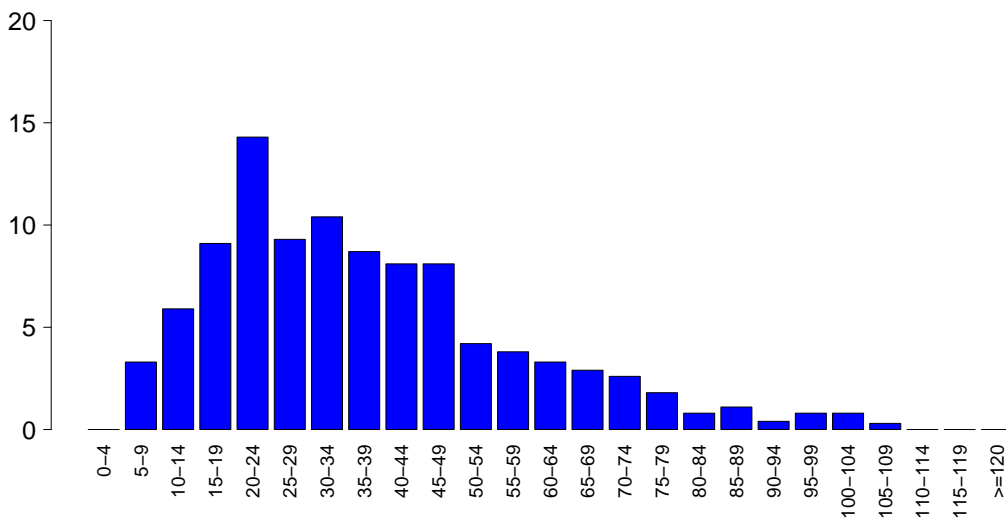
GCS (admission)

Median	15
Q1–Q3	11–15
Not evaluable	149
Missing	0

GCS (first 24 hours)

Median	15
Q1–Q3	9–15
Not evaluable	237
Missing	0

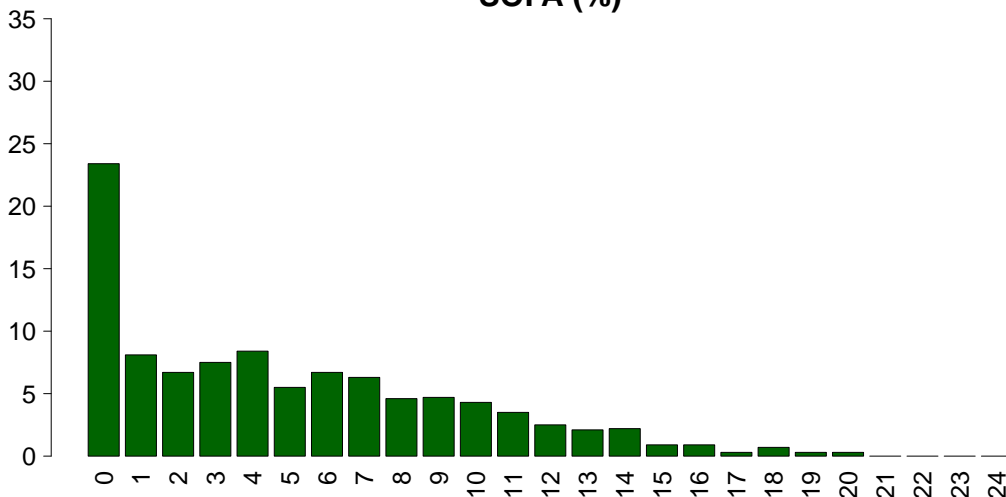
SAPS II (%)



SAPSII

Mean	37.5
SD	20.4
Median	33
Q1–Q3	22–48
Not evaluable	237
Missing	0

SOFA (%)



SOFA

Mean	5.0
SD	4.6
Median	4
Q1–Q3	1–8
Not evaluable	237
Missing	0

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Characteristics during the stay - Adult non surgical patients evaluated in the GiViTI model

Complications during the stay	N	%
No	671	67.2
Yes	327	32.8
Missing	0	

Failures during the stay	N	%
No	861	86.3
Yes	137	13.7

A: Respiratory failure	60	6.0
B: Cardiovascular failure	64	6.4
C: Neurological failure	12	1.2
D: Hepatic failure	12	1.2
E: Renal failure (AKIN)	48	4.8
F: Acute skin failure	0	0.0
G: Metabolic failure	21	2.1
H: Coagulation failure	6	0.6
Missing	0	

Failures during the stay (top 10)	N	%
A	25	2.5
B	20	2.0
E	17	1.7
AB	14	1.4
G	12	1.2
ABE	6	0.6
BE	5	0.5
D	5	0.5
AE	4	0.4
AC	3	0.3
Missing	0	

Respiratory failure occurred	N	%
None	938	94.0
Intubation for airway maint.	12	1.2
Hypoxic failure	40	4.0
Hypercapnic failure	17	1.7
Missing	0	

Cardiovascular failure occurred	N	%
None	934	93.6
Cardiogenic shock	26	2.6
Hypovolemic shock	4	0.4
Haemorrhagic/hypovolemic shock	2	0.2
Septic shock	30	3.0
Anaphylactic shock	0	0.0
Neurogenic shock	0	0.0
Other shock	5	0.5
Missing	0	

Neurological failure occurred	N	%
None	986	98.8
Cerebral coma	7	0.7
Metabolic coma	4	0.4
Postanoxic coma	1	0.1
Missing	0	

Renal failure occurred (AKIN)	N	%
None	950	95.2
Mild	2	0.2
Moderate	8	0.8
Severe	38	3.8
Missing	0	

Complications during the stay	N	%
Respiratory	56	5.6
Pleural effusion	25	2.5
Atelectasis	10	1.0
Severe ARDS	9	0.9
Aspiration pneumonia	9	0.9
Pneumothorax/Pneumomediastinum	9	0.9
Cardiovascular	73	7.3
Acute severe arrhythmia: tachycardias	40	4.0
Cardiac arrest	17	1.7
Acute severe arrhythmia: bradycardias	9	0.9
Pulmonary edema	9	0.9
Acute myocardial infarction	9	0.9
Neurological	93	9.3
Drowsiness/agitation/delirium	55	5.5
Intracranial hypertension	20	2.0
Brain edema	12	1.2
CrIMyNe	9	0.9
Seizures	9	0.9
Gastrointestinal and hepatic	43	4.3
Paralytic Ileus	13	1.3
Liver Dysfunction Syndrome	11	1.1
Ascites	8	0.8
Gastrointestinal bleeding: upper tract	8	0.8
Gastrointestinal bleeding: lower tract	7	0.7
Other	48	4.8
Metabolic disorder	21	2.1
Other disease	20	2.0
Nephrourologic disease	11	1.1
Category/Stage II: Partial Thickness Skin Loss	2	0.2
Other skin and/or soft tissue pathology	2	0.2
Category/Stage I: Nonblanchable Erythema	1	0.1
HELLP syndrome	1	0.1
Infections	122	12.2
Pneumonia	65	6.5
NON-surgical urinary tract infection	27	2.7
L.R.T.I. other than pneumonia	11	1.1
Upper respiratory tract infection	6	0.6
Clinical sepsis	5	0.5
F.U.O. fever of unknown origin	4	0.4
Catheter-related bacteremia (CR-BSI)	3	0.3
Other fungal infections	3	0.3
Other viral infections	3	0.3
Primary bacteraemia of unknown origin	2	0.2
Missing	0	

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Characteristics during the stay - Adult non surgical patients evaluated in the GiViTI model

Infections			Maximum severity of infection		
	N	%		N	%
None	447	44.8	None	447	45.6
Only on admission	429	43.0	INFECTION WITHOUT SEPSIS	234	23.9
On admission and during ICU stay	40	4.0	SEPSIS	119	12.1
Only during ICU stay	82	8.2	SEPTIC SHOCK	181	18.5
Missing	0		Missing	17	

Severity evolution

Severity evolution		During the stay				
		None	INFECTION WITHOUT SEPSIS	SEPSIS	SEPTIC SHOCK	TOT
Admission	None	447 (85.0%)	56 (10.6%)	19 (3.6%)	4 (0.8%)	526
	INFECTION WITHOUT SEPSIS	-	177 (88.9%)	20 (10.1%)	2 (1.0%)	199
	SEPSIS	-	-	80 (89.9%)	9 (10.1%)	89
	SEPTIC SHOCK	-	-	-	166 (100.0%)	166
	TOT	447	233	119	181	980

Ventil. Associat. Pneumonia (VAP)	N	%
No	950	95.2
Yes	48	4.8
Missing	0	

Incidence of VAP

(Pts. with VAP/1000 days of VM pre-VAP)

Estimate	17.7
CI (95%)	13.0–23.4

Incidence of VAP

(Pts. with VAP/pts. ventilated for 8 days)

Estimate	14.2%
CI (95%)	10.4–18.8

Catheter Bacteraemia (CR-BSI)	N	%
No	995	99.7
Yes	3	0.3
Missing	0	

Incidence of CR-BSI

(Pts. with CR-BSI/1000 days of CVC pre-CR-BSI)

Estimate	0.6
CI (95%)	0.1–1.8

Incidence of CR-BSI

(Pts. with CR-BSI/pts. catheterized for 12 days)

Estimate	0.7%
CI (95%)	0.1–2.1

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Process indicators - Adult non surgical patients evaluated in the GiViTI model

Procedures and/or treatments (Missing=0) Procedures (antibiotics excluded)	Use		On admission		On discharge		Length (days)		Days from admission			
	N	%	N	%	N	%	Median	Q1-Q3	Missing	Median	Q1-Q3	Missing
	808	81.0										
Invasive ventilation	451	45.2	214	21.4	79	7.9	3	1-9	0	0	0-0	0
Non invasive ventilation	168	16.8	28	2.8	28	2.8	2	1-3	0	0	0-1	0
Tracheostomy	45	4.5	6	0.6	38	3.8	9	4-19	0	10	6-18	0
iNO (inhaled nitric oxide)	13	1.3	1	0.1	1	0.1	2	1-6	0	1	0-5	0
Central Venous Catheter	591	59.2	197	19.7	362	36.3	5	3-10	0	0	0-0	0
PICC	78	7.8	12	1.2	48	4.8	3	1-7	0	0	0-1	0
Arterial Catheter	661	66.2	203	20.3	199	19.9	5	2-9	0	0	0-0	0
Vasoactive drugs	534	53.5	167	16.7	87	8.7	3	1-6	0	0	0-0	0
Antiarrhythmics	135	13.5	20	2	27	2.7	2	1-4	0	1	0-4	0
IABP	2	0.2	0	0	0	0	4	3-4	0	1	0-2	0
Invasive monitoring of C.O.	76	7.6	11	1.1	8	0.8	4	3-8	0	0	0-1	0
Continuous monitoring of ScVO2	3	0.3	2	0.2	1	0.1	5	4-5	0	8	8-8	0
Temporary pacing	12	1.2	1	0.1	4	0.4	4	2-5	0	0	0-0	0
Ventricular assistance	0	0.0										
DC-shock	18	1.8								0	0-2	0
CPR	48	4.8								0	0-1	0
Massive blood transfusion	9	0.9								0	0-0	0
ICP monitoring without CSF drainage	28	2.8	18	1.8	5	0.5	10	7-13	0	1	0-2	0
ICP monitoring with CSF drainage	2	0.2	1	0.1	2	0.2	12	6-17	0	2	2-2	0
External ventricular drainage without ICP	1	0.1	0	0	1	0.1	8	8-8	0	5	5-5	0
Haemofiltration	5	0.5	0	0	1	0.1	1	1-2	0	5	2-5	0
Haemodialysis	88	8.8	10	1	30	3	4	1-9	0	1	0-3	0
ECMO	0	0.0										
Hepatic clearance techniques	0	0.0										
Clearance techniques during sepsis	2	0.2	0	0	0	0	2	2-3	0	2	1-2	0
IAP (intra-abdominal pressure)	18	1.8										
Hypothermia	26	2.6	2	0.2	1	0.1	1	1-2	0	0	0-0	0
Enteral nutrition	312	31.3	48	4.8	129	12.9	6	2-11	0	1	0-2	0
Parenteral nutrition	268	26.9	43	4.3	124	12.4	4	2-9	0	1	0-1	0
SDD (Topical, Topical and systemic)	0	0.0										
Patient restraint	87	8.7										
Peridural catheter	1	0.1	0	0	0	0	0	0-0	0	0	0-0	0
Electrical cardioversion	5	0.5								1	0-2	0
Vacuum therapy	3	0.3										
Antibiotics	634	63.5										
Antibiotic prophylaxis	124	12.4	34	3.4	60	6	3	1-5	0	0	0-0	0
Empirical antibiotic therapy	395	39.6	150	15	151	15.1	3	2-6	0	0	0-1	0
Empirical antibiotic therapy in unconfirmed diagnosis	47	4.7	17	1.7	28	2.8	4	2-7	0	0	0-1	0
Targeted antibiotic therapy	262	26.3	56	5.6	158	15.8	5	3-11	0	3	2-5	0

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Process indicators - Adult non surgical patients evaluated in the GiViTI model

			Length (days)				
Invasive ventilation (N=451)	N	%	Mean	SD	Median	Q1-Q3	Missing
Due to pulmonary failure	311	62.6	6.8	9.1	4	1.5–8	0
For airway maintenance	117	23.5	7.0	9.2	3	1–9	0
In weaning	3	0.6	0.7	0.6	1	0.5–1	0
Not evaluable	66	13.3	6.1	7.3	3	2.5–6	46
Reintubation within 48 hours	7	1.4	14.4	19.8	6	2–18	0
Non invasive ventilation (N=168)			Number of surgical interventions				
Non invasive ventilation only	102	60.7				0	972 97.4
Non invasive ventilation failed	24	14.3				1	19 1.9
For weaning	30	17.9				2	5 0.5
Other	12	7.1				3	1 0.1
Missing	0					>3	1 0.1
Tracheostomy not present on admission (N=39)						Missing	0
Surgical	13	33.3	Surgical interventions				
Percutwist	16	41.0	Days from admission				
Ciaglia	0	0.0				Mean	12.6
Monodil. Ciaglia	0	0.0				SD	12.9
Fantoni	0	0.0				Median	6
Griggs	1	2.6				Q1–Q3	5–16
Other Kind	5	12.8				Missing	0
Unknown	4	10.3	Surgical interventions (top 10)				
Missing	0					N	%
						Gastrointestinal surgery	11 1.1
						Other surgery	8 0.8
						Plastic surgery	4 0.4
						ENT surgery	3 0.3
						Orthopaedic surgery	3 0.3
						Neurosurgery	3 0.3
						Thoracic surgery	2 0.2
						Nephro/Urological surgery	1 0.1
						Abdominal vascular surgery	1 0.1
						Thoracic vascular surgery	1 0.1
						Missing	0
Tracheostomy - Days after the beginning of inv. vent. Not present on admission (N=38)			Non surgical interventions				
Mean	11.0					N	%
SD	7.0					No	960 96.2
Median	10					Yes	38 3.8
Q1–Q3	5.2–16.8					Missing	0
Missing	0		Non surgical interventions				
Invasive monitoring of C.O. (N=76)			Days from admission				
Swan Ganz	5	6.6				Mean	7.7
PICCO	22	28.9				SD	10.9
LIDCO	5	6.6				Median	4
Vigileo-PRAM	0	0.0				Q1–Q3	2–6.2
Other	44	57.9				Missing	1
Missing	0		Non surgical interventions				
SDD (N=0)			Days from admission				
Topical	0	0.0				N	%
Topical and systemic	0	0.0				Interventional cardiology	23 2.3
Missing	0					Interventional endoscopy	12 1.2
Antibiotic therapy						Interventional radiology	3 0.3
Pt. infected in ICU only (N=82)						Interventional neuroradiology	3 0.3
Only empirical	29	36.2				Missing	0
Only targeted	23	28.7	Surgical interventions				
Targeted after empirical	22	27.5				N	%
Other	6	7.5				No	972 97.4
Missing	2					Yes	26 2.6
Surgical interventions						Missing	0
No	972	97.4					
Yes	26	2.6					
Missing	0						

National report - Year 2018**Outcome indicators - Adult non surgical patients evaluated in the GiViTI model**

ICU outcome	N	%
Dead	192	19.5
Transferred to same hospital	671	68.1
Transferred to other hospital	110	11.2
Discharged home	13	1.3
Disch. terminally ill	0	0.0
Missing	12	

Transferred to (N=781)	N	%
Ward	619	79.3
Other ICU	68	8.7
High dependency care unit	94	12.0
Rehabilitation	0	0.0
Day hospital or Long-term care	0	0.0
Missing	0	

Reason of transfer to Other ICU (N=68)	N	%
Specialist expertise	13	19.1
Step-up care	21	30.9
Logistical/organizational reasons	27	39.7
Step-down care	7	10.3
Missing	0	

Transferred to Same hospital (N=671)	N	%
Ward	561	83.6
Other ICU	28	4.2
High dependency care unit	82	12.2
Rehabilitation	0	0.0
Day hospital or Long-term care	0	0.0
Missing	0	

Transferred to Other hospital (N=110)	N	%
Ward	58	52.7
Other ICU	40	36.4
High dependency care unit	12	10.9
Rehabilitation	0	0.0
Day hospital or Long-term care	0	0.0
Missing	0	

ICU mortality	N	%
Alive	794	80.5
Dead	192	19.5
Missing	12	

Timing of ICU mortality (N=192)	N	%
Daytime (08:00AM - 07:59PM)	119	62.0
Nighttime (08:00PM - 07:59AM)	73	38.0
Weekdays (Monday - Friday)	143	74.5
Weekend (Saturday - Sunday)	49	25.5
Missing	0	

Hospital mortality	N	%
Alive	728	72.9
Dead	270	27.1
Missing	0	

Timing of hosp. mortality (N=270)	N	%
In ICU	192	71.1
Within 24 hours after ICU	5	1.9
24-47 hours after ICU	11	4.1
48-71 hours after ICU	6	2.2
72-95 hours after ICU	4	1.5
After 95 hours after ICU	52	19.3
Missing	0	

Timing of hosp. mortality (days from ICU disch.) Discharged alive from ICU (N=78)		
Mean		17.8
SD		32.6
Median		9
Q1–Q3		2–19.8
Missing		0

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Outcome indicators - Adult non surgical patients evaluated in the GiViTI model

Last hospital mortality			ICU stay (days)		
	N	%			
Alive	717	71.8	Mean	6.8	
Dead	281	28.2	SD	9.3	
Missing	0		Median	4	
			Q1–Q3	1–8	
			Missing	1	
ICU stay (days)			ICU stay (days)		
Alive (N=794)			Alive (N=794)		
			Mean	6.4	
			SD	8.2	
			Median	4	
			Q1–Q3	1–8	
			Missing	1	
ICU stay (days)			ICU stay (days)		
Dead (N=192)			Dead (N=192)		
			Mean	8.5	
			SD	12.7	
			Median	4	
			Q1–Q3	1.8–9	
			Missing	0	
Stay after ICU (days)			Stay after ICU (days)		
Alive (N=794)			Alive (N=794)		
			Mean	13.0	
			SD	19.6	
			Median	7	
			Q1–Q3	2–16	
			Missing	0	
Hospital stay (days)			Hospital stay (days)		
Alive (N=794)			Alive (N=794)		
			Mean	20.5	
			SD	26.3	
			Median	13	
			Q1–Q3	6–25	
			Missing	0	
Hospital stay (days)			Hospital stay (days)		
Alive (N=728)			Alive (N=728)		
			Mean	21.1	
			SD	26.4	
			Median	14	
			Q1–Q3	6–26	
			Missing	0	
Hospital stay (days)			Hospital stay (days)		
Dead (N=270)			Dead (N=270)		
			Mean	18.9	
			SD	26.0	
			Median	12	
			Q1–Q3	4–24	
			Missing	0	

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Characteristics on admission - Adult elective surgical patients evaluated in the GiViTI model

Patients (N): 691

Sex	N	%
Male	414	59.9
Female	277	40.1
Missing	0	

Age (years)	N	%
17-45	44	6.4
46-65	240	34.7
66-75	228	33.0
>75	179	25.9
Missing	0	
Mean	66.7	
SD	13.0	
Median	68	
Q1–Q3	60–76	
Min–Max	17–99	

Body mass Index (BMI)	N	%
Underweight	30	4.3
Normal	267	38.6
Overweight	268	38.8
Obese	126	18.2
Missing	0	

Pregnancy status	N	%
Females (N=277)		
Not fertile	128	46.2
Not pregnant/Unknown	146	52.7
Currently pregnant	2	0.7
Post partum	1	0.4
Missing	0	

Comorbidities	N	%
No	58	8.4
Yes	633	91.6
Missing	0	

Comorbidities (top 10)	N	%
Hypertension	403	58.3
Any tumour without metastasis	232	33.6
Metastatic cancer	102	14.8
Diabetes Type II without insulin tr.	101	14.6
NYHA class II-III	86	12.4
Arrhythmia	85	12.3
Peripheral vascular disease	69	10.0
Moderate or severe renal disease	67	9.7
Moderate COPD	45	6.5
Drug-induced coagulopathy	44	6.4
Missing	0	

Stay before ICU (days)	Mean	SD	Median	Q1–Q3	Missing
	3.9	7.6	1	1–3	0

Source of admission	N	%
Same hospital	686	99.3
Other hospital	5	0.7
Long-term chronic care hospital	0	0.0
Directly from the community	0	0.0
Missing	0	

Ward of admission	N	%
Hospital (N=691)		
Medical ward	10	1.4
Surgical ward	661	95.7
Emergency room	4	0.6
Other ICU	4	0.6
High dependency care unit	12	1.7
Missing	0	

Reason for transfer from	N	%
Other ICU (N=4)		
Specialist expertise	0	0.0
Step-up care	2	50.0
Logistical/organizational reasons	2	50.0
Step-down care	0	0.0
Missing	0	

Ward of admission	N	%
Same hospital (N=686)		
Medical ward	10	1.5
Surgical ward	660	96.2
Emergency room	4	0.6
Other ICU	1	0.1
High dependency care unit	11	1.6
Missing	0	

Ward of admission	N	%
Other hospital (N=5)		
Medical ward	0	0.0
Surgical ward	1	20.0
Emergency room	0	0.0
Other ICU	3	60.0
High dependency care unit	1	20.0
Missing	0	

Scheduled admission	N	%
No	113	16.4
Yes	578	83.6
Missing	0	

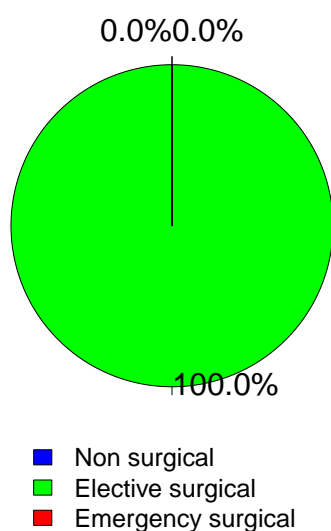
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Characteristics on admission - Adult elective surgical patients evaluated in the GiViTI model

Trauma	N	%
No	675	97.7
Yes	16	2.3
Multiple trauma	2	0.3
Missing	0	

Surgical status	N	%
Non surgical	0	0.0
Elective surgical	691	100.0
Emergency surgical	0	0.0
Missing	0	

Surgical status



Timing	N	%
Elective surgical (N=691)		
From -7 to -3 days	22	3.2
From -2 to -1 days	27	3.9
On ICU admission day	692	100.1
The day after ICU admission	8	1.2
Missing	1	

Surgical interventions (top 10)

Emergency surgical (N=0)	N	%
-	0	0.0
-	0	0.0
-	0	0.0
-	0	0.0
-	0	0.0
-	0	0.0
-	0	0.0
-	0	0.0
-	0	0.0
-	0	0.0
-	0	0.0
Missing	0	

Timing

Emergency surgical (N=0)	N	%
From -7 to -3 days	0	0.0
From -2 to -1 days	0	0.0
On ICU admission day	0	0.0
The day after ICU admission	0	0.0
Missing	0	

Source of admission	N	%
Surgical pt. (N=691)		
Operating theatre of surgical ward	616	89.1
Operating theatre of emergency room	2	0.3
Surgical ward	45	6.5
Other	28	4.1
Missing	0	

Surgical interventions (top 10)

Elective surgical (N=691)	N	%
Gastrointestinal surgery	378	54.7
Nephro/Urological surgery	93	13.5
Peripheral vascular surgery	67	9.7
Orthopaedic surgery	38	5.5
Other surgery	32	4.6
Abdominal vascular surgery	25	3.6
Hepatic surgery	24	3.5
Pancreatic surgery	12	1.7
Thoracic surgery	12	1.7
Gynaecological surgery	11	1.6
Missing	0	

Non surgical interventions	N	%
None	683	98.8
Elective	2	0.3
Emergency	6	0.9
Missing	0	

Non surgical interventions

Elective (N=2)	N	%
Interventional radiology	1	50.0
Interventional cardiology	0	0.0
Interventional neuroradiology	0	0.0
Interventional endoscopy	0	0.0
Missing	1	

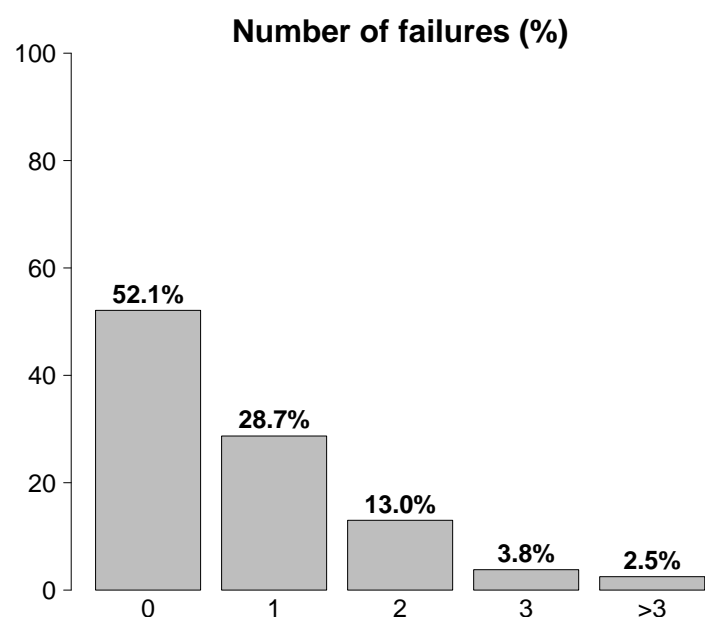
Non surgical interventions

Emergency (N=6)	N	%
Interventional endoscopy	2	33.3
Interventional cardiology	1	16.7
Interventional radiology	0	0.0
Interventional neuroradiology	0	0.0
Missing	3	

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Characteristics on admission - Adult elective surgical patients evaluated in the GiViTI model

Reason for admission	N	%
Monitoring/Weaning	429	62.1
Post surgical weaning	7	1.0
Surgical monitoring	421	60.9
Post interventional weaning	0	0.0
Interventional monitoring	1	0.1
Non surgical monitoring	0	0.0
Missing	0	
Admission for procedures/treatments	0	0.0
Intensive Treatment	262	37.9
Only ventilatory support	125	18.1
Only cardiovascular support	50	7.2
Ventilatory and cardiovascular support	87	12.6
Missing	0	
Palliative Sedation	0	0.0
Diagnosis of death/Organ donation	0	0.0
Missing	0	



Failures on admission	N	%
No	360	52.1
Yes	331	47.9
A: Respiratory failure	212	30.7
B: Cardiovascular failure	137	19.8
C: Neurological failure	8	1.2
D: Hepatic failure	5	0.7
E: Renal failure	103	14.9
F: Acute skin failure	1	0.1
G: Metabolic failure	55	8.0
H: Coagulation failure	11	1.6
Missing	0	

Failures on admission (top 10)	N	%
A	105	15.2
AB	51	7.4
E	37	5.4
B	35	5.1
G	15	2.2
ABE	12	1.7
AE	12	1.7
ABEG	10	1.4
BE	9	1.3
EG	9	1.3
Missing	0	

Respiratory failure	N	%
None	479	69.3
Only hypoxic failure	158	22.9
Only hypercapnic failure	2	0.3
Hypoxic-hypercapnic failure	9	1.3
Intubation for airway maint.	43	6.2
Missing	0	

Cardiovascular failure	N	%
None	554	80.2
Without shock	76	11.0
Cardiogenic shock	8	1.2
Septic shock	24	3.5
Haemorrhagic/hypovolemic shock	11	1.6
Hypovolemic shock	3	0.4
Anaphylactic shock	1	0.1
Neurogenic shock	1	0.1
Other shock	9	1.3
Mixed shock	4	0.6
Missing	0	

Neurologic failure	N	%
None	646	98.8
Cerebral coma	3	0.5
Metabolic coma	2	0.3
Postanoxic coma	3	0.5
Toxic coma	0	0.0
Missing or not evaluable	37	

Renal failure (AKIN)	N	%
None	588	85.1
Mild	76	11.0
Moderate	17	2.5
Severe	10	1.4
Missing	0	

Metabolic failure	N	%
None	636	92.0
pH \leq 7.3, PaCO ₂ $<$ 45 mmHg	28	4.1
Base deficit \geq 5 mmol/L, lactate $>$ 1.5x	27	3.9
Missing	0	

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Characteristics on admission - Adult elective surgical patients evaluated in the GiViTI model

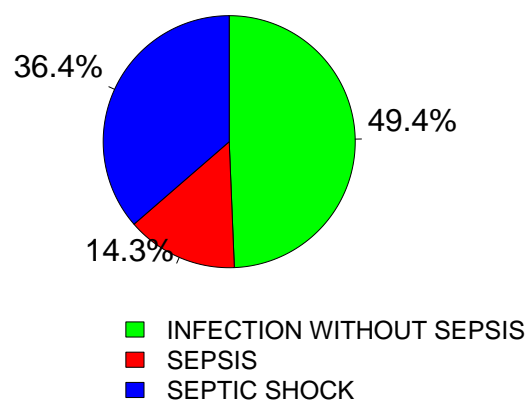
Clinical conditions on admission	N	%
Respiratory	47	6.8
Pleural effusion	12	1.7
Pulmonary embolism	6	0.9
Aspiration pneumonia	6	0.9
Acute asthma/bronchospasm	5	0.7
Lung cancer	5	0.7
Cardiovascular	104	15.1
Peripheral vascular disease	51	7.4
Left heart failure without pulm. edema	11	1.6
Non-ruptured aneurysm	10	1.4
Acute severe arrhythmia: tachycardias	7	1.0
Right heart failure	6	0.9
Neurological	11	1.6
Cerebral artery stroke	3	0.4
Metabolic/postanoxic encephalopathy	3	0.4
Brain tumour	2	0.3
Neuropathy/myopathy	2	0.3
Non traumatic cerebral oedema	1	0.1
Gastrointestinal and hepatic	359	52.0
Digestive tract malignancy	299	43.3
Hepatic malignancy	26	3.8
Intestinal occlusion	14	2.0
Paralytic ileus	11	1.6
Acute bile-duct disease	10	1.4
Trauma (anatomical districts)	16	2.3
Pelvis/bone/joint & muscle	13	1.9
Head	3	0.4
Spine	2	0.3
Chest	2	0.3
Major vessels injury	1	0.1
-	0	0.0
-	0	0.0
Other	316	45.7
Other disease	204	29.5
Nephrourologic disease	89	12.9
Coagulation disorder	11	1.6
Metabolic disorder	10	1.4
Orthopaedic disease	9	1.3
Post transplantation	7	1.0
Liver transplantation	4	0.6
Lung transplantation	2	0.3
Infections	83	12.0
Pneumonia	22	3.2
Post-surgical peritonitis	18	2.6
Cholecystitis/cholangitis	5	0.7
NON-surgical secondary peritonitis	5	0.7
NON-surgical urinary tract infection	5	0.7
Clinical sepsis	4	0.6
Post-surgical mediastinitis	4	0.6
Post-surgical skin/soft tissue infection	4	0.6
Post-surgical bone and joint infection	3	0.4
Orthopaedic prosthesis infection	3	0.4
Missing	0	

Trauma (anatomical districts)	N	%
Head	3	0.4
Cerebral contusion/laceration	2	0.3
Traumatic Subdural haematoma	2	0.3
Traumatic subarachnoid haemorrhage	2	0.3
Skull fracture	2	0.3
Maxillofacial fracture	2	0.3
Spine	2	0.3
Vertebral fracture, without deficit	1	0.1
Tetraplegia	1	0.1
-	0	0.0
Chest	2	0.3
Traum. haemothorax/pneumothorax	2	0.3
Flail chest	1	0.1
Severe lung contusion/laceration	1	0.1
Abdomen	0	0.0
-	0	0.0
-	0	0.0
-	0	0.0
Pelvis/bone/joint & muscle	13	1.9
Long bone fracture	13	1.9
-	0	0.0
-	0	0.0
Major vessels injury	1	0.1
Neck vessels: dissection/transection	1	0.1
-	0	0.0
-	0	0.0
Miscellaneous	0	0.0
-	0	0.0
-	0	0.0
Missing	0	

Infection severity on admission	N	%
None	608	88.8
INFECTION WITHOUT SEPSIS	38	5.5
SEPSIS	11	1.6
SEPTIC SHOCK	28	4.1
Missing	6	

Infection severity on admission

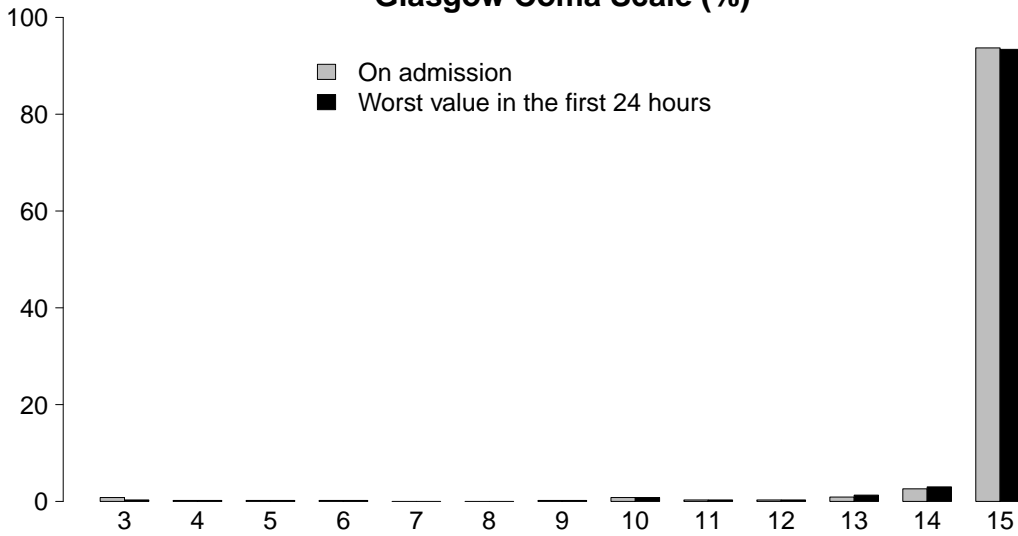
Patients infected (N=77)



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Severity scores - Adult elective surgical patients evaluated in the GiViTI model

Glasgow Coma Scale (%)



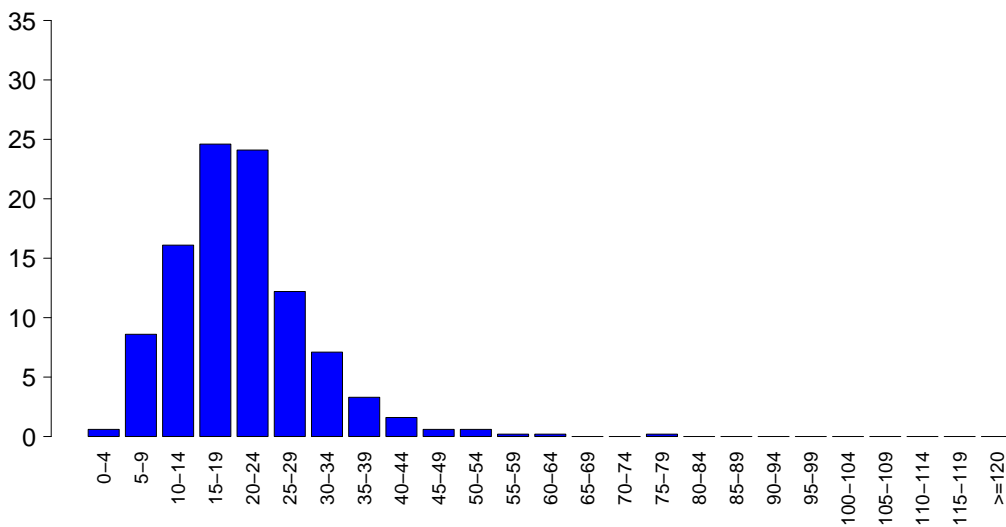
GCS (admission)

Median	15
Q1–Q3	15–15
Not evaluable	37
Missing	0

GCS (first 24 hours)

Median	15
Q1–Q3	15–15
Not evaluable	53
Missing	0

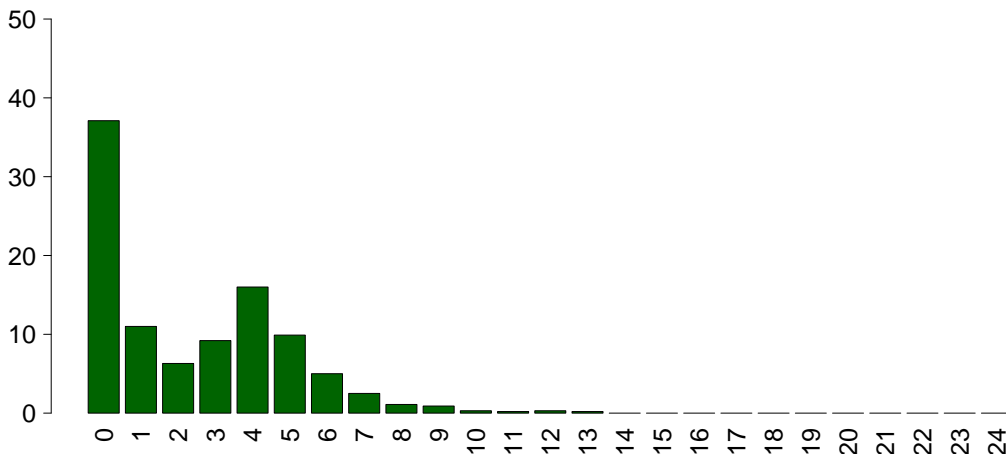
SAPS II (%)



SAPSII

Mean	20.4
SD	9.2
Median	19.5
Q1–Q3	14–25
Not evaluable	53
Missing	0

SOFA (%)



SOFA

Mean	2.4
SD	2.5
Median	2
Q1–Q3	0–4
Not evaluable	53
Missing	0

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Characteristics during the stay - Adult elective surgical patients evaluated in the GiViTI model

Complications during the stay	N	%
No	460	66.6
Yes	231	33.4
Missing	0	

Failures during the stay	N	%
No	638	92.3
Yes	53	7.7
A: Respiratory failure	22	3.2
B: Cardiovascular failure	27	3.9
C: Neurological failure	2	0.3
D: Hepatic failure	9	1.3
E: Renal failure (AKIN)	23	3.3
F: Acute skin failure	0	0.0
G: Metabolic failure	10	1.4
H: Coagulation failure	1	0.1
Missing	0	

Failures during the stay (top 10)	N	%
E	9	1.3
B	7	1.0
A	6	0.9
AB	6	0.9
G	4	0.6
ABE	3	0.4
BE	3	0.4
D	2	0.3
ABCE	1	0.1
ABD	1	0.1
Missing	0	

Respiratory failure occurred	N	%
None	669	96.8
Intubation for airway maint.	7	1.0
Hypoxic failure	15	2.2
Hypercapnic failure	5	0.7
Missing	0	

Cardiovascular failure occurred	N	%
None	664	96.1
Cardiogenic shock	3	0.4
Hypovolemic shock	1	0.1
Haemorrhagic/hypovolemic shock	5	0.7
Septic shock	15	2.2
Anaphylactic shock	1	0.1
Neurogenic shock	0	0.0
Other shock	4	0.6
Missing	0	

Neurological failure occurred	N	%
None	689	99.7
Cerebral coma	0	0.0
Metabolic coma	2	0.3
Postanoxic coma	0	0.0
Missing	0	

Renal failure occurred (AKIN)	N	%
None	668	96.7
Mild	9	1.3
Moderate	7	1.0
Severe	7	1.0
Missing	0	

Complications during the stay	N	%
Respiratory	33	4.8
Pleural effusion	15	2.2
Atelectasis	11	1.6
Aspiration pneumonia	6	0.9
Pneumothorax/Pneumomediastinum	5	0.7
Moderate ARDS	4	0.6
Cardiovascular	46	6.7
Acute severe arrhythmia: tachycardias	25	3.6
Cardiac arrest	7	1.0
Acute severe arrhythmia: bradycardias	6	0.9
Pulmonary edema	6	0.9
Right heart failure	4	0.6
Neurological	41	5.9
Drowsiness/agitation/delirium	37	5.4
CrIMyNe	2	0.3
Seizures	2	0.3
Brain edema	1	0.1
Intracranial hypertension	1	0.1
Gastrointestinal and hepatic	70	10.1
Paralytic Ileus	34	4.9
Anastomotic dehiscence	13	1.9
Intrabdominal bleeding	10	1.4
Gastrointestinal bleeding: lower tract	8	1.2
Liver Dysfunction Syndrome	8	1.2
Other	83	12.0
Other disease	62	9.0
Nephrourologic disease	15	2.2
Metabolic disorder	10	1.4
Iatrogenic major vessels injury	2	0.3
Category/Stage II: Partial Thickness Skin Loss	1	0.1
Other skin and/or soft tissue pathology	1	0.1
-	0	0.0
Infections	92	13.3
Post-surgical peritonitis	41	5.9
Post-surgical skin/soft tissue infection	17	2.5
Pneumonia	15	2.2
Clinical sepsis	8	1.2
F.U.O. fever of unknown origin	3	0.4
NON-surgical secondary peritonitis	3	0.4
Post-surgical urinary tract infection	3	0.4
Upper respiratory tract infection	2	0.3
NON-surgical urinary tract infection	2	0.3
Primary bacteraemia of unknown origin	1	0.1
Missing	0	

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Characteristics during the stay - Adult elective surgical patients evaluated in the GiViTI model

Infections		N	%	Maximum severity of infection		N	%
	None	531	76.8		None	531	78.6
	Only on admission	68	9.8		INFECTION WITHOUT SEPSIS	79	11.7
	On admission and during ICU stay	15	2.2		SEPSIS	24	3.6
	Only during ICU stay	77	11.1		SEPTIC SHOCK	42	6.2
	Missing	0			Missing	15	

Severity evolution

Severity evolution		During the stay				
		N (R %)	None	INFECTION WITHOUT SEPSIS	SEPSIS	SEPTIC SHOCK
Admission	None	531 (88.8%)	44 (7.4%)	13 (2.2%)	10 (1.7%)	598
	INFECTION WITHOUT SEPSIS	-	35 (92.1%)	2 (5.3%)	1 (2.6%)	38
	SEPSIS	-	-	9 (81.8%)	2 (18.2%)	11
	SEPTIC SHOCK	-	-	-	28 (100.0%)	28
	TOT	531	79	24	41	675

Ventil. Associat. Pneumonia (VAP)	N	%
No	685	99.1
Yes	6	0.9
Missing	0	

Incidence of VAP

(Pts. with VAP/1000 days of VM pre-VAP)

Estimate	15.3
CI (95%)	5.6–33.3

Incidence of VAP

(Pts. with VAP/pts. ventilated for 8 days)

Estimate	12.2%
CI (95%)	4.5–26.6

Catheter Bacteraemia (CR-BSI)	N	%
No	690	99.9
Yes	1	0.1
Missing	0	

Incidence of CR-BSI

(Pts. with CR-BSI/1000 days of CVC pre-CR-BSI)

Estimate	0.5
CI (95%)	0.0–2.6

Incidence of CR-BSI

(Pts. with CR-BSI/pts. catheterized for 12 days)

Estimate	0.6%
CI (95%)	0.0–3.1

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Process indicators - Adult elective surgical patients evaluated in the GiViTI model																
Procedures and/or treatments (Missing=0)	Use			On admission			On discharge			Length (days)			Days from admission			
	N	%	98.3	N	%		N	%		Median	Q1-Q3	Missing	Median	Q1-Q3	Missing	
Procedures (antibiotics excluded)	679															
Invasive ventilation	107	15.5		78	11.3		17	2.5		2	1-4	0	1	0-4	0	
Non invasive ventilation	173	25.0		33	4.8		20	2.9		2	1-3	0	0	0-0	0	
Tracheostomy	8	1.2		4	0.6		6	0.9		5	2-6	0	18	9-23	0	
iNO (inhaled nitric oxide)	6	0.9		0	0		3	0.4		2	1-4	0	1	0-3	0	
Central Venous Catheter	417	60.3		369	53.4		394	57		3	2-5	0	0	0-0	0	
PICC	75	10.9		29	4.2		64	9.3		4	2-6	0	0	0-1	0	
Arterial Catheter	526	76.1		400	57.9		98	14.2		3	1-5	0	0	0-0	0	
Vasoactive drugs	337	48.8		195	28.2		18	2.6		2	1-3	0	0	0-0	0	
Antiarrhythmics	43	6.2		8	1.2		13	1.9		1	0-3	0	2	1-4	0	
IABP	0	0.0		0	0.0		0	0.0		0	0-0	0	0	0-0	0	
Invasive monitoring of C.O.	20	2.9		2	0.3		6	0.9		4	2-9	0	0	0-2	0	
Continuous monitoring of ScVO2	1	0.1		0	0		0	0		3	3-3	0	0	0-0	0	
Temporary pacing	2	0.3		0	0		0	0		6	4-8	0	6	5-6	0	
Ventricular assistance	0	0.0		0	0.0		0	0.0		0	0-0	0	0	0-0	0	
DC-shock	4	0.6		0	0.0		0	0.0		0	0-0	0	0	0-0	0	
CPR	5	0.7		0	0.0		0	0.0		0	0-0	0	0	0-0	0	
Massive blood transfusion	11	1.6		0	0.0		0	0.0		0	0-0	0	0	0-0	0	
ICP monitoring without CSF drainage	1	0.1		1	0.1		0	0		15	15-15	0	0	0-0	0	
ICP monitoring with CSF drainage	1	0.1		1	0.1		0	0		9	9-9	0	0	0-0	0	
External ventricular drainage without ICP	0	0.0		0	0.0		0	0.0		0	0-0	0	0	0-0	0	
Haemofiltration	1	0.1		0	0		0	0		1	1-1	0	7	7-7	0	
Haemodialysis	14	2.0		4	0.6		5	0.7		6	2-8	0	5	2-6	0	
ECMO	1	0.1		0	0		1	0.1		1	1-1	0	3	3-3	0	
Hepatic clearance techniques	0	0.0		0	0.0		0	0.0		0	0-0	0	0	0-0	0	
Clearance techniques during sepsis	0	0.0		0	0.0		0	0.0		0	0-0	0	0	0-0	0	
IAP (intra-abdominal pressure)	22	3.2		0	0.0		0	0		0	0-0	0	0	0-0	0	
Hypothermia	1	0.1		0	0		0	0		0	0-0	0	0	0-0	0	
Enteral nutrition	149	21.6		11	1.6		125	18.1		2	1-5	0	1	1-2	0	
Parenteral nutrition	471	68.2		51	7.4		351	50.8		2	1-4	0	1	0-1	0	
SDD (Topical, Topical and systemic)	0	0.0		0	0.0		0	0.0		0	0-0	0	0	0-0	0	
Patient restraint	10	1.4		0	0.0		0	0.0		0	0-0	0	0	0-0	0	
Peridural catheter	204	29.5		200	28.9		180	26		3	2-4	0	0	0-0	0	
Electrical cardioversion	2	0.3		0	0.0		0	0.0		0	0-0	0	0	0-0	0	
Vacuum therapy	4	0.6		0	0.0		0	0.0		0	0-0	0	0	0-0	0	
Antibiotics	612	88.6		0	0.0		0	0.0		0	0-0	0	0	0-0	0	
Antibiotic prophylaxis	521	75.4		394	57		227	32.9		1	0-3	0	0	0-0	0	
Empirical antibiotic therapy	110	15.9		30	4.3		53	7.7		2	1-5	0	2	1-3	0	
Empirical antibiotic therapy in unconfirmed diagnosis	12	1.7		3	0.4		9	1.3		4	2-4	0	1	1-4	0	
Targeted antibiotic therapy	82	11.9		20	2.9		70	10.1		5	3-8	0	3	2-6	0	

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Process indicators - Adult elective surgical patients evaluated in the GiViTI model

			Length (days)				
Invasive ventilation (N=107)	N	%	Mean	SD	Median	Q1-Q3	Missing
Due to pulmonary failure	45	22.8	4.6	5.8	2	1–6	0
For airway maintenance	44	22.3	4.3	6.4	2	1–4.2	0
In weaning	9	4.6	0.0	0.0	0	0–0	0
Not evaluable	99	50.3	1.4	1.6	1	0.8–1.2	91
Reintubation within 48 hours	2	1.0	7.5	6.4	7.5	5.25–9.75	0
Non invasive ventilation (N=173)	N	%	Number of surgical interventions			N	%
Non invasive ventilation only	149	86.1			0	658	95.2
Non invasive ventilation failed	7	4.0			1	20	2.9
For weaning	16	9.2			2	7	1.0
Other	1	0.6			3	3	0.4
Missing	0				>3	3	0.4
Tracheostomy not present on admission (N=4)	N	%			Missing	0	
Surgical	1	25.0	Surgical interventions				
Percutwist	1	25.0	Days from admission				
Ciaglia	1	25.0			Mean	10.3	
Monodil. Ciaglia	0	0.0			SD	8.6	
Fantoni	0	0.0			Median	7	
Griggs	0	0.0			Q1–Q3	4–16	
Other Kind	1	25.0			Missing	0	
Unknown	0	0.0	Surgical interventions (top 10)				
Missing	0				N	%	
					Gastrointestinal surgery	40	5.8
					Other surgery	9	1.3
					Orthopaedic surgery	3	0.4
					Pancreatic surgery	1	0.1
					Nephro/Urological surgery	1	0.1
					Maxillo-Facial surgery	1	0.1
					Thoracic surgery	1	0.1
					Neurosurgery	1	0.1
					Esophageal surgery	1	0.1
					-	0	0.0
					Missing	0	
Tracheostomy - Days after the beginning of inv. vent. Not present on admission (N=4)			Non surgical interventions				
Mean	14.0				N	%	
SD	9.8				No	682	98.7
Median	16				Yes	9	1.3
Q1–Q3	9.2–20.8				Missing	0	
Missing	0		Non surgical interventions				
Invasive monitoring of C.O. (N=20)	N	%	Days from admission				
Swan Ganz	1	5.0			Mean	8.5	
PICCO	15	75.0			SD	7.0	
LIDCO	3	15.0			Median	6	
Vigileo-PRAM	0	0.0			Q1–Q3	4.5–10	
Other	1	5.0			Missing	0	
Missing	0		Non surgical interventions				
SDD (N=0)	N	%	Days from admission				
Topical	0	0.0			Mean	8.5	
Topical and systemic	0	0.0			SD	7.0	
Missing	0				Median	6	
					Q1–Q3	4.5–10	
					Missing	0	
Antibiotic therapy			Non surgical interventions				
Pt. infected in ICU only (N=77)	N	%	Days from admission				
Only empirical	39	54.2			N	%	
Only targeted	11	15.3			Interventional endoscopy	7	1.0
Targeted after empirical	20	27.8			Interventional radiology	4	0.6
Other	2	2.8			Interventional cardiology	0	0.0
Missing	5				Interventional neuroradiology	0	0.0
Surgical interventions	N	%			Missing	0	
No	658	95.2	Non surgical interventions				
Yes	33	4.8			N	%	
Missing	0				Interventional endoscopy	7	1.0
					Interventional radiology	4	0.6
					Interventional cardiology	0	0.0
					Interventional neuroradiology	0	0.0
					Missing	0	

National report - Year 2018**Outcome indicators - Adult elective surgical patients evaluated in the GiViTI model**

ICU outcome	N	%
Dead	21	3.0
Transferred to same hospital	654	94.8
Transferred to other hospital	13	1.9
Discharged home	2	0.3
Disch. terminally ill	0	0.0
Missing	1	

Transferred to (N=667)	N	%
Ward	581	87.1
Other ICU	21	3.1
High dependency care unit	65	9.7
Rehabilitation	0	0.0
Day hospital or Long-term care	0	0.0
Missing	0	

Reason of transfer to Other ICU (N=21)	N	%
Specialist expertise	3	14.3
Step-up care	2	9.5
Logistical/organizational reasons	8	38.1
Step-down care	8	38.1
Missing	0	

Transferred to Same hospital (N=654)	N	%
Ward	575	87.9
Other ICU	14	2.1
High dependency care unit	65	9.9
Rehabilitation	0	0.0
Day hospital or Long-term care	0	0.0
Missing	0	

Transferred to Other hospital (N=13)	N	%
Ward	6	46.2
Other ICU	7	53.8
High dependency care unit	0	0.0
Rehabilitation	0	0.0
Day hospital or Long-term care	0	0.0
Missing	0	

ICU mortality	N	%
Alive	669	97.0
Dead	21	3.0
Missing	1	

Timing of ICU mortality (N=21)	N	%
Daytime (08:00AM - 07:59PM)	14	66.7
Nighttime (08:00PM - 07:59AM)	7	33.3
Weekdays (Monday - Friday)	14	66.7
Weekend (Saturday - Sunday)	7	33.3
Missing	0	

Hospital mortality	N	%
Alive	657	95.1
Dead	34	4.9
Missing	0	

Timing of hosp. mortality (N=34)	N	%
In ICU	21	61.8
Within 24 hours after ICU	1	2.9
24-47 hours after ICU	1	2.9
48-71 hours after ICU	0	0.0
72-95 hours after ICU	0	0.0
After 95 hours after ICU	11	32.4
Missing	0	

Timing of hosp. mortality (days from ICU disch.) Discharged alive from ICU (N=13)		
Mean		20.8
SD		15.8
Median		18
Q1–Q3		5–34
Missing		0

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Outcome indicators - Adult elective surgical patients evaluated in the GiViTI model

Last hospital mortality			ICU stay (days)		
	N	%			
Alive	656	94.9	Mean	4.0	
Dead	35	5.1	SD	7.8	
Missing	0		Median	2	
			Q1–Q3	1–4	
			Missing	1	
ICU stay (days)			ICU stay (days)		
Alive (N=669)			Alive (N=669)		
			Mean	3.8	
			SD	7.2	
			Median	2	
			Q1–Q3	1–4	
			Missing	1	
ICU stay (days)			ICU stay (days)		
Dead (N=21)			Dead (N=21)		
			Mean	10.8	
			SD	17.0	
			Median	4	
			Q1–Q3	1–15	
			Missing	0	
Stay after ICU (days)			Stay after ICU (days)		
Alive (N=669)			Alive (N=669)		
			Mean	11.2	
			SD	18.6	
			Median	6	
			Q1–Q3	3–12	
			Missing	0	
Hospital stay (days)			Hospital stay (days)		
Alive (N=669)			Alive (N=669)		
			Mean	19.5	
			SD	26.8	
			Median	12	
			Q1–Q3	8–22	
			Missing	0	
Hospital stay (days)			Hospital stay (days)		
Alive (N=657)			Alive (N=657)		
			Mean	19.1	
			SD	27.1	
			Median	12	
			Q1–Q3	7–21	
			Missing	0	
Hospital stay (days)			Hospital stay (days)		
Dead (N=34)			Dead (N=34)		
			Mean	27.2	
			SD	19.2	
			Median	24.5	
			Q1–Q3	9.2–41	
			Missing	0	

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Characteristics on admission - Adult emergency surgical patients evaluated in the GiViTI model

Patients (N): 678

Sex	N	%
Male	444	65.5
Female	234	34.5
Missing	0	

Age (years)	N	%
17-45	104	15.3
46-65	186	27.4
66-75	154	22.7
>75	234	34.5
Missing	0	
Mean	65.3	
SD	17.9	
Median	68	
Q1–Q3	56–80	
Min–Max	17–95	

Body mass Index (BMI)	N	%
Underweight	35	5.2
Normal	282	41.6
Overweight	235	34.7
Obese	126	18.6
Missing	0	

Pregnancy status	N	%
Females (N=234)		
Not fertile	128	54.7
Not pregnant/Unknown	104	44.4
Currently pregnant	0	0.0
Post partum	2	0.9
Missing	0	

Comorbidities	N	%
No	109	16.1
Yes	569	83.9
Missing	0	

Comorbidities (top 10)	N	%
Hypertension	366	54.0
Arrhythmia	137	20.2
NYHA class II-III	104	15.3
Moderate or severe renal disease	97	14.3
Any tumour without metastasis	82	12.1
Diabetes Type II without insulin tr.	78	11.5
Drug-induced coagulopathy	64	9.4
Moderate COPD	59	8.7
Peripheral vascular disease	52	7.7
Metastatic cancer	51	7.5
Missing	0	

Stay before ICU (days)	Mean	SD	Median	Q1–Q3	Missing
	3.9	8.4	1	0–3	0

Source of admission	N	%
Same hospital	636	93.8
Other hospital	41	6.0
Long-term chronic care hospital	1	0.1
Directly from the community	0	0.0
Missing	0	

Ward of admission	N	%
Hospital (N=677)		
Medical ward	50	7.4
Surgical ward	448	66.2
Emergency room	128	18.9
Other ICU	24	3.5
High dependency care unit	27	4.0
Missing	0	

Reason for transfer from	N	%
Other ICU (N=24)		
Specialist expertise	8	33.3
Step-up care	9	37.5
Logistical/organizational reasons	7	29.2
Step-down care	0	0.0
Missing	0	

Ward of admission	N	%
Same hospital (N=636)		
Medical ward	49	7.7
Surgical ward	439	69.0
Emergency room	112	17.6
Other ICU	15	2.4
High dependency care unit	21	3.3
Missing	0	

Ward of admission	N	%
Other hospital (N=41)		
Medical ward	1	2.4
Surgical ward	9	22.0
Emergency room	16	39.0
Other ICU	9	22.0
High dependency care unit	6	14.6
Missing	0	

Scheduled admission	N	%
No	678	100.0
Yes	0	0.0
Missing	0	

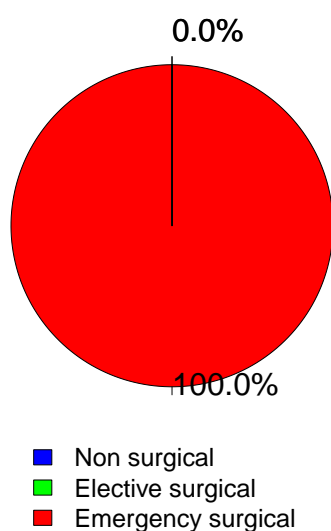
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Characteristics on admission - Adult emergency surgical patients evaluated in the GiViTI model

Trauma	N	%
No	501	73.9
Yes	177	26.1
Multiple trauma	58	8.6
Missing	0	

Surgical status	N	%
Non surgical	0	0.0
Elective surgical	0	0.0
Emergency surgical	678	100.0
Missing	0	

Surgical status



Source of admission	N	%
Surgical pt. (N=678)		
Operating theatre of surgical ward	389	57.5
Operating theatre of emergency room	75	11.1
Surgical ward	59	8.7
Other	154	22.7
Missing	1	

Surgical interventions (top 10)	N	%
Elective surgical (N=0)		
-	0	0.0
-	0	0.0
-	0	0.0
-	0	0.0
-	0	0.0
-	0	0.0
-	0	0.0
-	0	0.0
-	0	0.0
Missing	0	

Timing	N	%
Elective surgical (N=0)		
From -7 to -3 days	0	0.0
From -2 to -1 days	0	0.0
On ICU admission day	0	0.0
The day after ICU admission	0	0.0
Missing	0	

Surgical interventions (top 10)	N	%
Emergency surgical (N=678)		
Gastrointestinal surgery	325	47.9
Neurosurgery	85	12.5
Orthopaedic surgery	66	9.7
Other surgery	44	6.5
Nephro/Urological surgery	31	4.6
Thoracic surgery	24	3.5
Peripheral vascular surgery	22	3.2
Biliary tract surgery	22	3.2
Abdominal vascular surgery	19	2.8
Splenectomy	16	2.4
Missing	24	

Timing	N	%
Emergency surgical (N=678)		
From -7 to -3 days	36	5.3
From -2 to -1 days	79	11.7
On ICU admission day	577	85.1
The day after ICU admission	35	5.2
Missing	2	

Non surgical interventions	N	%
None	656	96.8
Elective	1	0.1
Emergency	21	3.1
Missing	0	

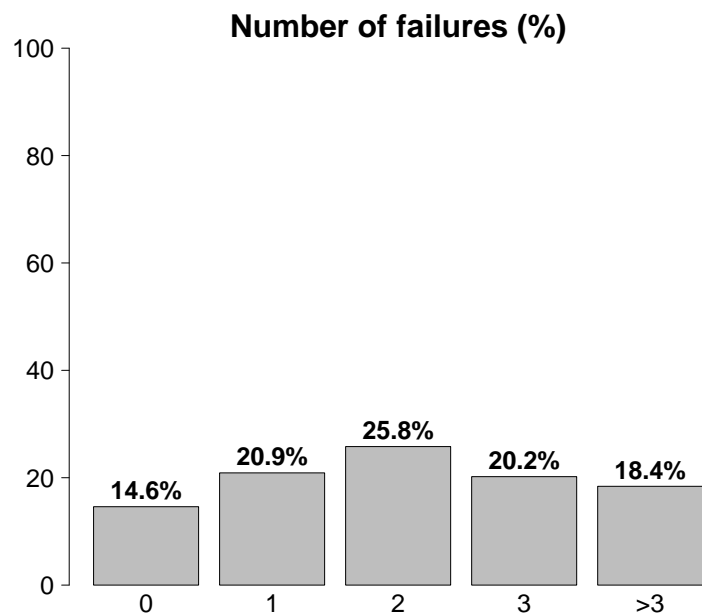
Non surgical interventions	N	%
Elective (N=1)		
Interventional radiology	0	0.0
Interventional cardiology	0	0.0
Interventional neuroradiology	0	0.0
Interventional endoscopy	0	0.0
Missing	1	

Non surgical interventions	N	%
Emergency (N=21)		
Interventional endoscopy	9	42.9
Interventional radiology	7	33.3
Interventional cardiology	2	9.5
Interventional neuroradiology	0	0.0
Missing	3	

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Characteristics on admission - Adult emergency surgical patients evaluated in the GiViTI model

Reason for admission	N	%
Monitoring/Weaning	135	19.9
Post surgical weaning	7	1.0
Surgical monitoring	127	18.7
Post interventional weaning	0	0.0
Interventional monitoring	1	0.1
Non surgical monitoring	0	0.0
Missing	0	
Admission for procedures/treatments	0	0.0
Intensive Treatment	543	80.1
Only ventilatory support	147	21.7
Only cardiovascular support	67	9.9
Ventilatory and cardiovascular support	329	48.5
Missing	0	
Palliative Sedation	0	0.0
Diagnosis of death/Organ donation	0	0.0
Missing	0	



Failures on admission	N	%
No	99	14.6
Yes	579	85.4
A: Respiratory failure	476	70.2
B: Cardiovascular failure	396	58.4
C: Neurological failure	35	5.2
D: Hepatic failure	10	1.5
E: Renal failure	272	40.1
F: Acute skin failure	2	0.3
G: Metabolic failure	209	30.8
H: Coagulation failure	37	5.5
Missing	0	

Failures on admission (top 10)	N	%
AB	106	15.6
A	93	13.7
ABEG	79	11.7
ABE	56	8.3
AE	31	4.6
ABG	29	4.3
B	23	3.4
BEG	22	3.2
E	16	2.4
ABEGH	11	1.6
Missing	0	

Respiratory failure	N	%
None	202	29.8
Only hypoxic failure	193	28.5
Only hypercapnic failure	15	2.2
Hypoxic-hypercapnic failure	38	5.6
Intubation for airway maint.	230	33.9
Missing	0	

Cardiovascular failure	N	%
None	282	41.6
Without shock	124	18.3
Cardiogenic shock	6	0.9
Septic shock	151	22.3
Haemorrhagic/hypovolemic shock	71	10.5
Hypovolemic shock	8	1.2
Anaphylactic shock	0	0.0
Neurogenic shock	5	0.7
Other shock	12	1.8
Mixed shock	19	2.8
Missing	0	

Neurologic failure	N	%
None	446	92.7
Cerebral coma	19	4.0
Metabolic coma	9	1.9
Postanoxic coma	4	0.8
Toxic coma	3	0.6
Missing or not evaluable	197	

Renal failure (AKIN)	N	%
None	406	59.9
Mild	143	21.1
Moderate	63	9.3
Severe	66	9.7
Missing	0	

Metabolic failure	N	%
None	469	69.2
pH \leq 7.3, PaCO ₂ $<$ 45 mmHg	92	13.6
Base deficit \geq 5 mmol/L, lactate $>$ 1.5x	117	17.3
Missing	0	

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Characteristics on admission - Adult emergency surgical patients evaluated in the GiViTI model

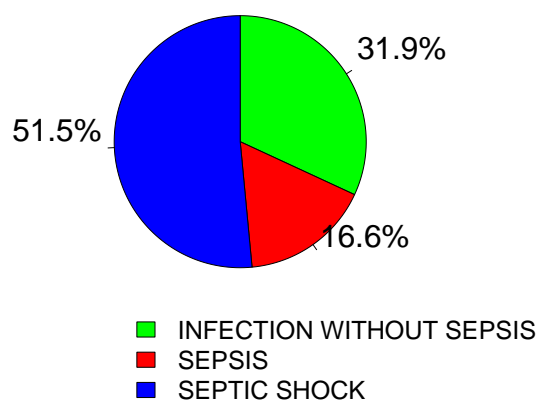
Clinical conditions on admission	N	%
Respiratory	105	15.5
Pleural effusion	32	4.7
Aspiration pneumonia	31	4.6
Atelectasis	13	1.9
Lung cancer	10	1.5
Pulmonary embolism	10	1.5
Cardiovascular	101	14.9
Left heart failure without pulm. edema	21	3.1
Acute severe arrhythmia: tachycardias	20	2.9
Peripheral vascular disease	19	2.8
Non-congenital valvular disease	16	2.4
Pulmonary hypertension	15	2.2
Neurological	32	4.7
Spontaneous Intraparenchymal bleeding	6	0.9
Seizures	5	0.7
Brain tumour	5	0.7
Cerebral artery stroke	4	0.6
Intracranial hypertension	4	0.6
Gastrointestinal and hepatic	265	39.1
Gastrointestinal perforation	70	10.3
Intestinal occlusion	55	8.1
Digestive tract malignancy	44	6.5
Bowel ischaemia	37	5.5
Paralytic Ileus	25	3.7
Trauma (anatomical districts)	177	26.1
Head	86	12.7
Pelvis/bone/joint & muscle	61	9.0
Chest	53	7.8
Spine	35	5.2
Abdomen	28	4.1
Major vessels injury	11	1.6
Miscellaneous	1	0.1
Other	204	30.1
Other disease	115	17.0
Nephrourologic disease	72	10.6
Coagulation disorder	37	5.5
Metabolic disorder	33	4.9
Haematological disease	11	1.6
Post transplantation	25	3.7
Liver transplantation	20	2.9
Renal transplantation	5	0.7
Infections	338	49.9
Pneumonia	85	12.5
NON-surgical secondary peritonitis	83	12.2
Post-surgical peritonitis	49	7.2
Cholecystitis/cholangitis	28	4.1
Primary peritonitis	27	4.0
NON-surgical skin/soft tissue infection	16	2.4
NON-surgical urinary tract infection	13	1.9
Post-surgical skin/soft tissue infection	11	1.6
Tertiary peritonitis	10	1.5
NON-surgical bone and joint infection	9	1.3
Missing	0	

Trauma (anatomical districts)	N	%
Head	86	12.7
Traumatic Subdural haematoma	54	8.0
Traumatic subarachnoid haemorrhage	45	6.6
Cerebral contusion/laceration	42	6.2
Skull fracture	38	5.6
Maxillofacial fracture	29	4.3
Spine	35	5.2
Vertebral fracture, without deficit	18	2.7
Tetraplegia	10	1.5
Paraplegia	3	0.4
Chest	53	7.8
Traum. haemothorax/pneumothorax	33	4.9
Other injuries of the chest	31	4.6
Severe lung contusion/laceration	13	1.9
Abdomen	28	4.1
Spleen: Moderate-Severe laceration	11	1.6
Bowel transection/perforation	7	1.0
Minor injuries of the abdomen	5	0.7
Pelvis/bone/joint & muscle	61	9.0
Long bone fracture	51	7.5
Multiple fracture of the pelvis	10	1.5
Very severe or open fracture of the pelvis	4	0.6
Major vessels injury	11	1.6
Neck vessels: dissection/transection	4	0.6
Proximal limbs vessels: transection	3	0.4
Aorta: rupture/dissection	2	0.3
Miscellaneous	1	0.1
Burns (>30% BSA)	1	0.1
-	0	0.0
Missing	0	

Infection severity on admission	N	%
None	340	51.1
INFECTION WITHOUT SEPSIS	104	15.6
SEPSIS	54	8.1
SEPTIC SHOCK	168	25.2
Missing	12	

Infection severity on admission

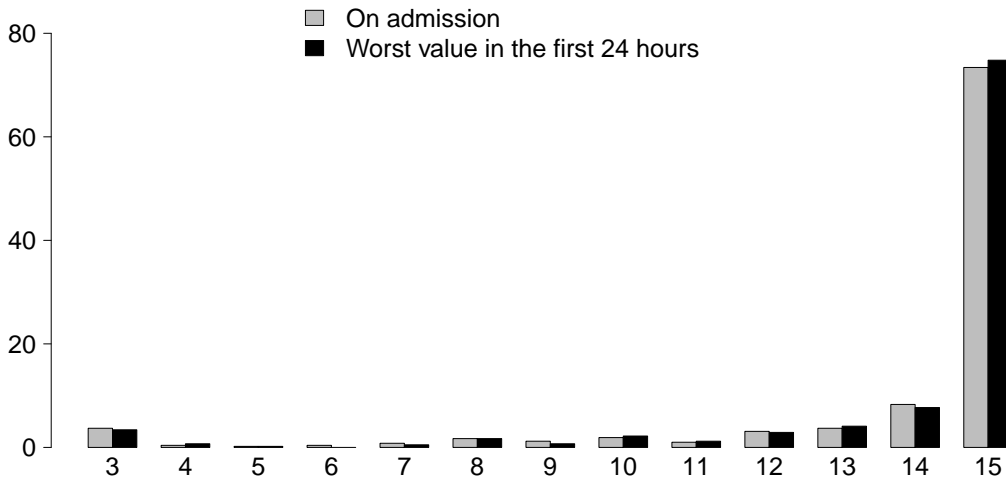
Patients infected (N=326)



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Severity scores - Adult emergency surgical patients evaluated in the GiViTI model

Glasgow Coma Scale (%)



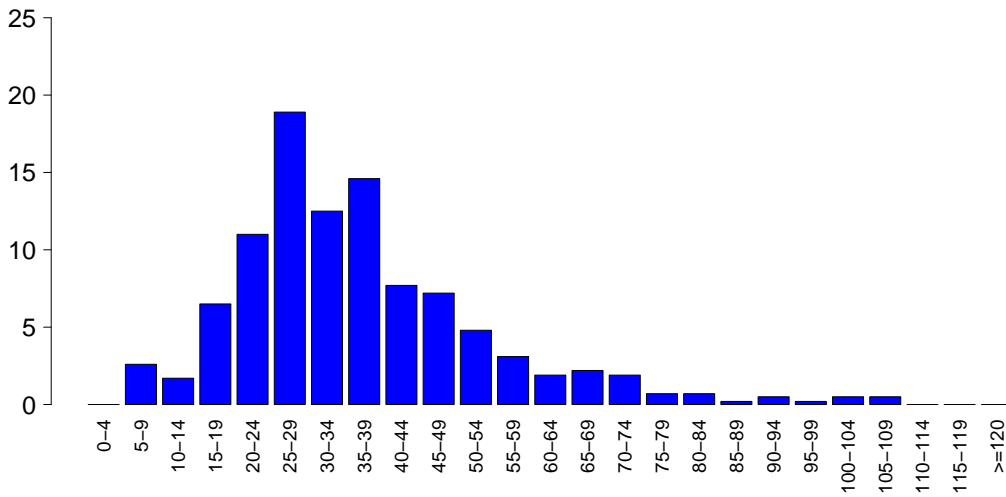
GCS (admission)

Median	15
Q1–Q3	14–15
Not evaluable	197
Missing	0

GCS (first 24 hours)

Median	15
Q1–Q3	14–15
Not evaluable	261
Missing	0

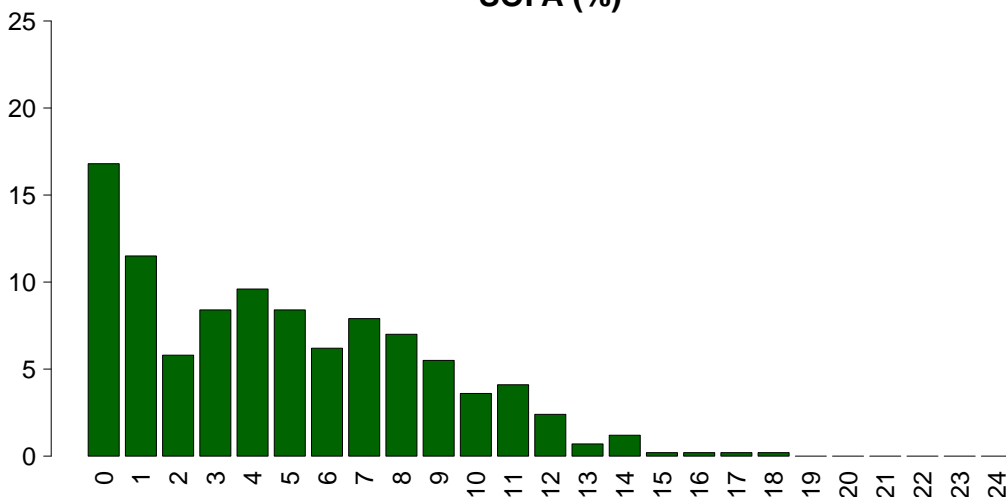
SAPS II (%)



SAPSII

Mean	36.3
SD	17.1
Median	33
Q1–Q3	26–44
Not evaluable	261
Missing	0

SOFA (%)



SOFA

Mean	4.8
SD	3.9
Median	4
Q1–Q3	1–8
Not evaluable	261
Missing	0

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Characteristics during the stay - Adult emergency surgical patients evaluated in the GiViTI model

Complications during the stay	N	%
No	294	43.4
Yes	384	56.6
Missing	0	

Failures during the stay	N	%
No	541	79.8
Yes	137	20.2

A: Respiratory failure	59	8.7
B: Cardiovascular failure	58	8.6
C: Neurological failure	11	1.6
D: Hepatic failure	20	2.9
E: Renal failure (AKIN)	55	8.1
F: Acute skin failure	1	0.1
G: Metabolic failure	21	3.1
H: Coagulation failure	12	1.8
Missing	0	

Failures during the stay (top 10)	N	%
A	24	3.5
B	21	3.1
E	18	2.7
AB	10	1.5
D	8	1.2
AE	6	0.9
ABE	5	0.7
BE	5	0.7
G	5	0.7
DG	4	0.6
Missing	0	

Respiratory failure occurred	N	%
None	619	91.3
Intubation for airway maint.	27	4.0
Hypoxic failure	28	4.1
Hypercapnic failure	18	2.7
Missing	0	

Cardiovascular failure occurred	N	%
None	620	91.4
Cardiogenic shock	7	1.0
Hypovolemic shock	3	0.4
Haemorrhagic/hypovolemic shock	10	1.5
Septic shock	32	4.7
Anaphylactic shock	1	0.1
Neurogenic shock	0	0.0
Other shock	6	0.9
Missing	0	

Neurological failure occurred	N	%
None	667	98.4
Cerebral coma	4	0.6
Metabolic coma	6	0.9
Postanoxic coma	1	0.1
Missing	0	

Renal failure occurred (AKIN)	N	%
None	623	91.9
Mild	10	1.5
Moderate	10	1.5
Severe	35	5.2
Missing	0	

Complications during the stay	N	%
Respiratory	98	14.5
Pleural effusion	49	7.2
Aspiration pneumonia	28	4.1
Atelectasis	24	3.5
Acute asthma/bronchospasm	6	0.9
Pulmonary embolism	6	0.9
Cardiovascular	83	12.2
Acute severe arrhythmia: tachycardias	36	5.3
Cardiac arrest	23	3.4
Left heart failure w/o pulm. edema	7	1.0
Peripheral vascular disease	7	1.0
Deep venous thrombosis	6	0.9
Neurological	97	14.3
Drowsiness/agitation/delirium	56	8.3
Intracranial hypertension	23	3.4
Brain edema	17	2.5
Seizures	9	1.3
New ischaemic stroke	7	1.0
Gastrointestinal and hepatic	115	17.0
Paralytic Ileus	43	6.3
Intrabdominal bleeding	17	2.5
Ascites	16	2.4
Liver Dysfunction Syndrome	16	2.4
Bowel ischaemia	12	1.8
Other	78	11.5
Other disease	29	4.3
Nephrourologic disease	26	3.8
Metabolic disorder	21	3.1
Other skin and/or soft tissue pathology	6	0.9
Graft vascular thrombosis	2	0.3
Category/Stage III: Full Thickness Skin Loss	2	0.3
Extremity compartment syndrome (severe)	2	0.3
Infections	162	23.9
Pneumonia	68	10.0
Post-surgical peritonitis	23	3.4
NON-surgical urinary tract infection	21	3.1
F.U.O. fever of unknown origin	10	1.5
NON-surgical secondary peritonitis	9	1.3
Post-surgical skin/soft tissue infection	9	1.3
Other fungal infections	8	1.2
L.R.T.I. other than pneumonia	7	1.0
Other viral infections	6	0.9
Clinical sepsis	5	0.7
Missing	0	

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Characteristics during the stay - Adult emergency surgical patients evaluated in the GiViTI model

Infections			Maximum severity of infection		
	N	%		N	%
None	233	34.4	None	233	35.3
Only on admission	283	41.7	INFECTION WITHOUT SEPSIS	167	25.3
On admission and during ICU stay	55	8.1	SEPSIS	73	11.1
Only during ICU stay	107	15.8	SEPTIC SHOCK	187	28.3
Missing	0		Missing	18	

Severity evolution

Severity evolution		During the stay				
		None	INFECTION WITHOUT SEPSIS	SEPSIS	SEPTIC SHOCK	TOT
Admission	None	233 (70.4%)	73 (22.1%)	17 (5.1%)	8 (2.4%)	331
	INFECTION WITHOUT SEPSIS	-	94 (90.4%)	8 (7.7%)	2 (1.9%)	104
	SEPSIS	-	-	47 (87.0%)	7 (13.0%)	54
	SEPTIC SHOCK	-	-	-	168 (100.0%)	168
	TOT	233	167	72	185	657

Ventil. Associat. Pneumonia (VAP)	N	%
No	619	91.3
Yes	59	8.7
Missing	0	

Incidence of VAP

(Pts. with VAP/1000 days of VM pre-VAP)

Estimate	22.9
CI (95%)	17.4–29.5

Incidence of VAP

(Pts. with VAP/pts. ventilated for 8 days)

Estimate	18.3%
CI (95%)	13.9–23.6

Catheter Bacteraemia (CR-BSI)	N	%
No	677	99.9
Yes	1	0.1
Missing	0	

Incidence of CR-BSI

(Pts. with CR-BSI/1000 days of CVC pre-CR-BSI)

Estimate	0.2
CI (95%)	0.0–1.1

Incidence of CR-BSI

(Pts. with CR-BSI/pts. catheterized for 12 days)

Estimate	0.2%
CI (95%)	0.0–1.3

National report - Year 2018															
Process indicators - Adult emergency surgical patients evaluated in the GiViTI model															
Procedures and/or treatments (Missing=0)	Use			On admission			On discharge			Length (days)			Days from admission		
	N	%		N	%		N	%		Median	Q1-Q3	Missing	Median	Q1-Q3	Missing
Procedures (antibiotics excluded)	665	98.1													
Invasive ventilation	425	62.7		342	50.4		97	14.3		3	1-10	0	0	0-1	0
Non invasive ventilation	181	26.7		22	3.2		42	6.2		2	1-4	0	0	0-2	0
Tracheostomy	56	8.3		7	1		46	6.8		8	5-16	0	18	13-22	0
iNO (inhaled nitric oxide)	24	3.5		7	1		6	0.9		3	2-9	0	1	0-2	0
Central Venous Catheter	506	74.6		357	52.7		434	64		6	3-13	0	0	0-0	0
PICC	69	10.2		12	1.8		56	8.3		5	3-7	0	0	0-1	0
Arterial Catheter	572	84.4		396	58.4		284	41.9		5	2-10	0	0	0-0	0
Vasoactive drugs	486	71.7		297	43.8		62	9.1		3	1-6	0	0	0-0	0
Antiarrhythmics	86	12.7		18	2.7		24	3.5		3	1-6	0	2	1-4	0
IABP	0	0.0													
Invasive monitoring of C.O.	50	7.4		9	1.3		12	1.8		4	2-10	0	1	0-2	0
Continous monitoring of ScVO2	0	0.0													
Temporary pacing	0	0.0													
Ventricular assistance	0	0.0													
DC-shock	10	1.5											1	0-2	0
CPR	9	1.3											2	0-3	0
Massive blood transfusion	24	3.5											0	0-0	0
ICP monitoring without CSF drainage	51	7.5		50	7.4		6	0.9		10	4-15	0	2	2-2	0
ICP monitoring with CSF drainage	5	0.7		4	0.6		3	0.4		5	3-9	0	0	0-0	0
External ventricular drainage without ICP	4	0.6		1	0.1		1	0.1		7	2-18	0	15	12-18	0
Haemofiltration	0	0.0													
Haemodialysis	59	8.7		11	1.6		20	2.9		6	1-14	0	3	1-7	0
ECMO	0	0.0													
Hepatic clearance techniques	1	0.1													
Clearance techniques during sepsis	0	0.0													
IAP (intra-abdominal pressure)	88	13.0													
Hypothermia	9	1.3		4	0.6		0	0		4	1-14	0	0	0-0	0
Enteral nutrition	266	39.2		24	3.5		164	24.2		6	2-15	0	2	1-3	0
Parenteral nutrition	474	69.9		81	11.9		270	39.8		5	2-9	0	1	0-1	0
SDD (Topical, Topical and systemic)	1	0.1													
Patient restraint	21	3.1													
Peridural catheter	10	1.5		8	1.2		5	0.7		4	3-6	0	0	0-0	0
Electrical cardioversion	3	0.4											2	2-2	0
Vacuum therapy	7	1.0													
Antibiotics	629	92.8													
Antibiotic prophylaxis	316	46.6		175	25.8		151	22.3		3	1-5	0	0	0-0	0
Empirical antibiotic therapy	300	44.2		169	24.9		117	17.3		3	2-5	0	1	0-2	0
Empirical antibiotic therapy in unconfirmed diagnosis	32	4.7		12	1.8		18	2.7		3	1-6	0	2	0-4	0
Targeted antibiotic therapy	257	37.9		56	8.3		188	27.7		6	3-12	0	3	2-6	0

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Process indicators - Adult emergency surgical patients evaluated in the GiViTI model
Length (days)

Invasive ventilation (N=425)	N	%	Mean	SD	Median	Q1-Q3	Missing
Due to pulmonary failure	155	31.5	7.4	9.5	4	1–9	0
For airway maintenance	232	47.2	9.2	13.1	3	1–14	0
In weaning	9	1.8	0.7	0.5	1	0–1	0
Not evaluable	96	19.5	4.5	9.0	1	1–3	67
Reintubation within 48 hours	10	2.0	3.7	3.5	2.5	1.25–3.75	0

Non invasive ventilation (N=181)	N	%
Non invasive ventilation only	112	61.9
Non invasive ventilation failed	12	6.6
For weaning	47	26.0
Other	10	5.5
Missing	0	

Tracheostomy not present on admission (N=49)	N	%
Surgical	6	12.2
Percutwist	11	22.4
Ciaglia	2	4.1
Monodil. Ciaglia	0	0.0
Fantoni	0	0.0
Griggs	3	6.1
Other Kind	15	30.6
Unknown	12	24.5
Missing	0	

Tracheostomy - Days after the beginning of inv. vent.
Not present on admission (N=49)

Mean	17.4
SD	7.0
Median	18
Q1–Q3	13–22
Missing	0

Invasive monitoring of C.O. (N=50)	N	%
Swan Ganz	0	0.0
PICCO	33	66.0
LIDCO	17	34.0
Vigileo-PRAM	0	0.0
Other	0	0.0
Missing	0	

SDD (N=1)	N	%
Topical	1	100.0
Topical and systemic	0	0.0
Missing	0	

Antibiotic therapy

Pt. infected in ICU only (N=107)	N	%
Only empirical	30	30.6
Only targeted	27	27.6
Targeted after empirical	34	34.7
Other	7	7.1
Missing	9	

Surgical interventions	N	%
No	593	87.5
Yes	85	12.5
Missing	0	

Number of surgical interventions	N	%
0	593	87.5
1	48	7.1
2	17	2.5
3	9	1.3
>3	11	1.6
Missing	0	

Surgical interventions

Days from admission

Mean	9.4
SD	8.2
Median	7
Q1–Q3	4–12
Missing	1

Surgical interventions (top 10)	N	%
Gastrointestinal surgery	88	13.0
Other surgery	31	4.6
Pancreatic surgery	6	0.9
Plastic surgery	6	0.9
Neurosurgery	6	0.9
Orthopaedic surgery	5	0.7
Maxillo-Facial surgery	4	0.6
Thoracic surgery	4	0.6
Abdominal vascular surgery	3	0.4
Hepatic surgery	2	0.3
Missing	0	

Non surgical interventions	N	%
No	651	96.0
Yes	27	4.0
Missing	0	

Non surgical interventions

Days from admission

Mean	12.6
SD	8.4
Median	13
Q1–Q3	7.5–15.5
Missing	0

Non surgical interventions	N	%
Interventional endoscopy	18	2.7
Interventional radiology	11	1.6
Interventional cardiology	2	0.3
Interventional neuroradiology	0	0.0
Missing	0	

National report - Year 2018**Outcome indicators - Adult emergency surgical patients evaluated in the GiViTI model**

ICU outcome	N	%
Dead	102	15.0
Transferred to same hospital	536	79.1
Transferred to other hospital	38	5.6
Discharged home	2	0.3
Disch. terminally ill	0	0.0
Missing	0	

Transferred to (N=574)	N	%
Ward	307	53.5
Other ICU	80	13.9
High dependency care unit	187	32.6
Rehabilitation	0	0.0
Day hospital or Long-term care	0	0.0
Missing	0	

Reason of transfer to Other ICU (N=80)	N	%
Specialist expertise	11	13.8
Step-up care	6	7.5
Logistical/organizational reasons	43	53.8
Step-down care	20	25.0
Missing	0	

Transferred to Same hospital (N=536)	N	%
Ward	299	55.8
Other ICU	58	10.8
High dependency care unit	179	33.4
Rehabilitation	0	0.0
Day hospital or Long-term care	0	0.0
Missing	0	

Transferred to Other hospital (N=38)	N	%
Ward	8	21.1
Other ICU	22	57.9
High dependency care unit	8	21.1
Rehabilitation	0	0.0
Day hospital or Long-term care	0	0.0
Missing	0	

ICU mortality	N	%
Alive	576	85.0
Dead	102	15.0
Missing	0	

Timing of ICU mortality (N=102)	N	%
Daytime (08:00AM - 07:59PM)	56	54.9
Nighttime (08:00PM - 07:59AM)	46	45.1
Weekdays (Monday - Friday)	85	83.3
Weekend (Saturday - Sunday)	17	16.7
Missing	0	

Hospital mortality	N	%
Alive	509	75.1
Dead	169	24.9
Missing	0	

Timing of hosp. mortality (N=169)	N	%
In ICU	102	60.4
Within 24 hours after ICU	4	2.4
24-47 hours after ICU	5	3.0
48-71 hours after ICU	3	1.8
72-95 hours after ICU	5	3.0
After 95 hours after ICU	50	29.6
Missing	0	

Timing of hosp. mortality (days from ICU disch.) Discharged alive from ICU (N=67)		
Mean		27.7
SD		38.1
Median		14
Q1–Q3		3.5–35.5
Missing		0

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Outcome indicators - Adult emergency surgical patients evaluated in the GiViTI model

Last hospital mortality			ICU stay (days)		
	N	%			
Alive	503	74.2	Mean	8.6	
Dead	175	25.8	SD	11.0	
Missing	0		Median	5	
			Q1–Q3	2–10	
			Missing	0	
			ICU stay (days)		
			Alive (N=576)		
			Mean	8.3	
			SD	10.3	
			Median	5	
			Q1–Q3	2–10	
			Missing	0	
			ICU stay (days)		
			Dead (N=102)		
			Mean	10.5	
			SD	14.2	
			Median	5	
			Q1–Q3	1–12.8	
			Missing	0	
			Stay after ICU (days)		
			Alive (N=576)		
			Mean	19.5	
			SD	27.9	
			Median	11	
			Q1–Q3	4.5–25	
			Missing	1	
			Hospital stay (days)		
			Mean	28.8	
			SD	31.6	
			Median	18	
			Q1–Q3	9–38	
			Missing	1	
			Hospital stay (days)		
			Alive (N=509)		
			Mean	28.8	
			SD	30.1	
			Median	19	
			Q1–Q3	10.8–37	
			Missing	1	
			Hospital stay (days)		
			Dead (N=169)		
			Mean	28.6	
			SD	35.8	
			Median	16	
			Q1–Q3	6–42	
			Missing	0	

National report - Year 2018**Validity of the models** - Calibration belts

The calibration belt is designed to compare actually observed mortality with expected mortality according to a given prediction model. Expected mortality is plotted on the x axis while observed mortality is plotted on the y-axis. Two overlapping belts are presented in each graph: the first, in light grey, with a confidence level of 80%, and the second, in dark grey, with a confidence level of 95%. The belt lying above the bisector indicates that observed mortality is higher than expected mortality; vice versa, the belt lying below the bisector indicates that observed mortality is lower than expected mortality. The belt is plotted in the range of expected mortality values actually present in the sample under study. The higher the polynomial, the more complex the relationship between expected and observed mortality. A significant test ($p < 0.05$) indicates poor calibration.

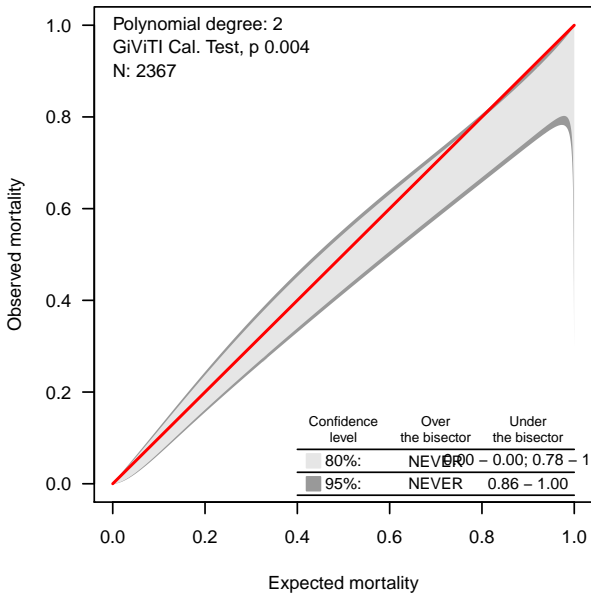
These pages show the calibration belts built on 2018 data using PIM 2, PIM 3, PELOD, SAPSII, GiViTI 2017 and GiViTI 2018 prognostic models. For further informations please look at [PLoS ONE 6(2): e16110].

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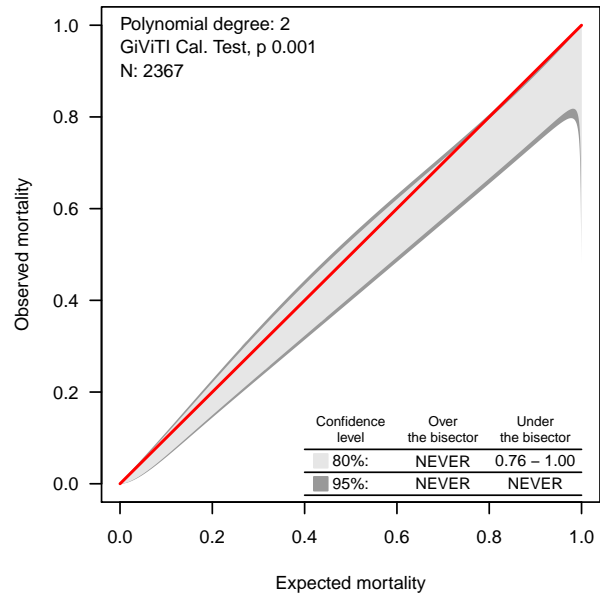
Validity of the models - Calibration belts

EXTERNAL SCORE

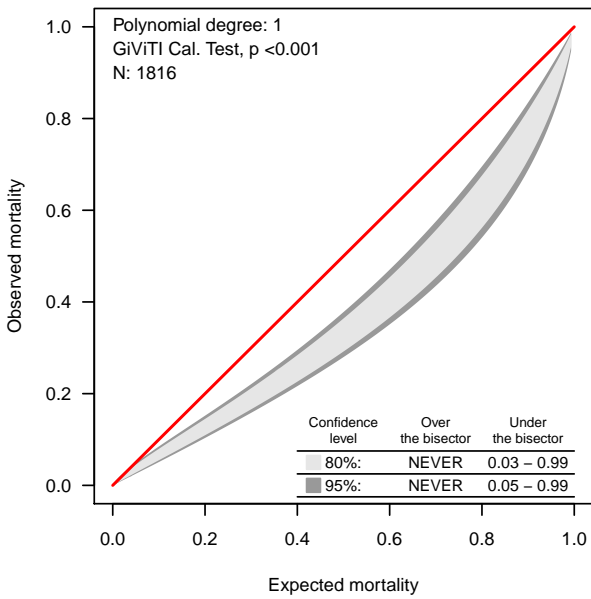
Predictive model: GiViTI 2018



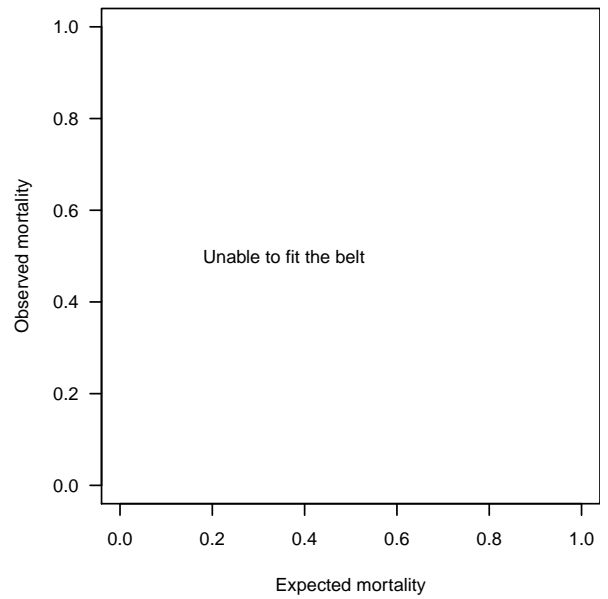
Predictive model: GiViTI 2017



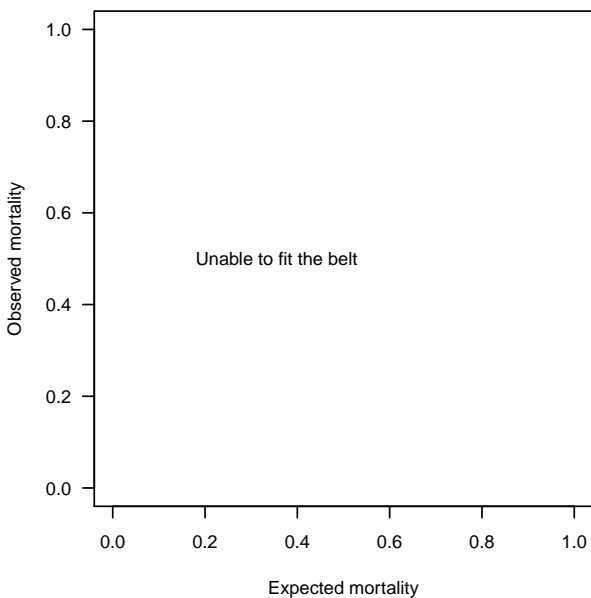
Predictive model: SAPSII



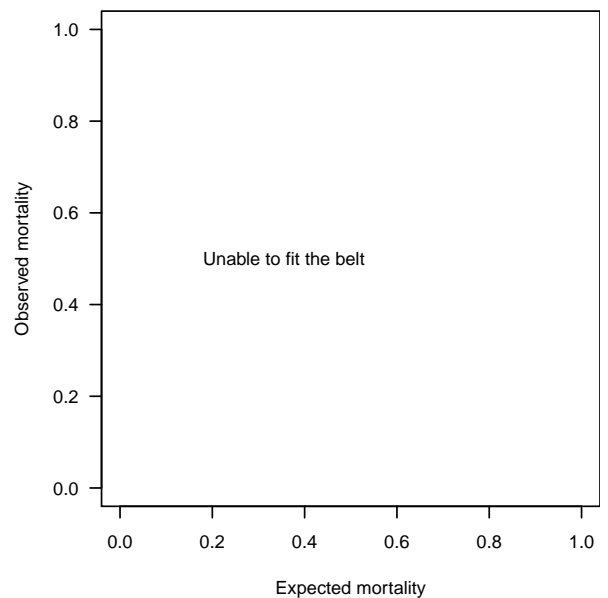
Predictive model : PELOD



Predictive model: PIM2



Predictive model: PIM3



Appendix

Coauthors

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