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SOCIETÀ ITALIANA DI MEDICINA FISICA E RIABILITATIVA

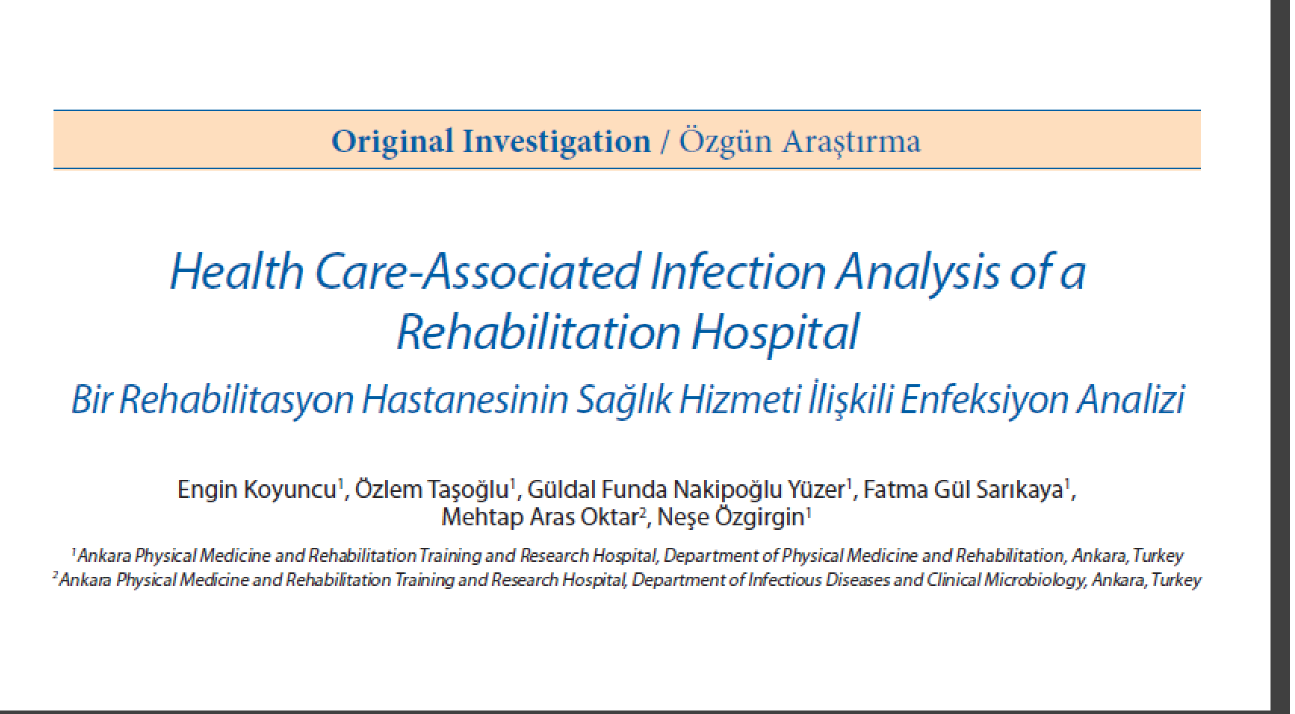
Ferrara 20 giugno 2019
Aula Congressi
Ospedale di CONA (FE)

Convegno Nazionale

La Gestione Appropriata delle Infezioni in Riabilitazione: indicazioni strategiche

INFEZIONI E OUTCOME RIABILITATIVO

Silvia Carli



Original Investigation / Özgün Araştırma

Health Care-Associated Infection Analysis of a Rehabilitation Hospital

Bir Rehabilitasyon Hastanesinin Sağlık Hizmeti İlişkili Enfeksiyon Analizi

Engin Koyuncu[1], Özlem Taşoğlu[1], Güldal Funda Nakipoğlu Yüzer[1], Fatma Gül Sarıkaya[1],
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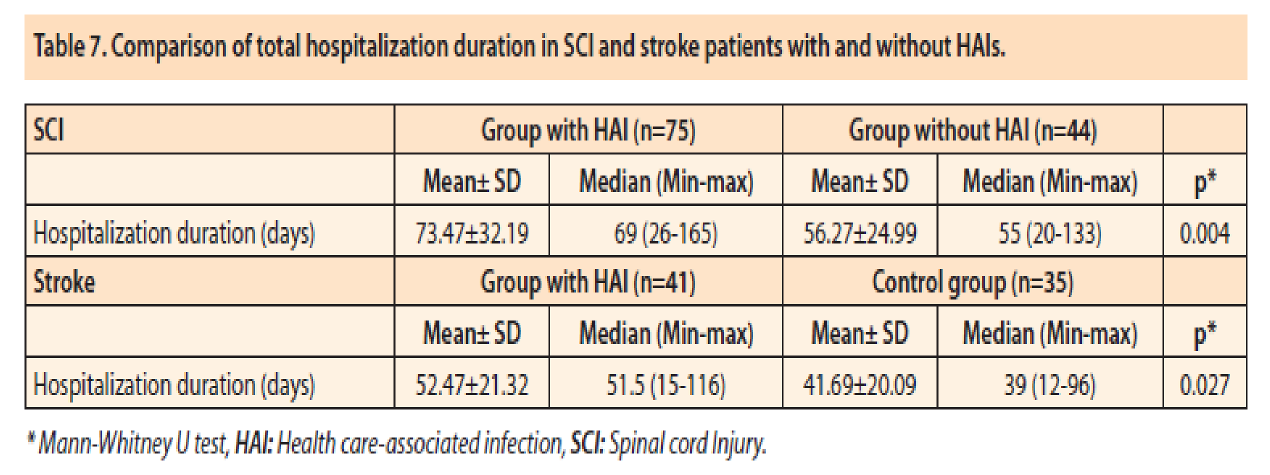
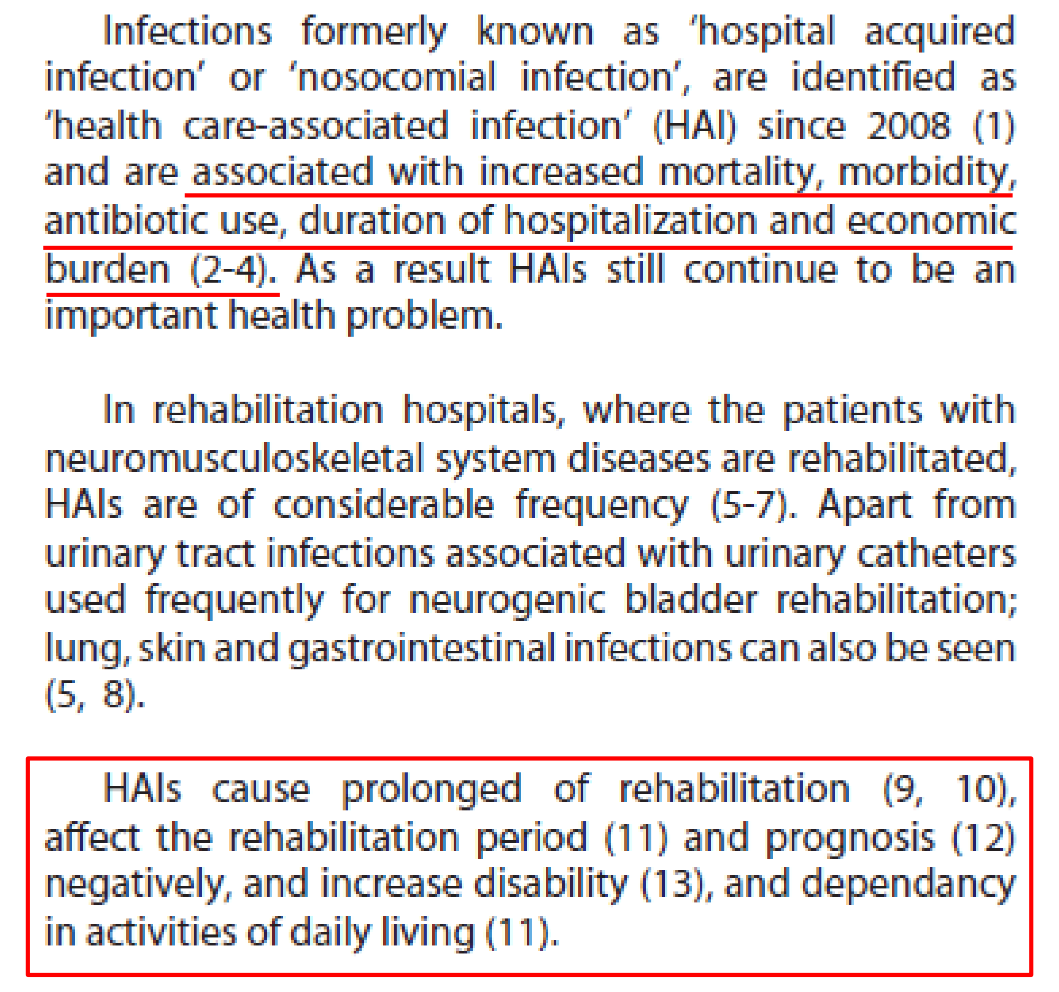


Table 7. Comparison of total hospitalization duration in SCI and stroke patients with and without HAIs.

SCI	Group with HAI (n=75)		Group without HAI (n=44)		
	Mean± SD	Median (Min-max)	Mean± SD	Median (Min-max)	p*
Hospitalization duration (days)	73.47±32.19	69 (26-165)	56.27±24.99	55 (20-133)	0.004
Stroke	**Group with HAI (n=41)**		**Control group (n=35)**		
	Mean± SD	Median (Min-max)	Mean± SD	Median (Min-max)	p*
Hospitalization duration (days)	52.47±21.32	51.5 (15-116)	41.69±20.09	39 (12-96)	0.027

** Mann-Whitney U test, **HAI:** Health care-associated infection, **SCI:** Spinal cord Injury.*



Infections formerly known as 'hospital acquired infection' or 'nosocomial infection', are identified as 'health care-associated infection' (HAI) since 2008 (1) and are associated with increased mortality, morbidity, antibiotic use, duration of hospitalization and economic burden (2-4). As a result HAIs still continue to be an important health problem.

In rehabilitation hospitals, where the patients with neuromusculoskeletal system diseases are rehabilitated, HAIs are of considerable frequency (5-7). Apart from urinary tract infections associated with urinary catheters used frequently for neurogenic bladder rehabilitation; lung, skin and gastrointestinal infections can also be seen (5, 8).

HAIs cause prolonged of rehabilitation (9, 10), affect the rehabilitation period (11) and prognosis (12) negatively, and increase disability (13), and dependancy in activities of daily living (11).

Stroke-associated infection independently predicts 3-month poor functional outcome and mortality

Satoshi Suda[1] · Junya Aoki[1] · Takashi Shimoyama[1] · Kentaro Suzuki[1] · Yuki Sakamoto[1] · Takehiro Katano[1] · Seiji Okubo[1] · Chikako Nito[1] · Yasuhiro Nishiyama[1] · Masahiro Mishina[1] · Kazumi Kimura[1]

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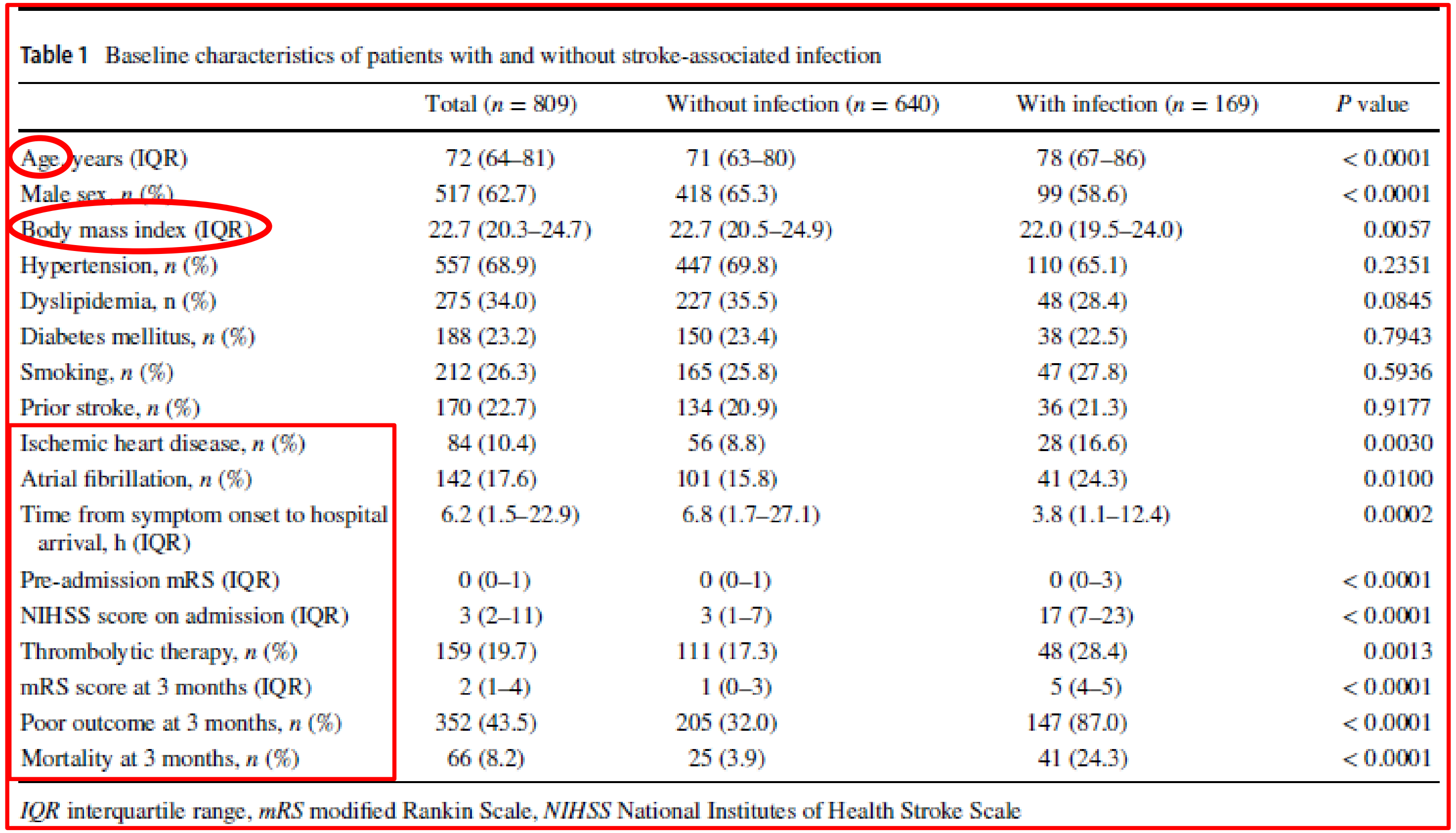

Table 1 Baseline characteristics of patients with and without stroke-associated infection

	Total ($n = 809$)	Without infection ($n = 640$)	With infection ($n = 169$)	*P* value
Age, years (IQR)	72 (64–81)	71 (63–80)	78 (67–86)	< 0.0001
Male sex, *n* (%)	517 (62.7)	418 (65.3)	99 (58.6)	< 0.0001
Body mass index (IQR)	22.7 (20.3–24.7)	22.7 (20.5–24.9)	22.0 (19.5–24.0)	0.0057
Hypertension, *n* (%)	557 (68.9)	447 (69.8)	110 (65.1)	0.2351
Dyslipidemia, n (%)	275 (34.0)	227 (35.5)	48 (28.4)	0.0845
Diabetes mellitus, *n* (%)	188 (23.2)	150 (23.4)	38 (22.5)	0.7943
Smoking, *n* (%)	212 (26.3)	165 (25.8)	47 (27.8)	0.5936
Prior stroke, *n* (%)	170 (22.7)	134 (20.9)	36 (21.3)	0.9177
Ischemic heart disease, *n* (%)	84 (10.4)	56 (8.8)	28 (16.6)	0.0030
Atrial fibrillation, *n* (%)	142 (17.6)	101 (15.8)	41 (24.3)	0.0100
Time from symptom onset to hospital arrival, h (IQR)	6.2 (1.5–22.9)	6.8 (1.7–27.1)	3.8 (1.1–12.4)	0.0002
Pre-admission mRS (IQR)	0 (0–1)	0 (0–1)	0 (0–3)	< 0.0001
NIHSS score on admission (IQR)	3 (2–11)	3 (1–7)	17 (7–23)	< 0.0001
Thrombolytic therapy, *n* (%)	159 (19.7)	111 (17.3)	48 (28.4)	0.0013
mRS score at 3 months (IQR)	2 (1–4)	1 (0–3)	5 (4–5)	< 0.0001
Poor outcome at 3 months, *n* (%)	352 (43.5)	205 (32.0)	147 (87.0)	< 0.0001
Mortality at 3 months, *n* (%)	66 (8.2)	25 (3.9)	41 (24.3)	< 0.0001

IQR interquartile range, *mRS* modified Rankin Scale, *NIHSS* National Institutes of Health Stroke Scale

- Incidenza tra 5-65%
- Incrementa tasso di mortalità e lunghezza di degenza per gli infetti rispetto ai non infetti
- Relazione tra infezione e outcome funzionale include complicanze legate all’infezione come febbre e immobilità

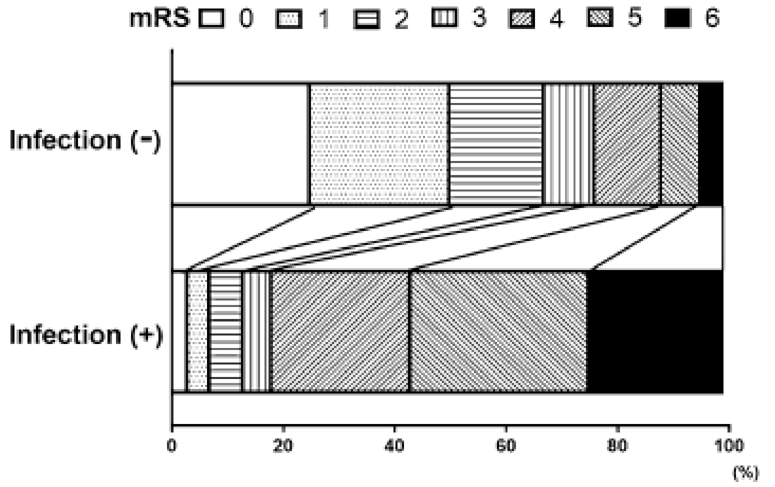

Fig. 1 Functional outcome at 3 months after stroke onset, assessed using the modified Rankin scale (mRS), in patients with or without stroke-associated infection

Readmission to the acute care unit and functional outcomes in patients with severe brain injury during rehabilitation

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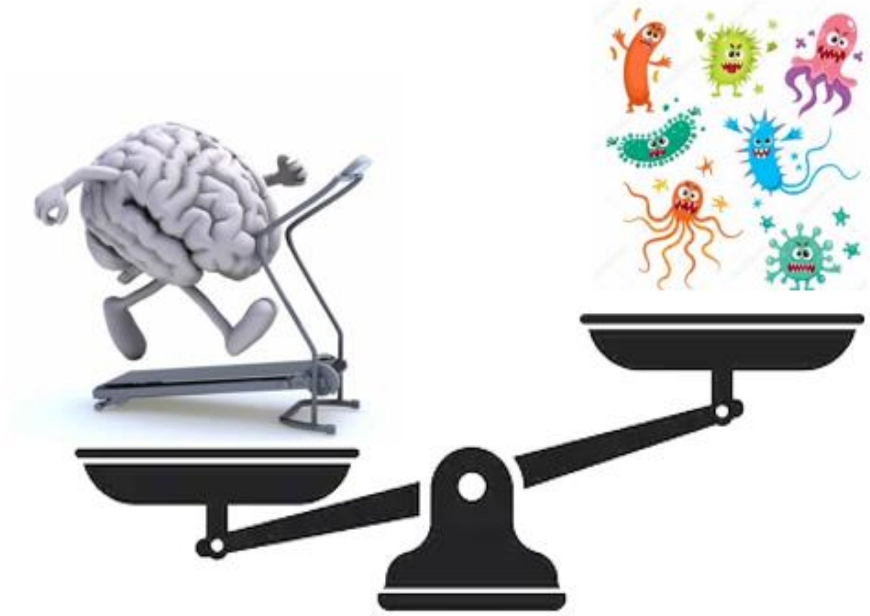

ABSTRACT

BACKGROUND: Medical and surgical complications are common after brain lesions and may require acute care unit readmission (ACUR) during the rehabilitation stay. This clinical phenomenon has not been explored in subjects with severe brain injury (sBI).
AIM: Because sBI patients come from the intensive care unit (ICU), patients may be transferred to rehabilitation before complete clinical stabilization. We investigated ACUR and causes as well as whether those who required ACUR had different functional outcomes.
DESIGN: Prospective cohort study.
SETTING: Dedicated rehabilitation setting.
PARTICIPANTS: Adult subjects with sBI causing a disorder of consciousness graded 3-8 on the Glasgow Coma Scale admitted to a dedicated rehabilitative setting were prospectively enrolled from January 2014 to December 2015.
METHODS: Functional outcome was investigated using the Rancho Los Amigos Levels of Cognitive Functioning (LCF), Disability Rating Scale (DRS), Glasgow Outcome Scale (GOS) and modified Rankin Scale (mRS), in subjects with and without ACUR, at admission and discharge. Mortality and length of stay (LOS) were recorded.
RESULTS: One hundred-thirty (53 F, 77 M; mean age: 55.7±17.8) subjects were admitted to the rehabilitation setting, and 97 were enrolled (43 F, 54 M; mean age: 54.7±18.2). Thirty-six ACUR were detected that involved 29 (29.8%) patients. There were 20 and 16 referrals to acute medical and surgical care, respectively. Significant functional outcomes in all assessment measures were observed after rehabilitation, but subjects without ACUR showed significant improvement in all measurements: LCF ($P=0.001$), DRS ($P<0.001$), GOS ($P=0.003$), and mRS ($P<0.001$), compared to those who required ACUR. At baseline, patients with ACUR were more disabled than those without ACUR, and they had significant lower LCF scores: 2.60 (95% CI: 2.15-3.14) and 3.47 (95% CI: 3.07-3.91) ($P=0.013$), respectively. Significant longer LOS was observed in subjects with ACUR as compared to those without ACUR: 120 (q1-q3:93-165) *vs.* 63 (q1–q3: 38-93) days ($P<0.001$), respectively. The intra-hospital mortality rate was higher in patients who required ACUR (8.1 events per 100 person-months) as compared to those who did not require ACUR (2.8 events per 100 person-months).
CONCLUSIONS: Readmission to acute care was common in subjects with sBI during rehabilitation. Subjects who required ACUR had poorer functional outcomes, higher risk of mortality and longer LOS than subjects without ACUR.
CLINICAL REHABILITATION IMPACT: Careful control of these subjects and more strict collaboration and communication among physicians on the rehabilitative team are required to plan proper care pathways.

(*Cite this article as:* Intiso D, Fontana A, Maruzzi G, Tolfa M, Copetti M, Di Rienzo F. Readmission to the acute care unit and functional outcomes in patients with severe brain injury during rehabilitation. Eur J Phys Rehabil Med 2017;53:268-76. DOI: 10.23736/S1973-9087.16.04288-X)

Key words: Brain injuries - Rehabilitation - Patient readmission.

Outcome of neurological early rehabilitation patients carrying multi-drug resistant bacteria: results from a German multi-center study

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Abstract

Background: Colonization or infection with multi-drug resistant (MDR) bacteria is considered detrimental to the outcome of neurological and neurosurgical early rehabilitation patients.

Methods: In a German multi-center study, 754 neurological early rehabilitation patients were enrolled and and reviewed in respect to MDR status, length of stay (LOS) and the following outcome variables: Barthel Index (BI), Early Rehabilitation Index (ERI), Glasgow Outcome Score Extended (GOSE), Coma Remission Scale (CRS), Functional Ambulation Categories (FAC).

Results: The mean age of the study population was 68.0 ± 14.8 years. Upon admission, the following prevalence for MDRs was observed: MRSA (methicillin resistant staphylococcus aureus) 7.0% (53/754), ESBL- (extended spectrum beta-lactamase) producing bacteria strains 12.6% (95/754), VRE (vancomycin resistant enterococci) 2.8% (21/754). Patients colonized or infected with MDR bacteria (MDR+) were significantly more frequently diagnosed with a critical illness polyneuropathy – CIP – than non-colonized (MDR-) patients: 29.0% vs. 14.8%. In addition, they were more frequently mechanically ventilated (MDR+: 55/138, 39.9%; MDR- 137/616, 22.2%). MDR+ patients were referred to rehabilitation earlier, had a longer LOS in early rehabilitation, lower BI on admission and at discharge, lower ERI on admission and lower CRS at discharge than MDR- patients. There was a highly significant correlation of the BI upon admission with the BI at discharge ($r_s = 0.492$, $p < 0.001$). GOSE at discharge differed significantly between both groups (χ^2-test, $p < 0.01$). Perhaps of greatest importance, mortality among MDR+ was higher in comparison to MDR- (18.1% vs. 7.6%).

Conclusions: The outcome of neurological early rehabilitation patients colonized or infected with MDR bacteria including MRSA or ESBL producing strains is significantly poorer than by non-colonized patients. There is some evidence that the poor outcome could be related to the higher morbidity and lower functional status upon admission.

Keywords: MRSA, ESBL, Early rehabilitation, Outcome

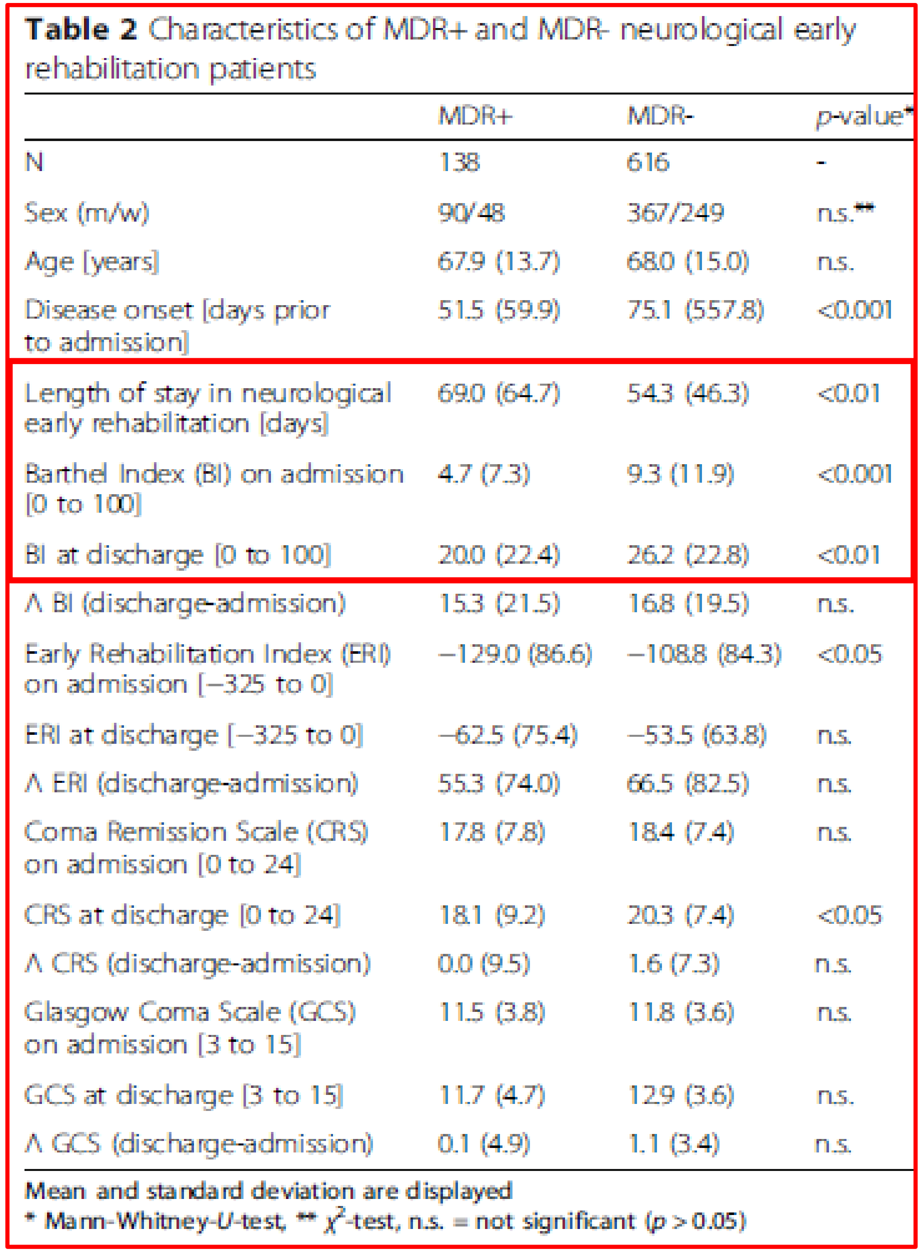


Table 2 Characteristics of MDR+ and MDR- neurological early rehabilitation patients

	MDR+	MDR-	*p*-value*
N	138	616	-
Sex (m/w)	90/48	367/249	n.s.**
Age [years]	67.9 (13.7)	68.0 (15.0)	n.s.
Disease onset [days prior to admission]	51.5 (59.9)	75.1 (557.8)	<0.001
Length of stay in neurological early rehabilitation [days]	69.0 (64.7)	54.3 (46.3)	<0.01
Barthel Index (BI) on admission [0 to 100]	4.7 (7.3)	9.3 (11.9)	<0.001
BI at discharge [0 to 100]	20.0 (22.4)	26.2 (22.8)	<0.01
Δ BI (discharge-admission)	15.3 (21.5)	16.8 (19.5)	n.s.
Early Rehabilitation Index (ERI) on admission [−325 to 0]	−129.0 (86.6)	−108.8 (84.3)	<0.05
ERI at discharge [−325 to 0]	−62.5 (75.4)	−53.5 (63.8)	n.s.
Δ ERI (discharge-admission)	55.3 (74.0)	66.5 (82.5)	n.s.
Coma Remission Scale (CRS) on admission [0 to 24]	17.8 (7.8)	18.4 (7.4)	n.s.
CRS at discharge [0 to 24]	18.1 (9.2)	20.3 (7.4)	<0.05
Δ CRS (discharge-admission)	0.0 (9.5)	1.6 (7.3)	n.s.
Glasgow Coma Scale (GCS) on admission [3 to 15]	11.5 (3.8)	11.8 (3.6)	n.s.
GCS at discharge [3 to 15]	11.7 (4.7)	12.9 (3.6)	n.s.
Δ GCS (discharge-admission)	0.1 (4.9)	1.1 (3.4)	n.s.

Mean and standard deviation are displayed
* Mann-Whitney-*U*-test, ** χ^2-test, n.s. = not significant ($p > 0.05$)

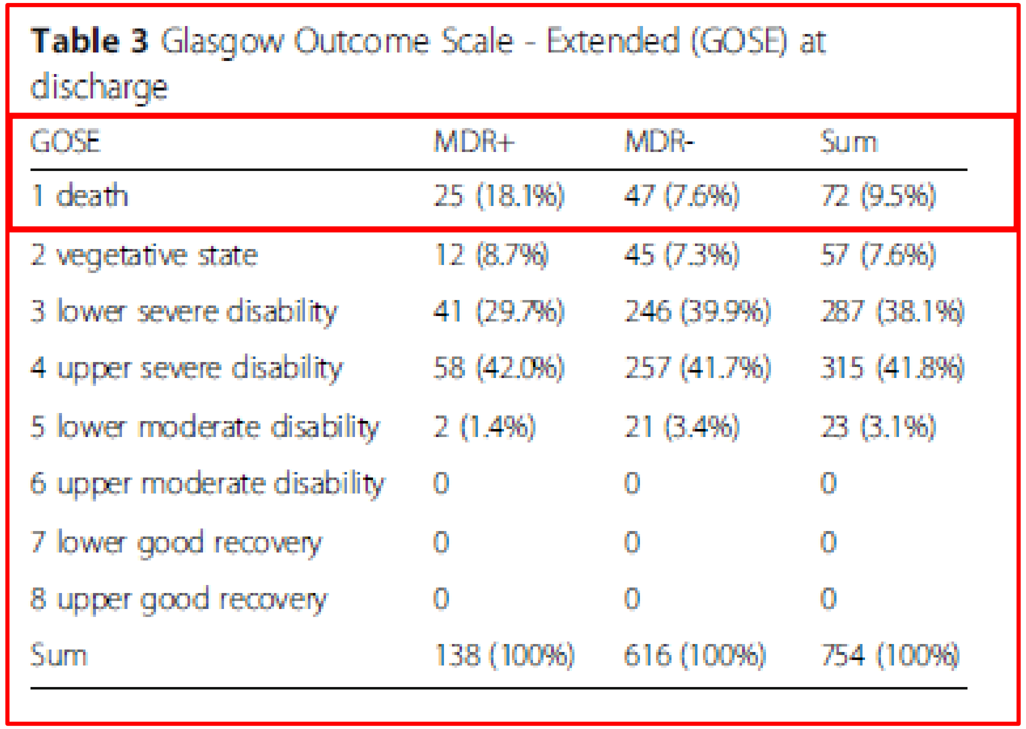
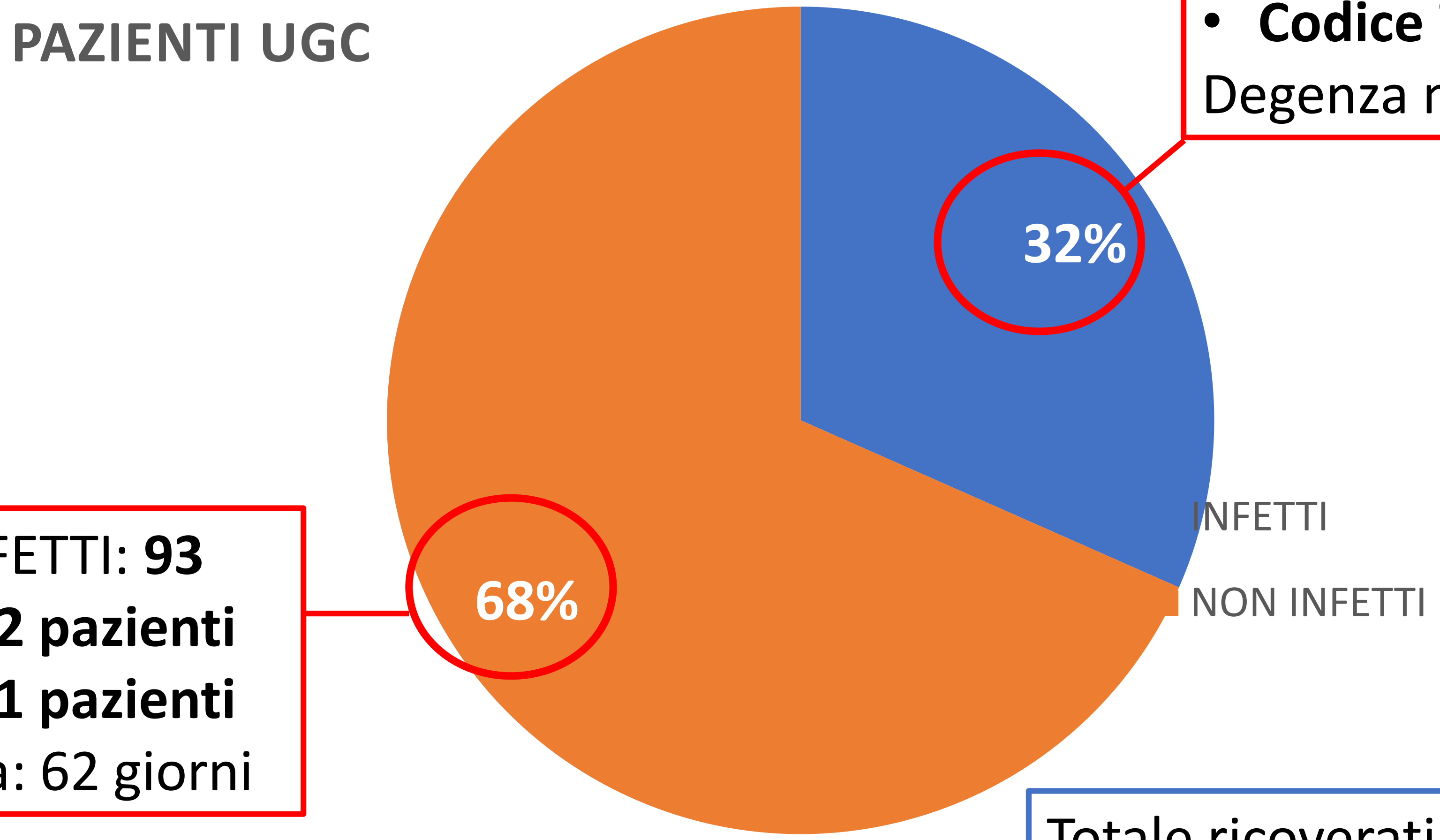


Table 3 Glasgow Outcome Scale - Extended (GOSE) at discharge

GOSE	MDR+	MDR-	Sum
1 death	25 (18.1%)	47 (7.6%)	72 (9.5%)
2 vegetative state	12 (8.7%)	45 (7.3%)	57 (7.6%)
3 lower severe disability	41 (29.7%)	246 (39.9%)	287 (38.1%)
4 upper severe disability	58 (42.0%)	257 (41.7%)	315 (41.8%)
5 lower moderate disability	2 (1.4%)	21 (3.4%)	23 (3.1%)
6 upper moderate disability	0	0	0
7 lower good recovery	0	0	0
8 upper good recovery	0	0	0
Sum	138 (100%)	616 (100%)	754 (100%)

- MDR+ maggiore lunghezza di degenza, minor Barthel Index all’ingresso e alla dimissione rispetto a MDR-
- MDR+ minor autonomia alla dimissione (secondo Barthel Index) rispetto a MDR-

UGC 2017: infezioni



Totale INFETTI: **43**
- **Codice 56: 2 pazienti**
- **Codice 75: 41 pazienti**

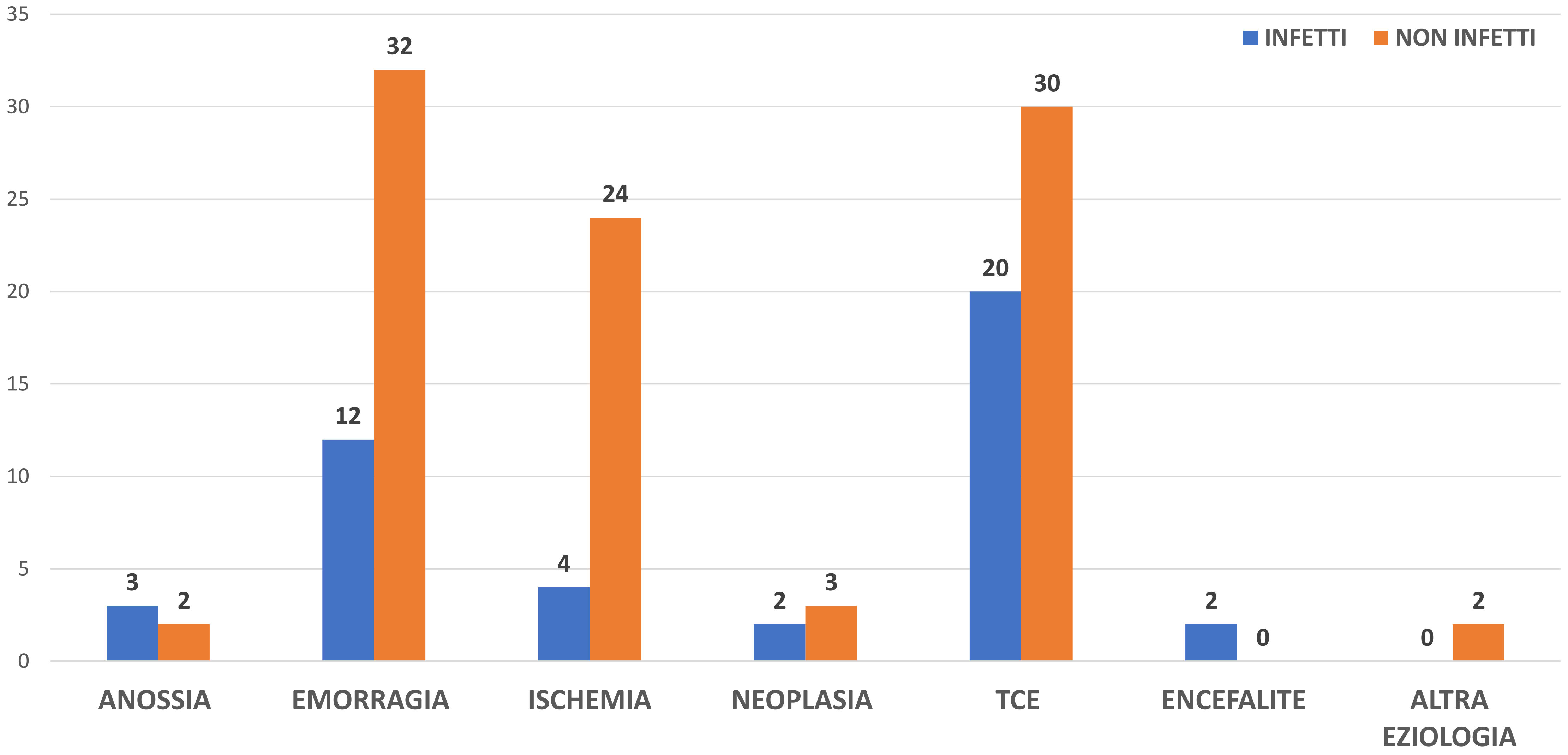
Degenza media: 94 giorni

Totale NON INFETTI: **93**
- **Codice 56: 12 pazienti**
- **Codice 75: 81 pazienti**

Degenza media: 62 giorni

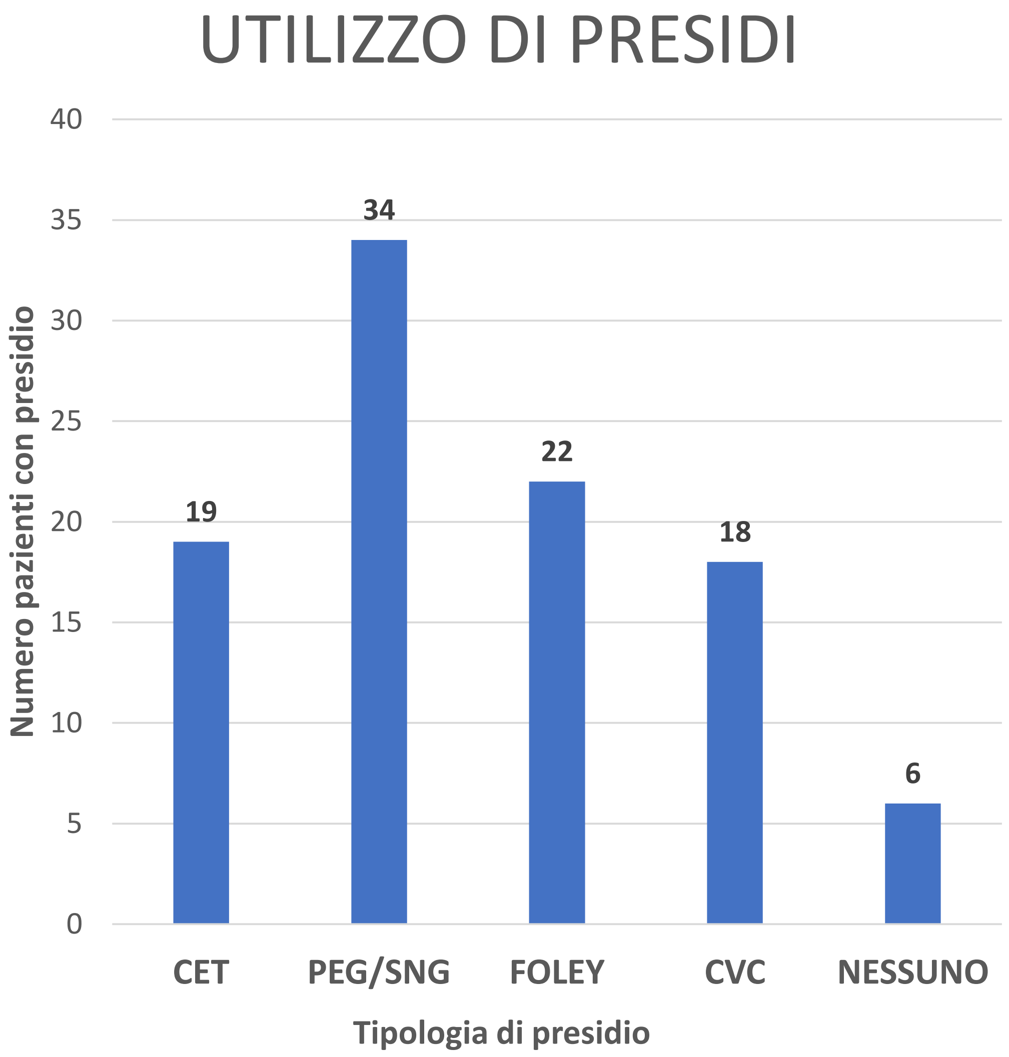
Totale ricoverati 2017: **136**
Giornate di degenza: **13.340**

Eziologia



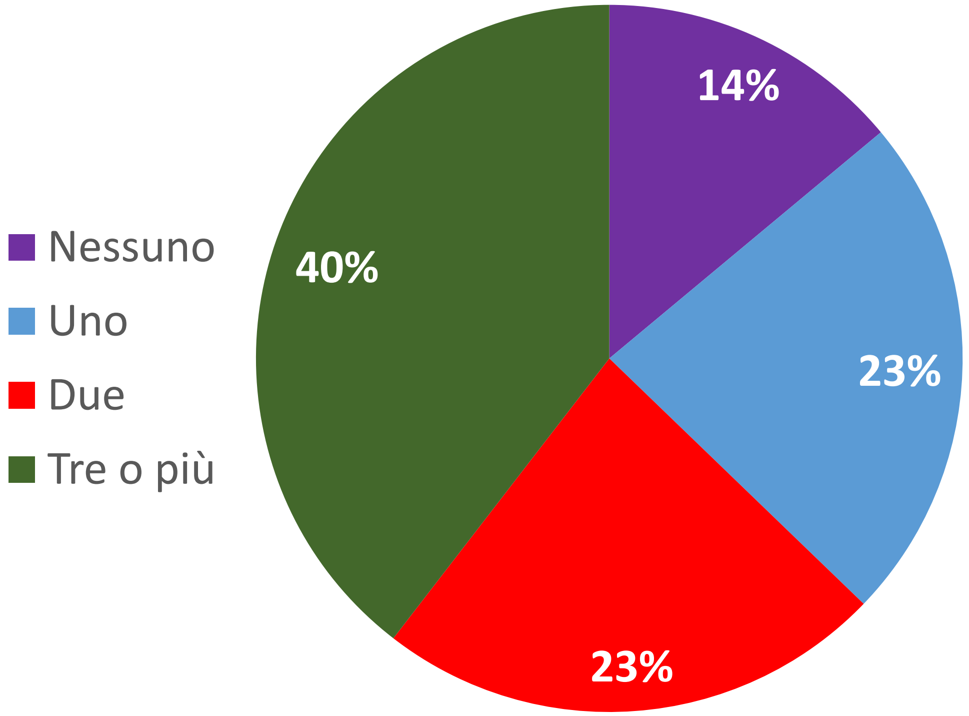
35
30
25
20
15
10
5
0
INFETTI
NON INFETTI
3
2
12
32
4
24
2
3
20
30
2
0
0
2
ANOSSIA
EMORRAGIA
ISCHEMIA
NEOPLASIA
TCE
ENCEFALITE
ALTRA EZIOLOGIA

Pazienti infetti: presidi

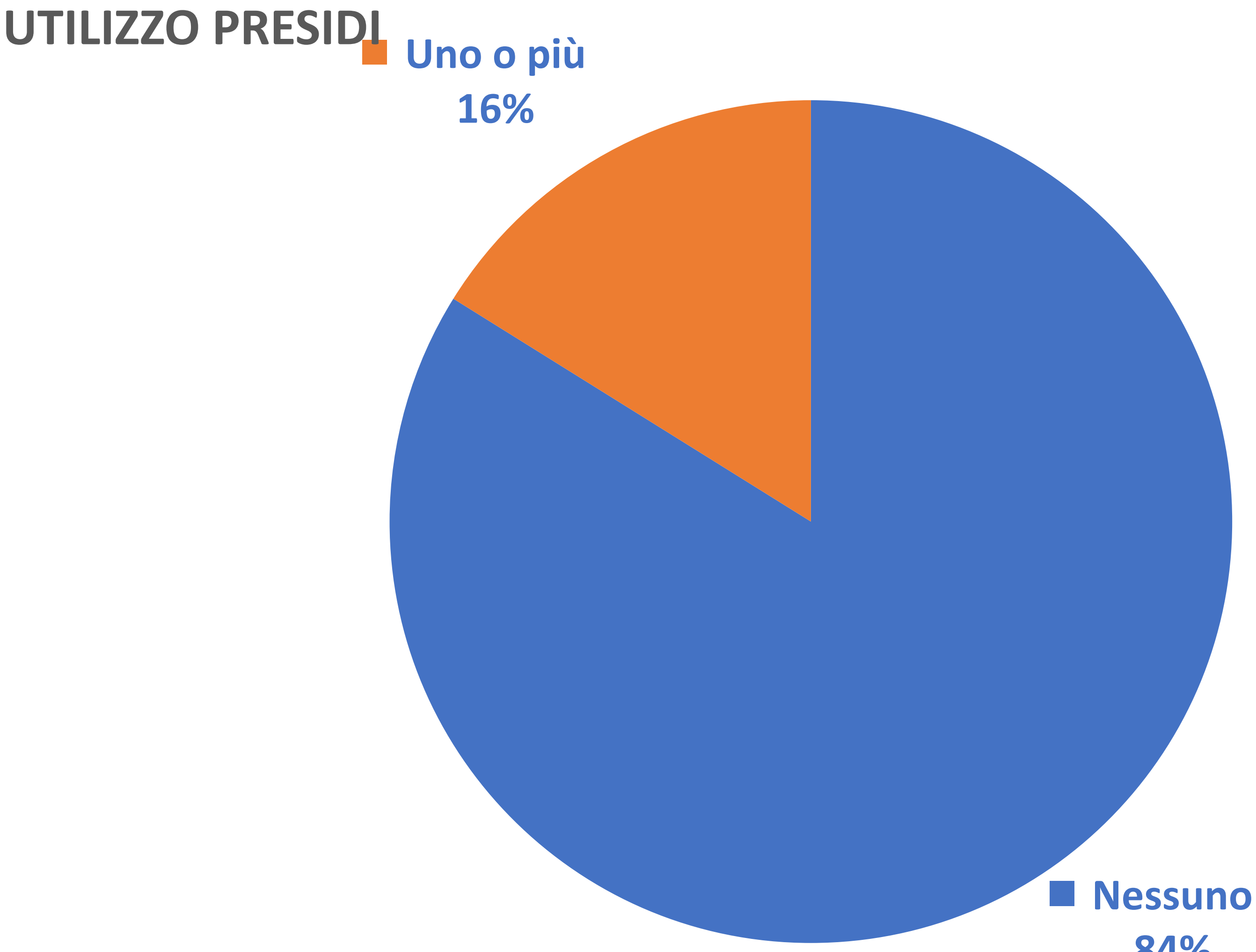


Totale pazienti infetti: **43**

- Pazienti senza presidio: **6 (14%)**
- Pazienti con 1 presidio: **10 (23%)**
- Pazienti con 2 presidi: **10 (23%)**
- Pazienti con ≥ 3 presidi: **17 (40%)**

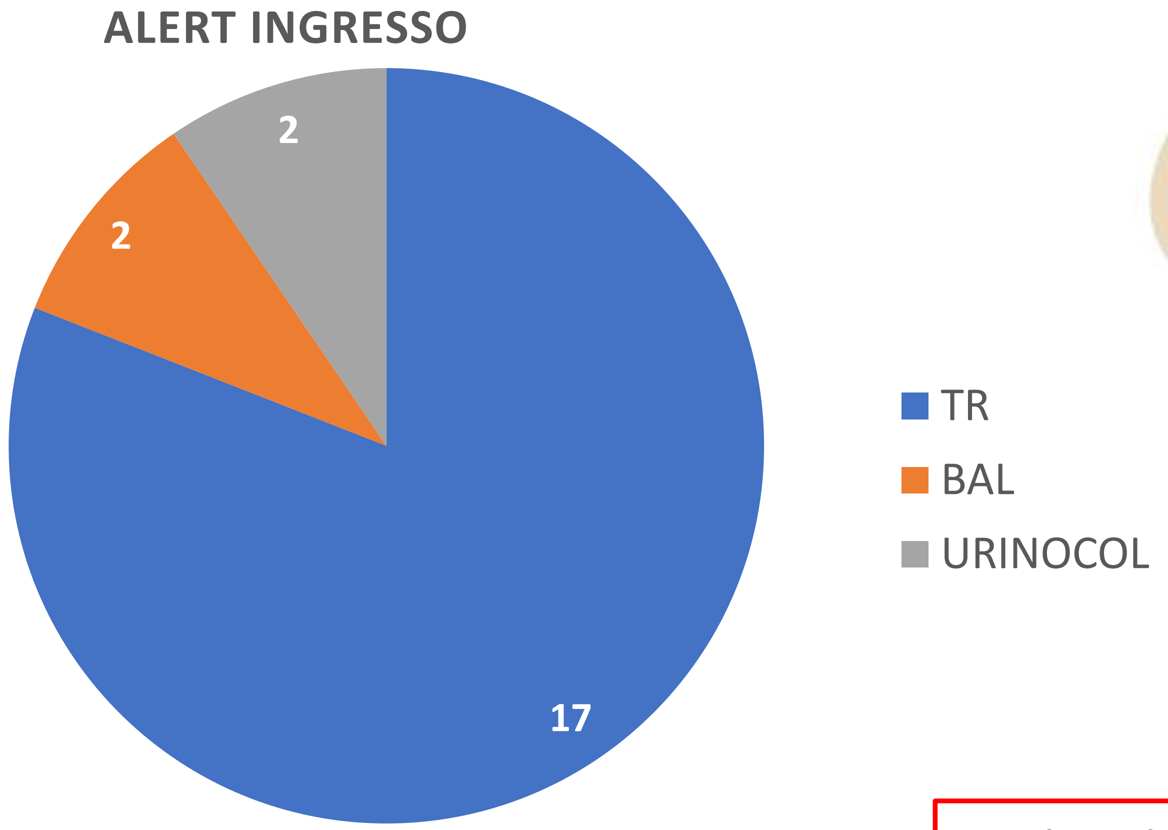


Pazienti non infetti: presidi



Totale pazienti NON infetti: **93**
Totale pazienti con presidio: **15 (16%)**
Totale pazienti senza presidio: **78 (84%)**

Pazienti alert ingresso

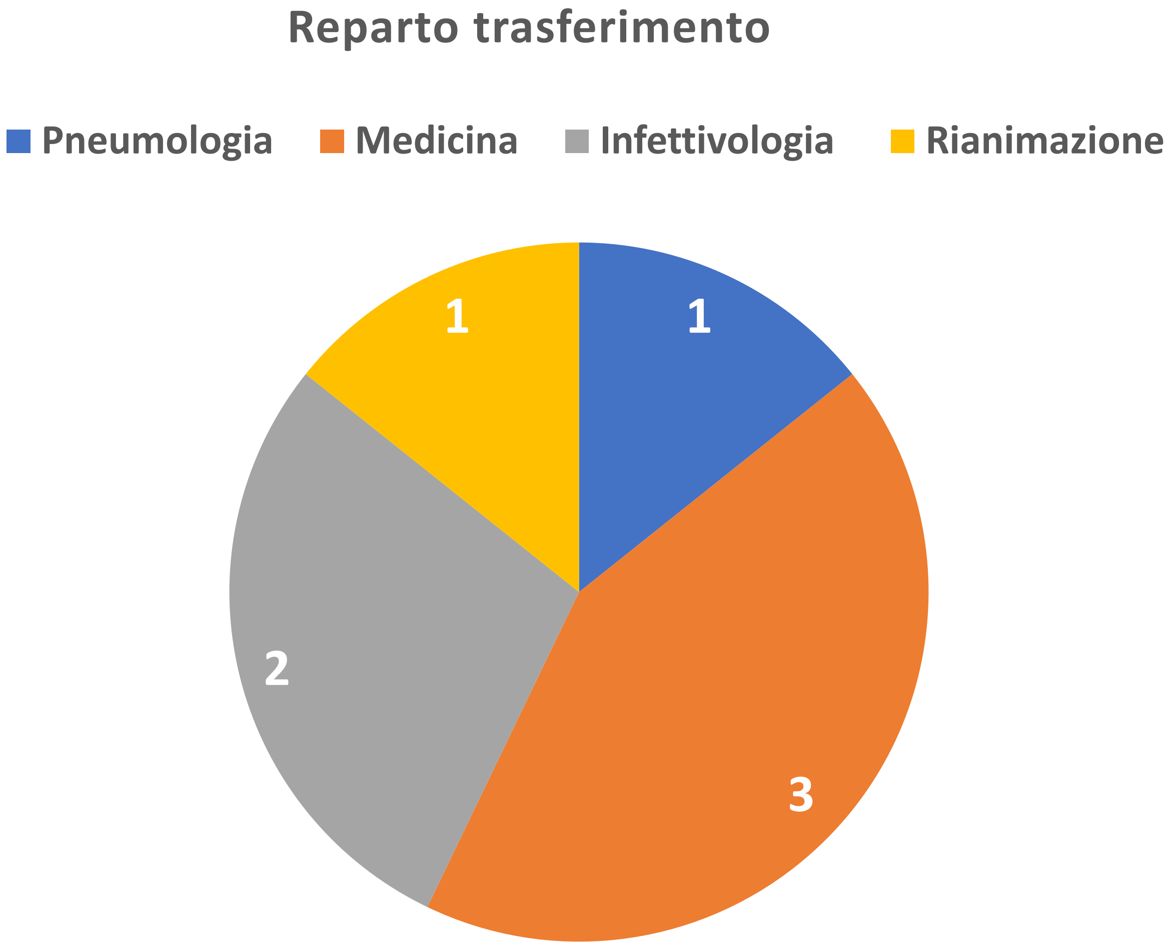


DANGER:
BACTERIA
WORKING

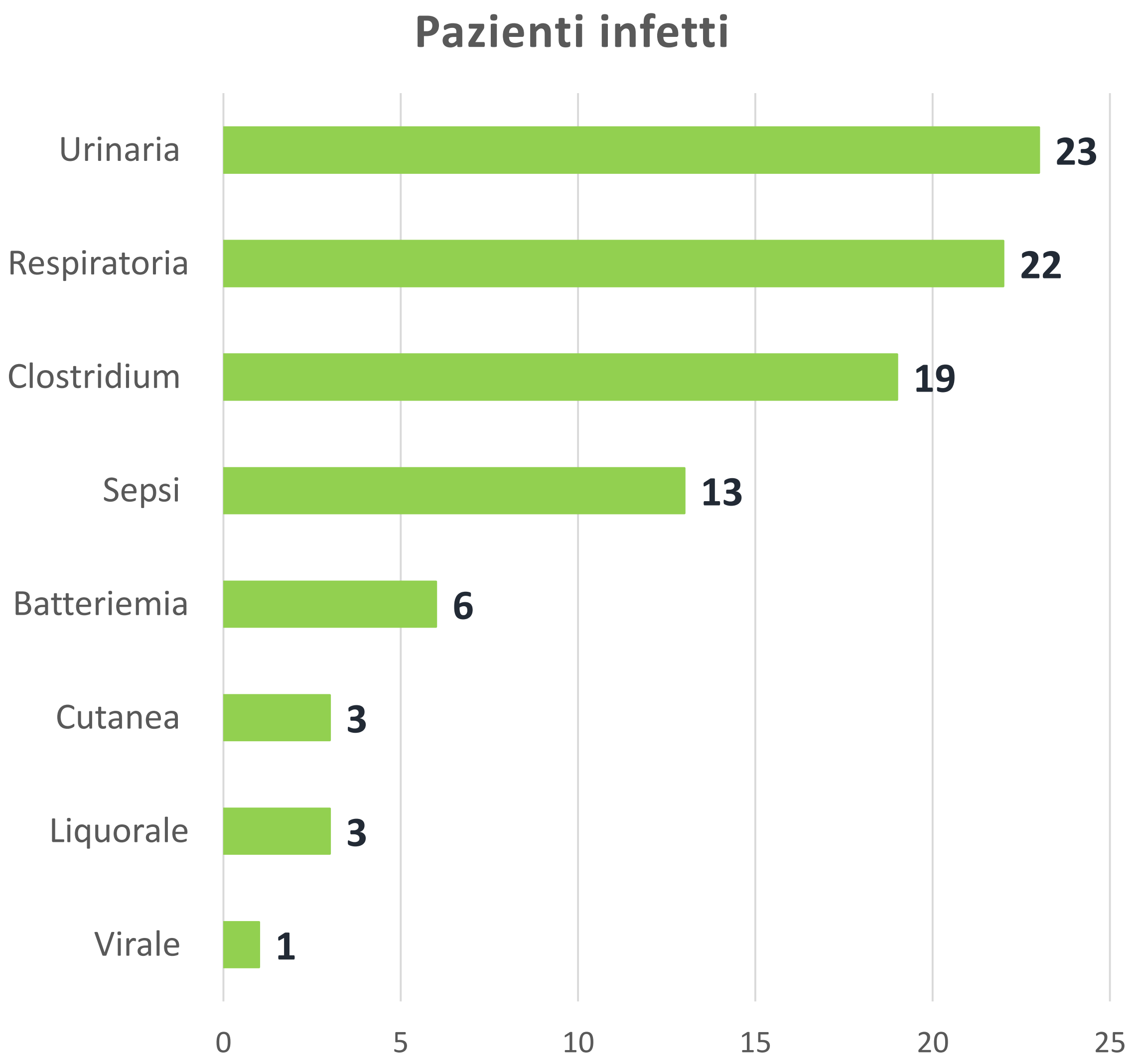
Pazienti alert ingresso 2017: **21**

Pazienti infetti: trasferimenti a reparti per acuti

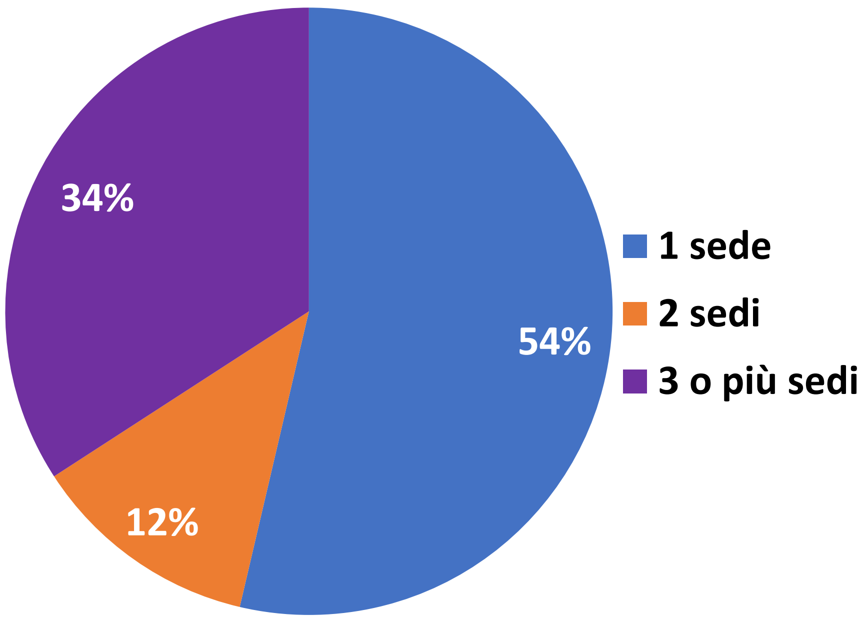
- Totale pazienti infetti: **43**
- Totale pazienti trasferiti in altro reparto per sepsi: **7**



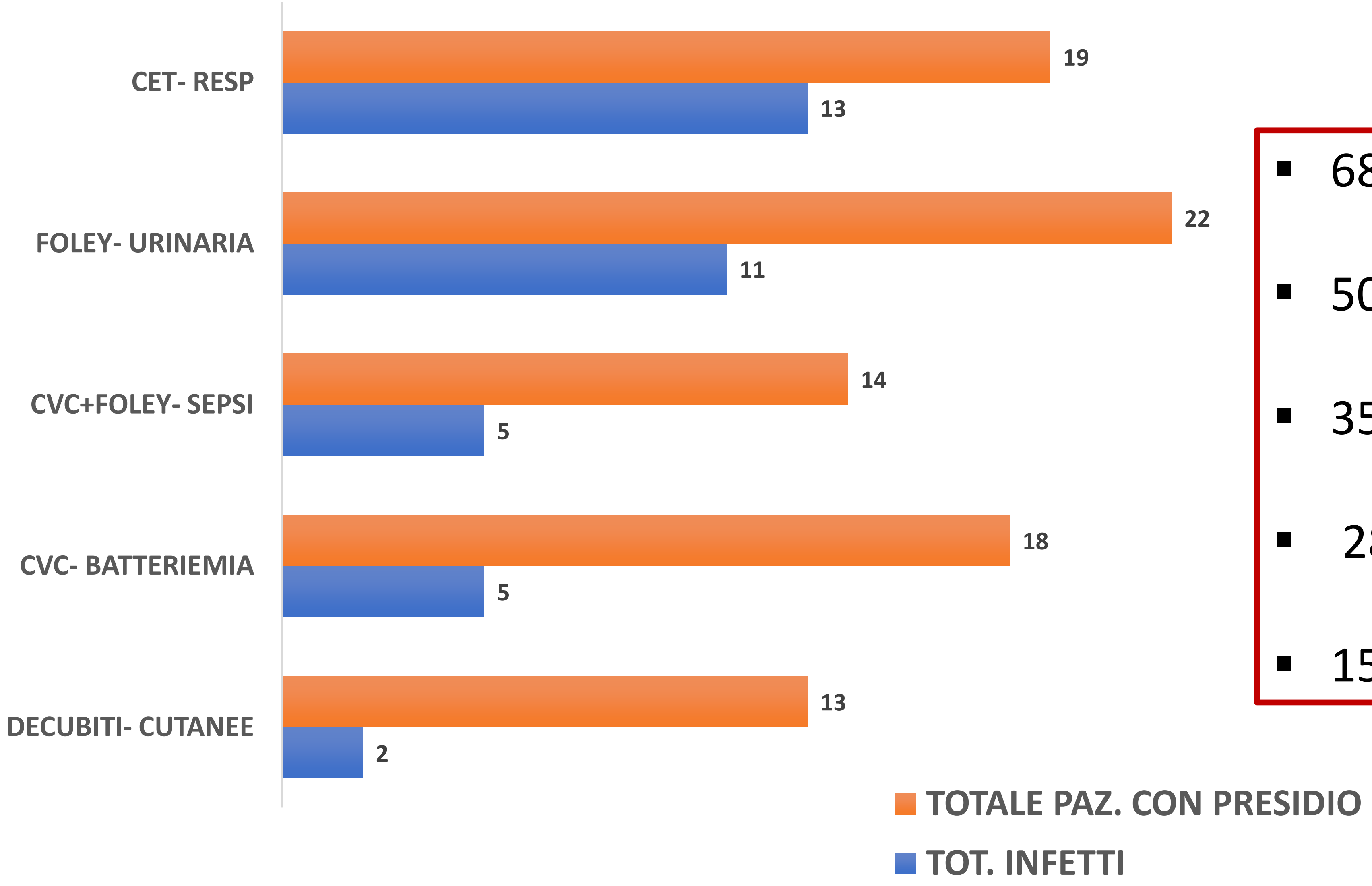
Sede infezione



- 53,4% infezione urinaria
- 51% infezione respiratoria
- 44% Clostridium Difficile
- 30% sepsi
- 14% batteriemia
- 7% infezione cutanea
- 7% infezione liquorale
- 2% infezione virale

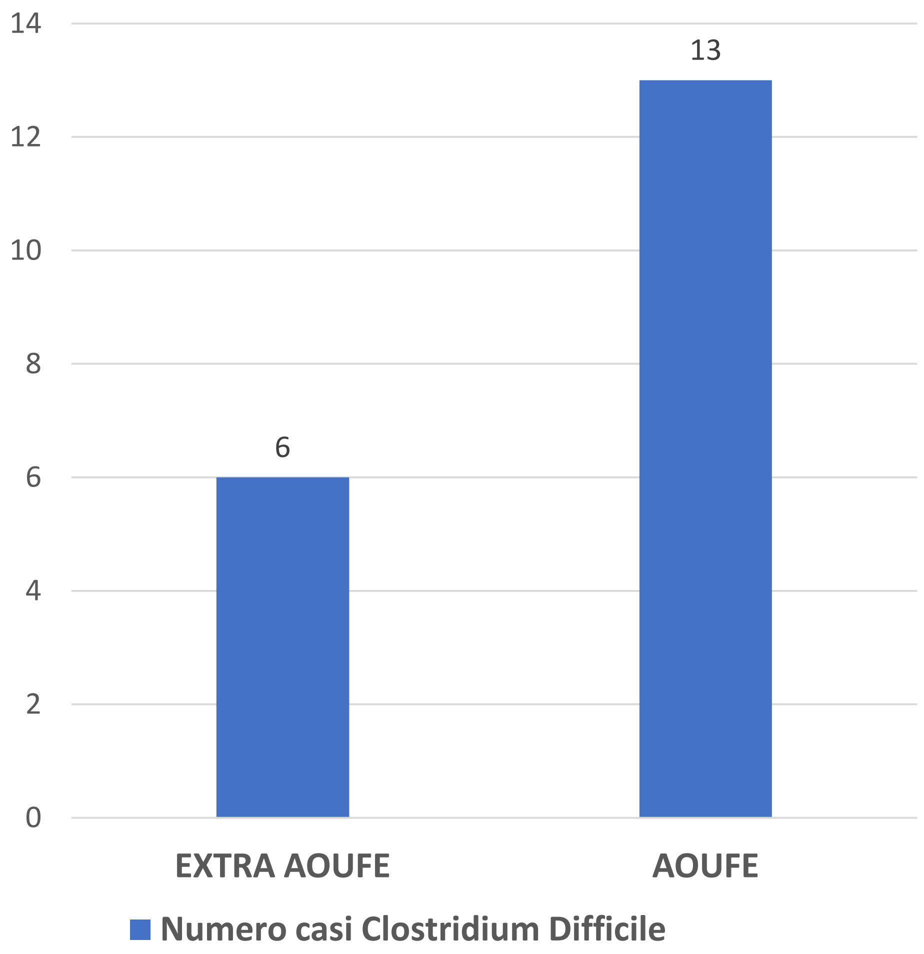


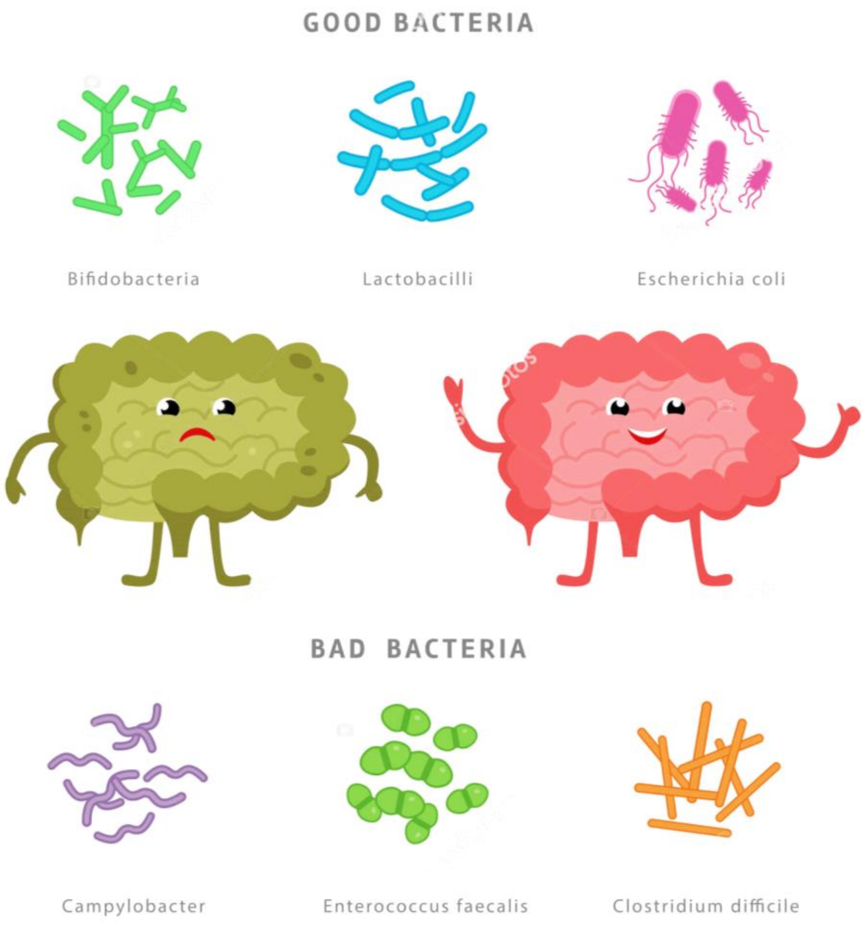
Relazione tra presidi e sede



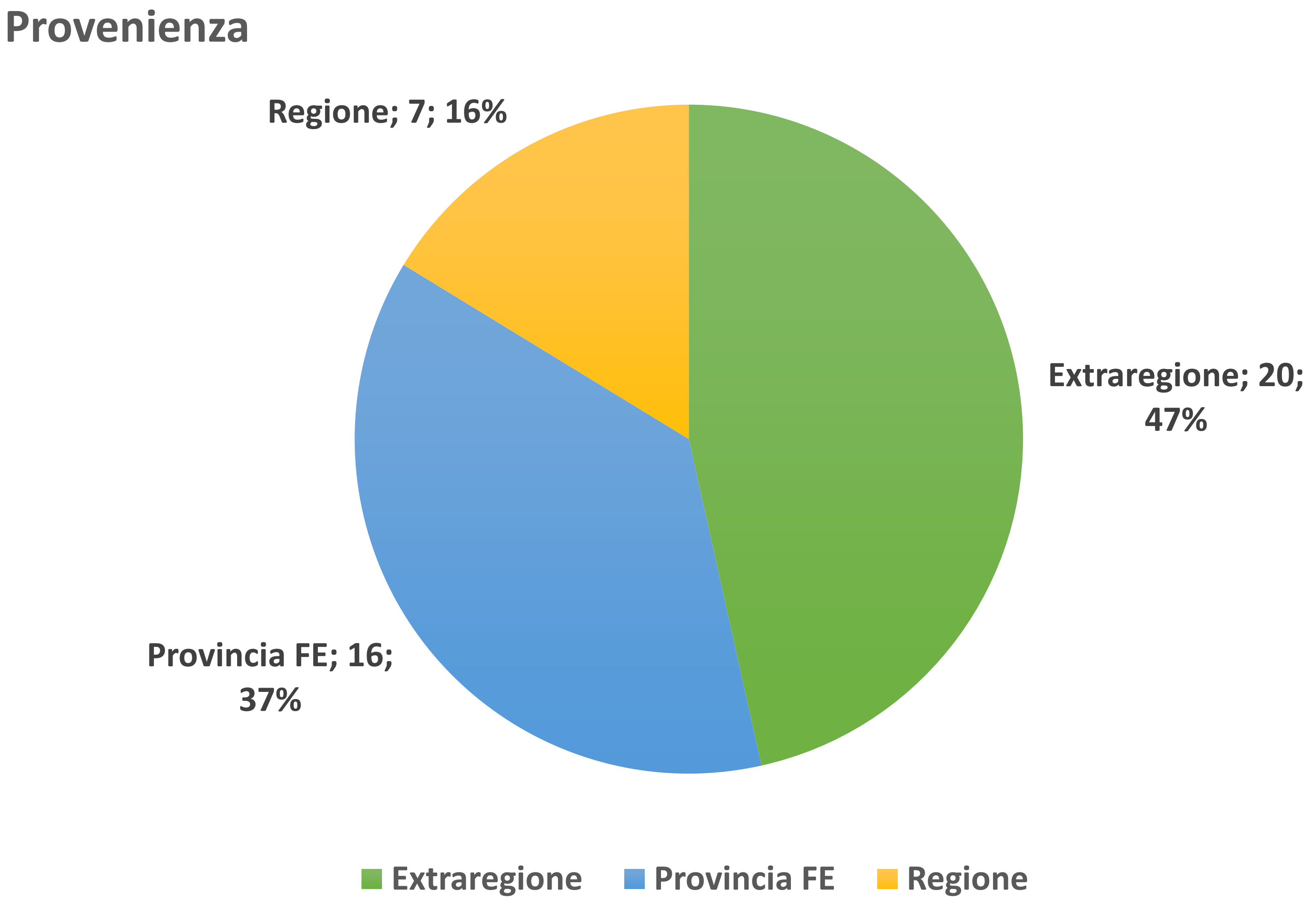
- 68% CET- Sede Respiratoria
- 50% FOLEY- Sede Urinaria
- 35% CVC+FOLEY- Sepsi
- 28% CVC- Batteriemia
- 15% LDD- Sede Cutanea

Clostridium difficile

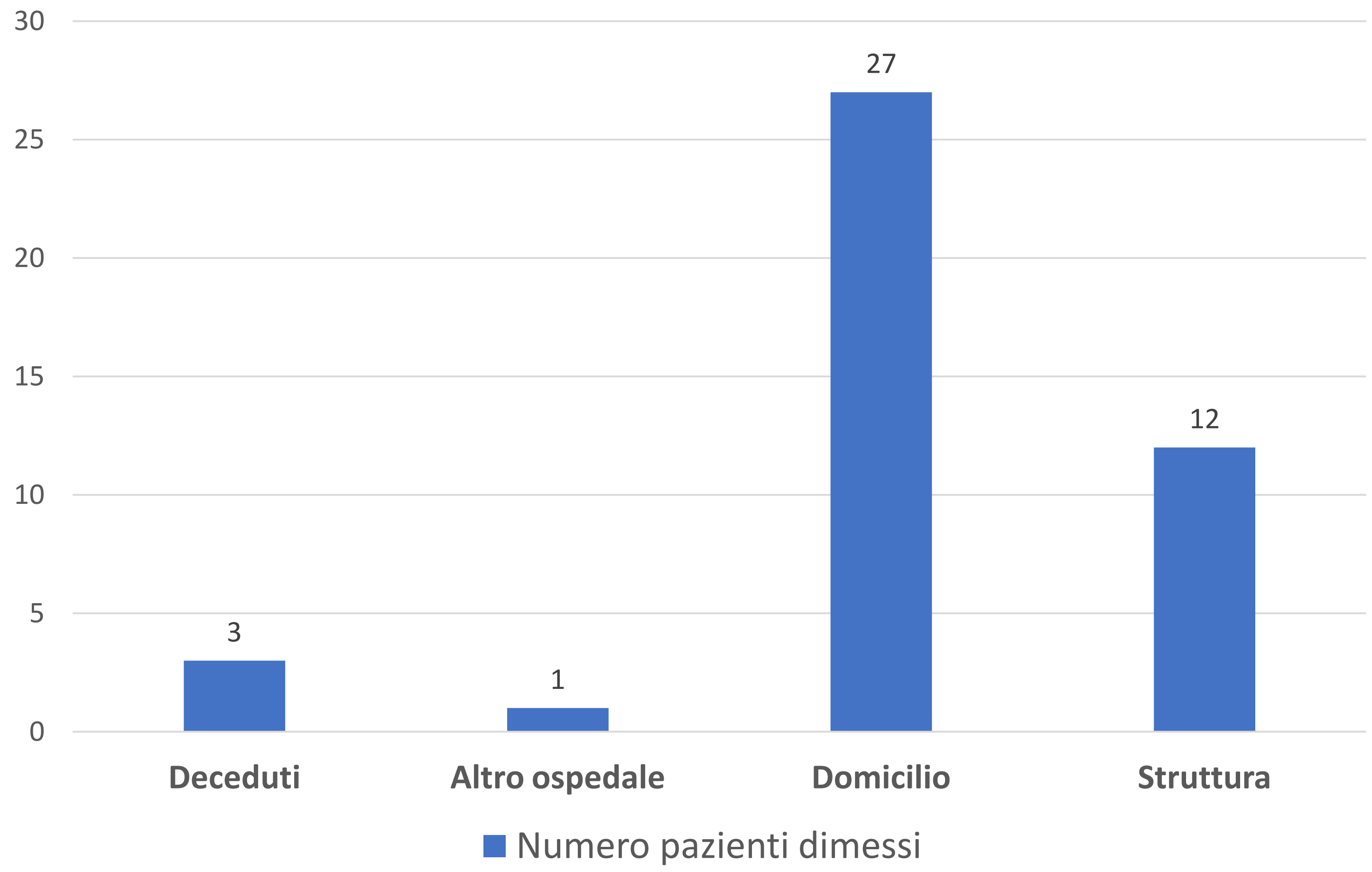



GOOD BACTERIA
Bifidobacteria
Lactobacilli
Escherichia coli
BAD BACTERIA
Campylobacter
Enterococcus faecalis
Clostridium difficile

Provenienza pazienti infetti

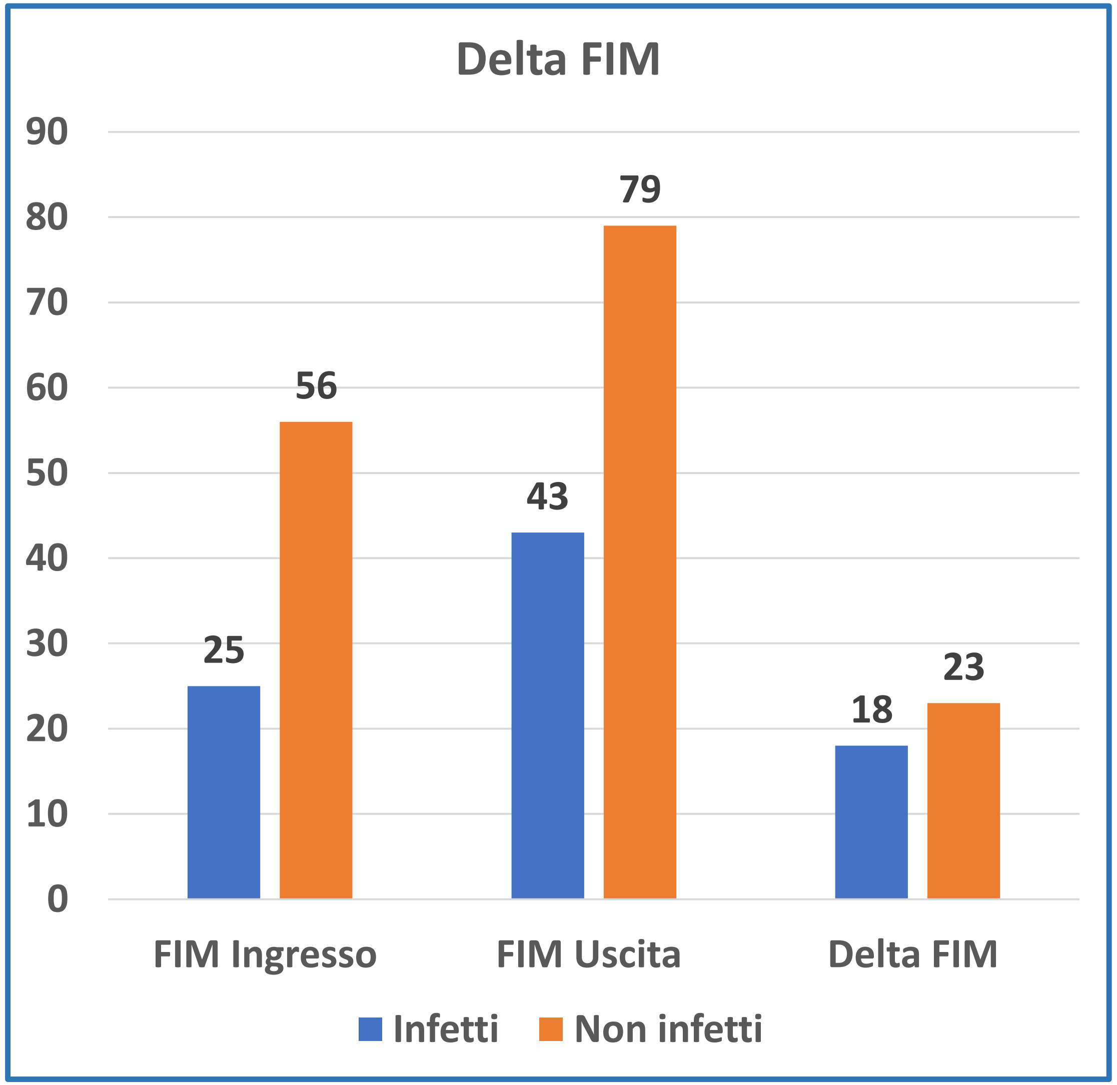


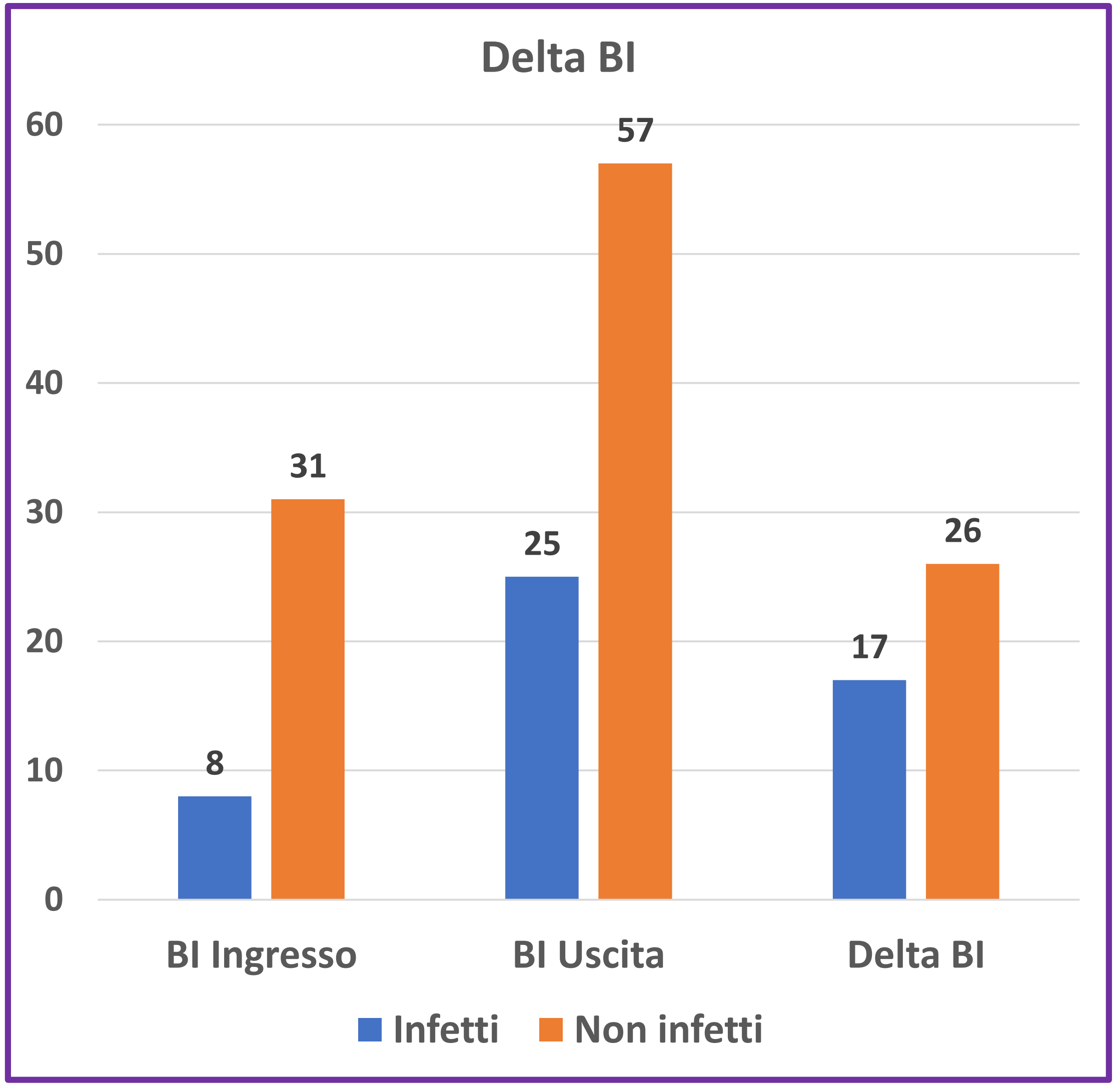
Destinazione alla dimissione pazienti infetti



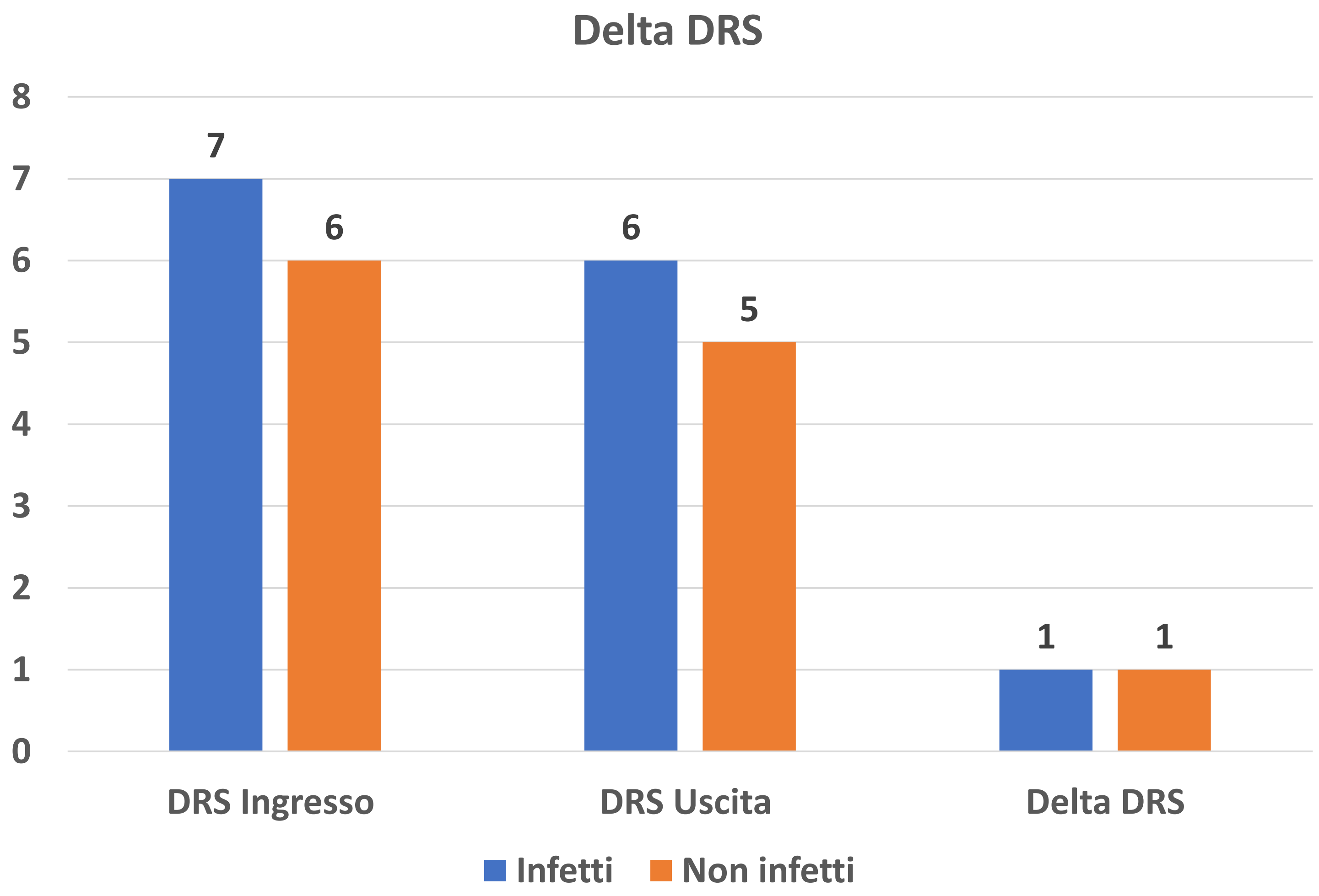
- 7% deceduti
- 2% trasferiti presso altro ospedale
- 63% dimessi a domicilio
- 28% trasferiti in struttura

Outcome FIM-Barthel Index

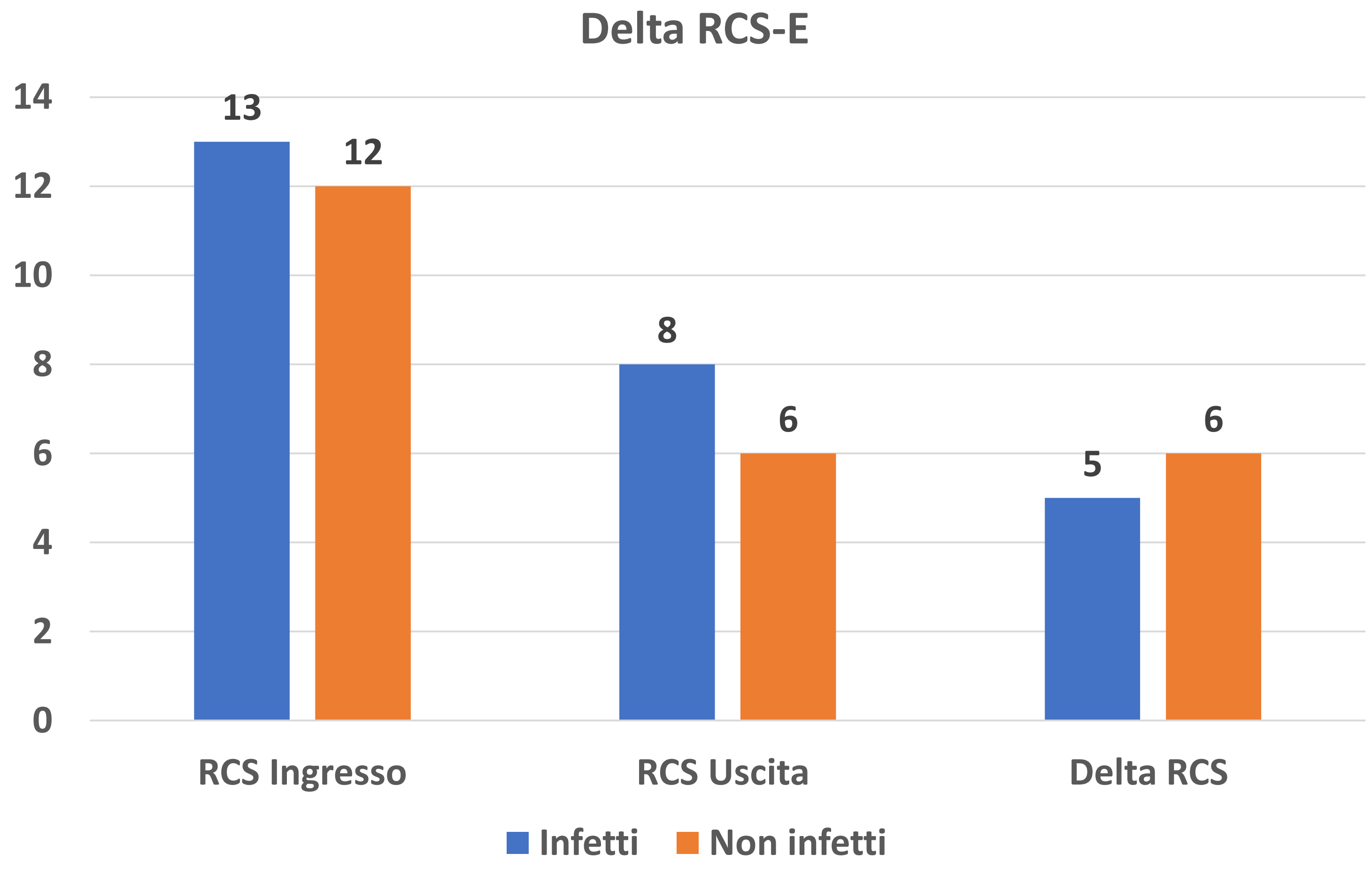




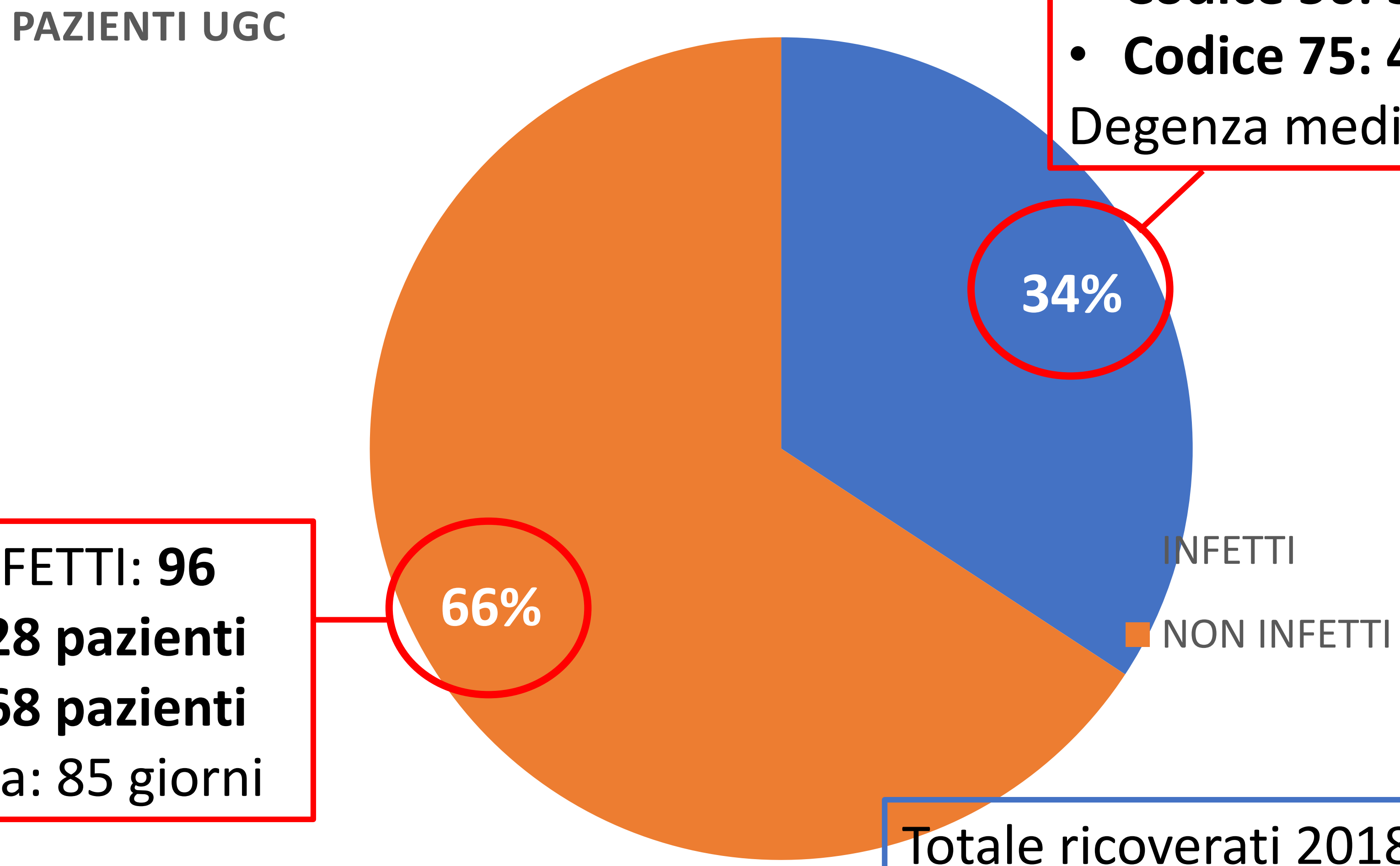
Outcome DRS


Delta DRS
8
7
6
5
4
3
2
1
0
7
6
6
5
1
1
DRS Ingresso
DRS Uscita
Delta DRS
Infetti
Non infetti

Complessità clinico-riabilitativa RCS-E



Pazienti UGC: 2018



Totale INFETTI: **50**
- **Codice 56: 3 pazienti**
- **Codice 75: 47 pazienti**

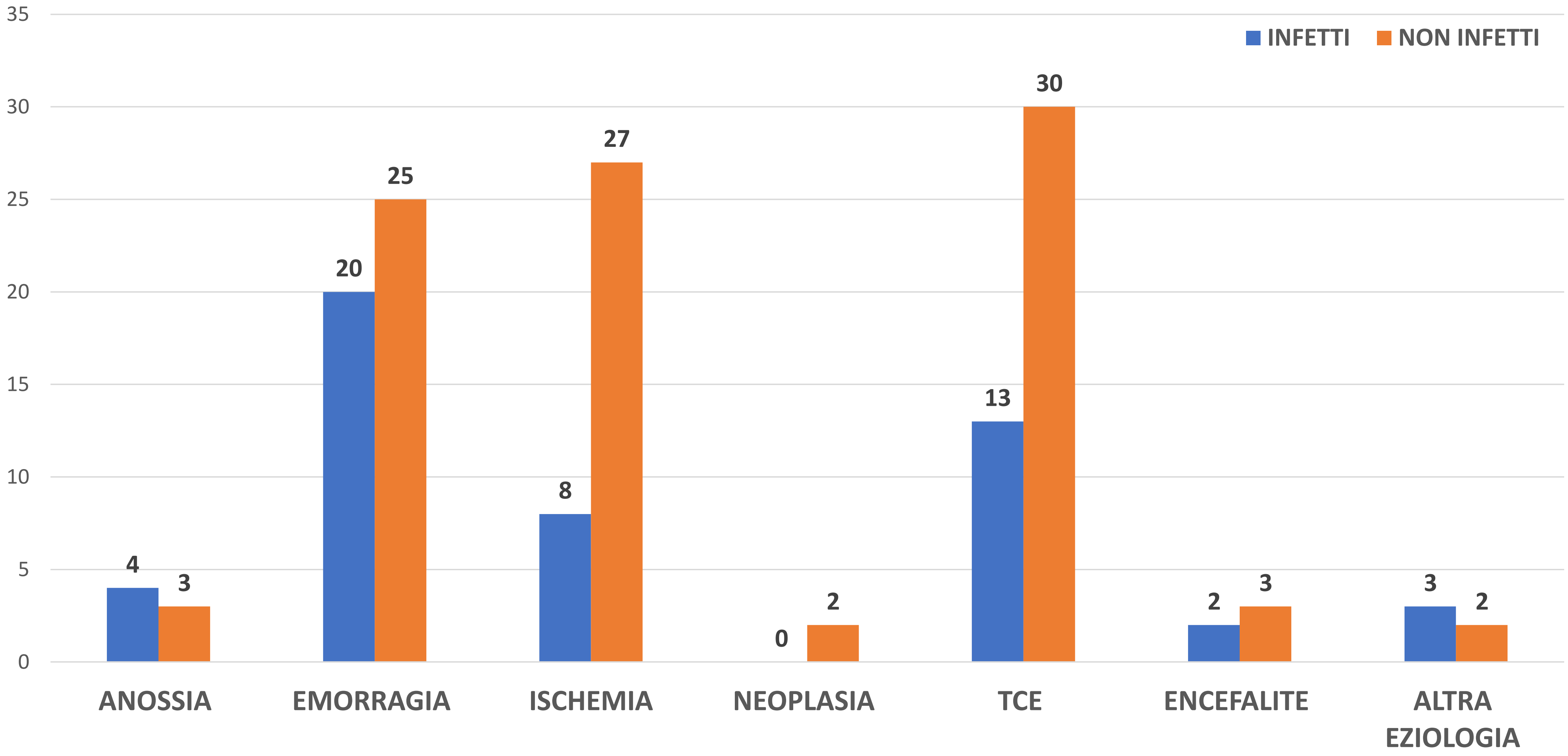
Degenza media: 102 giorni

Totale NON INFETTI: **96**
- **Codice 56: 28 pazienti**
- **Codice 75: 68 pazienti**

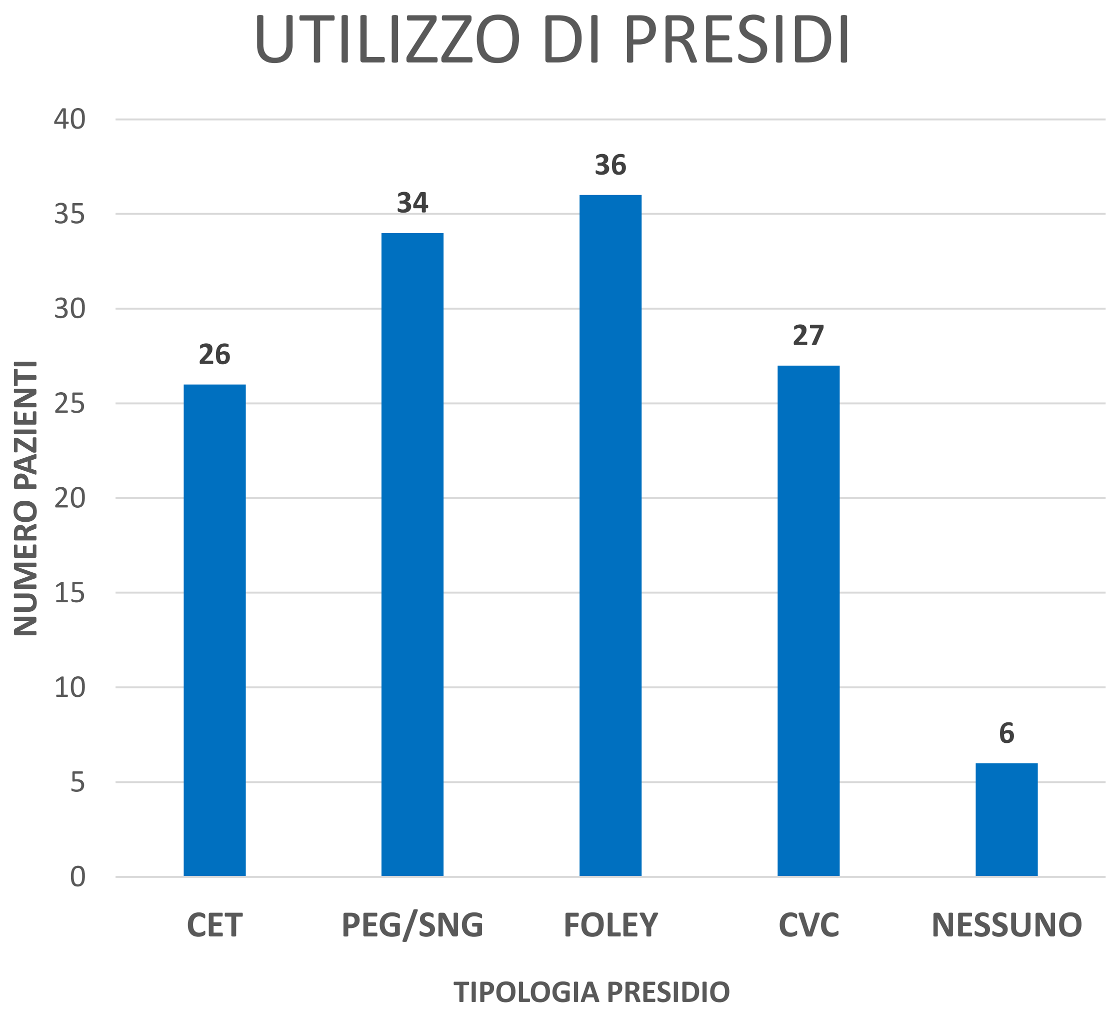
Degenza media: 85 giorni

Totale ricoverati 2018: **146**
Giornate degenza: **13.773**

Eziologia

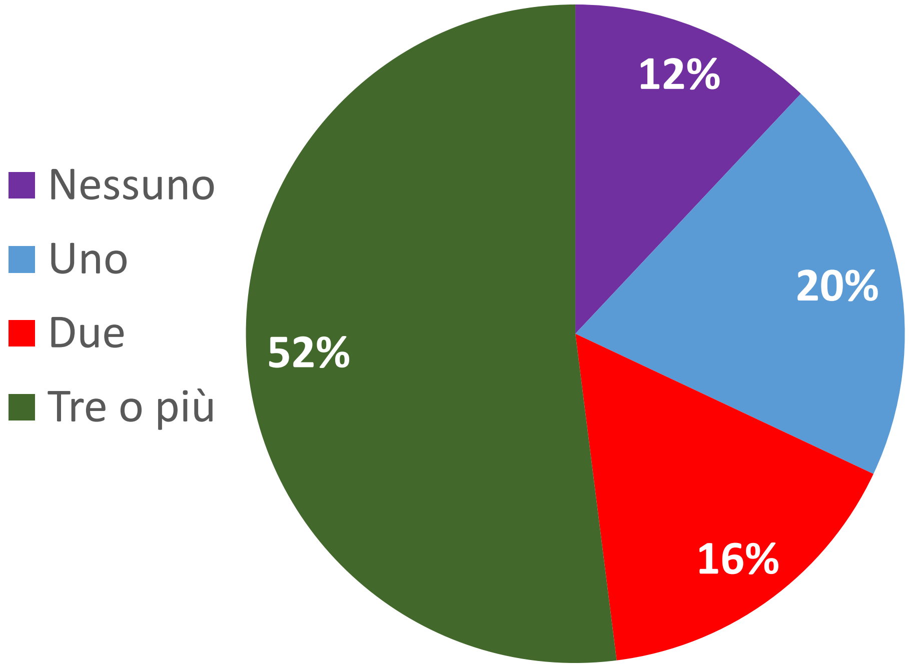

35
30
25
20
15
10
5
0
INFETTI
NON INFETTI
4
3
20
25
8
27
0
2
13
30
2
3
3
2
ANOSSIA
EMORRAGIA
ISCHEMIA
NEOPLASIA
TCE
ENCEFALITE
ALTRA EZIOLOGIA

Pazienti infetti: presidi

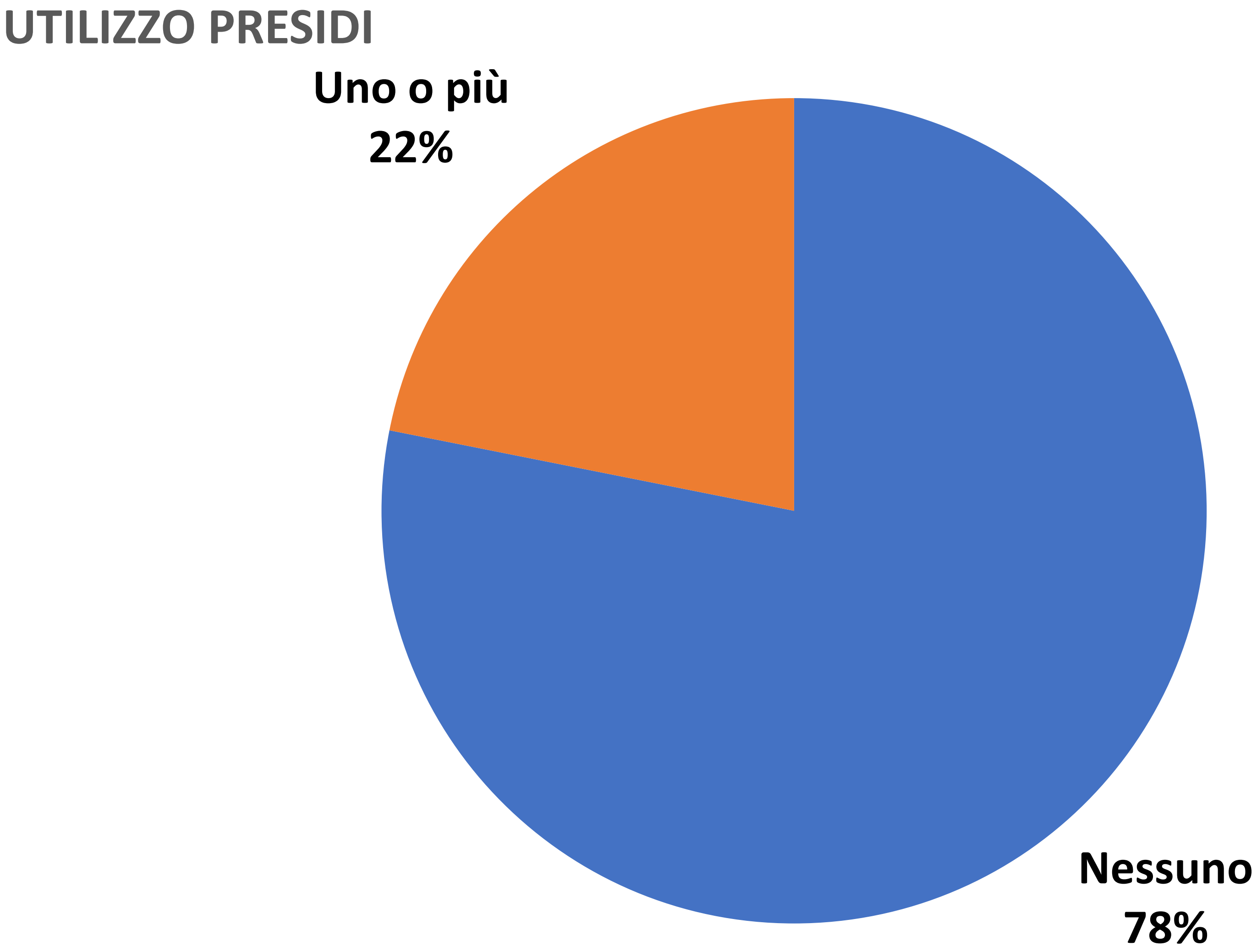


Totale pazienti infetti: **50**

- Pazienti senza presidio: **6 (12%)**
- Pazienti con 1 presidio: **10 (20%)**
- Pazienti con 2 presidi: **8 (16%)**
- Pazienti con ≥ 3 presidi: **26 (52%)**

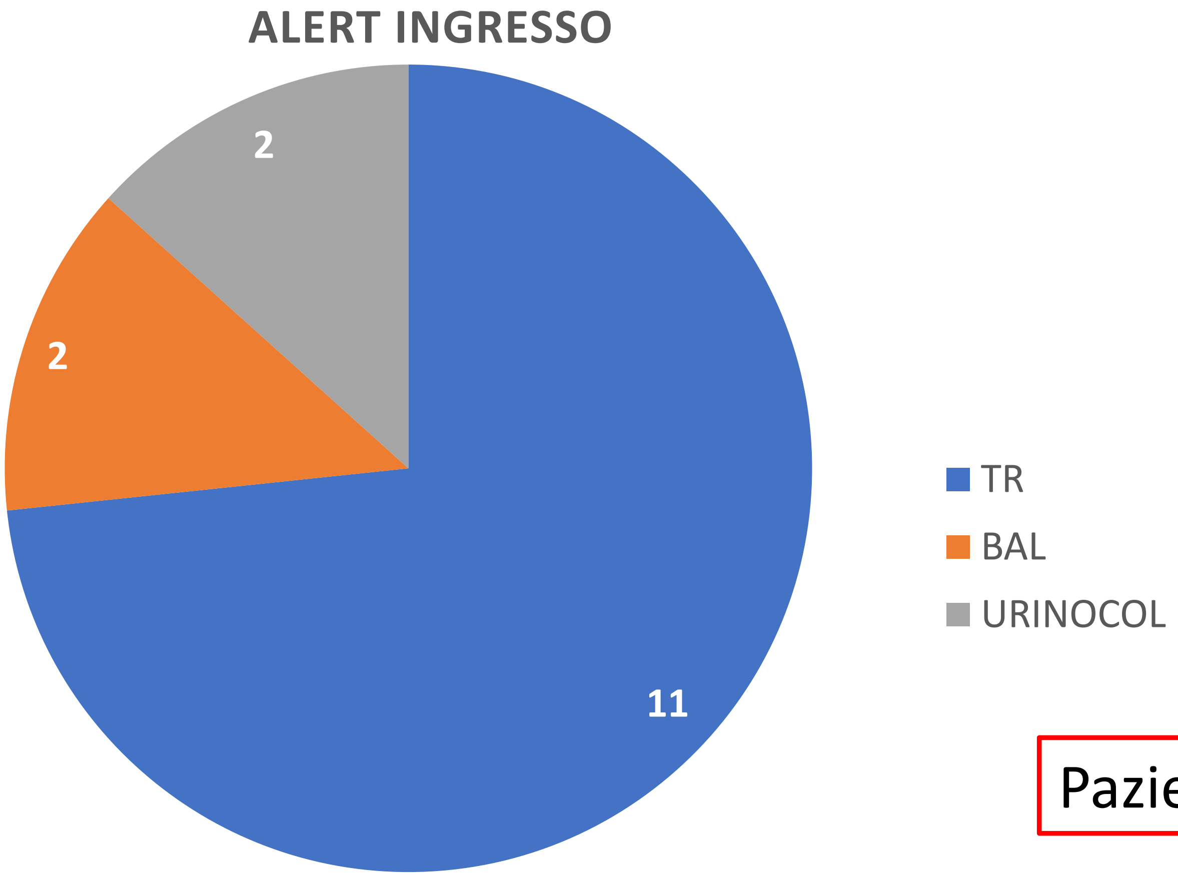


Pazienti non infetti: presidi



Totale pazienti NON infetti: **96**
Totale pazienti con presidio: **21 (22%)**
Totale pazienti senza presidio: **75 (78%)**

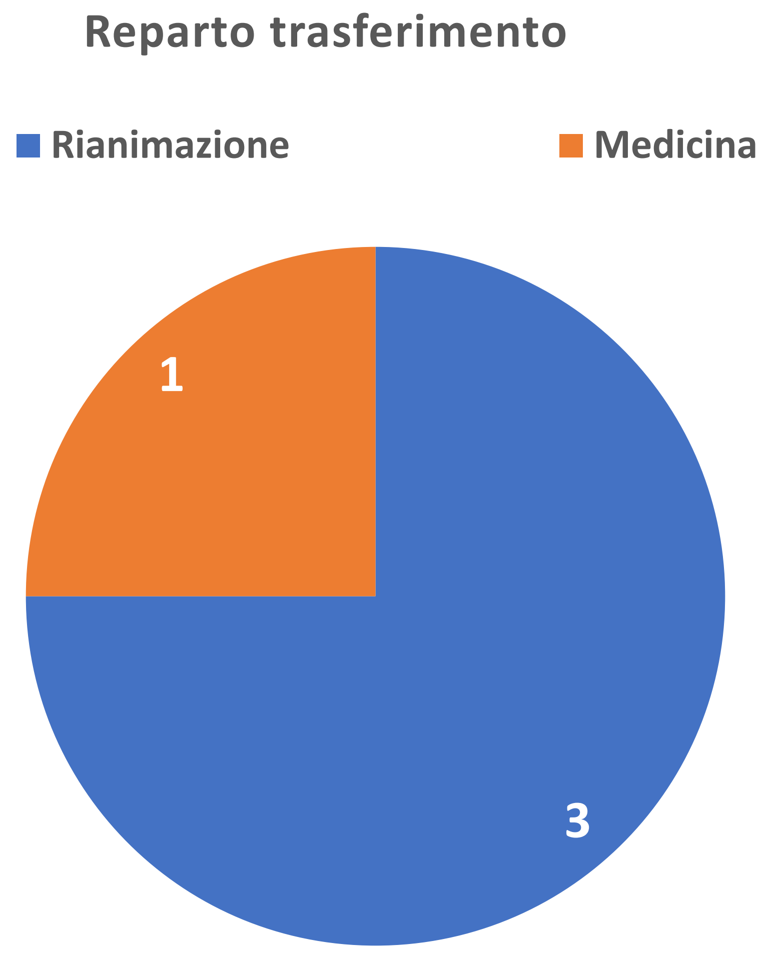
Pazienti alert ingresso



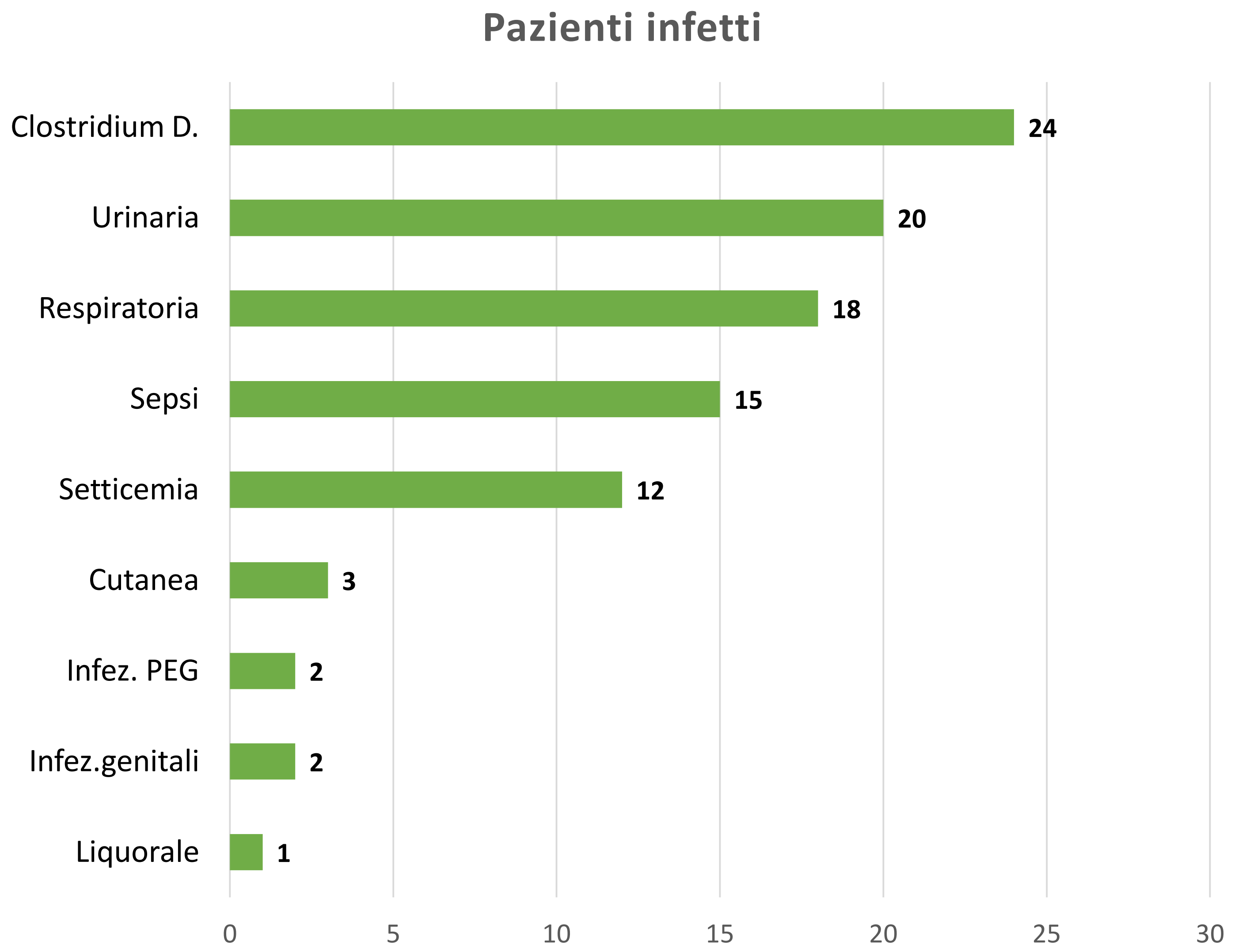
Pazienti alert ingresso 2018: **15**

Pazienti infetti: trasferimenti a reparti per acuti

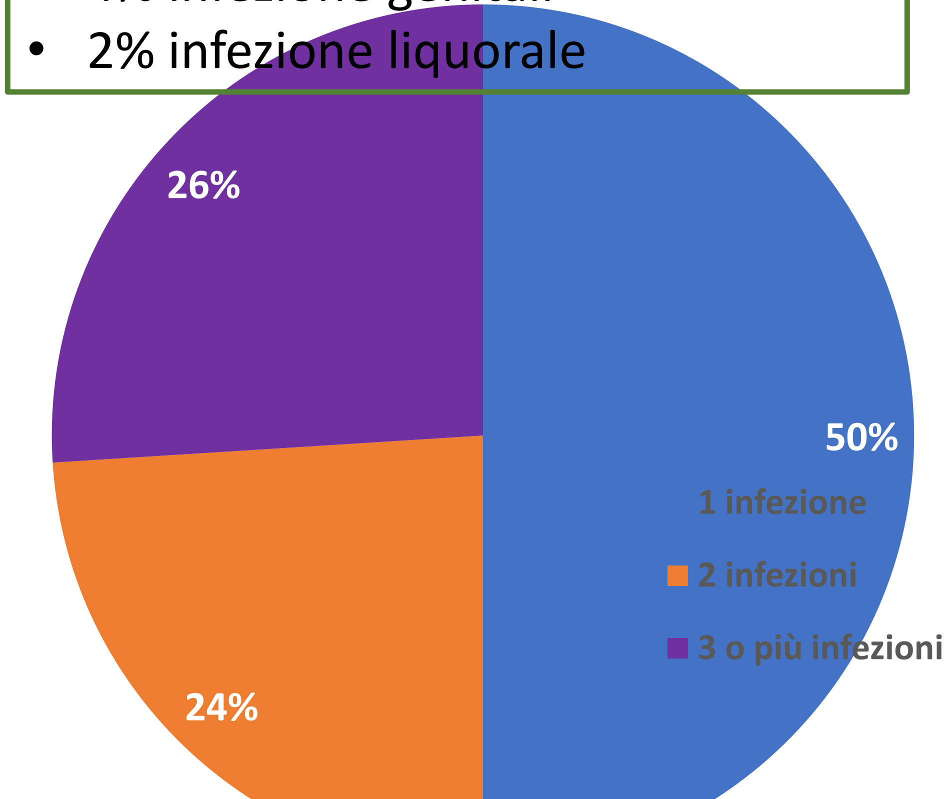
- Totale pazienti infetti: **50**
- Totale pazienti trasferiti in altro reparto per sepsi: **4**



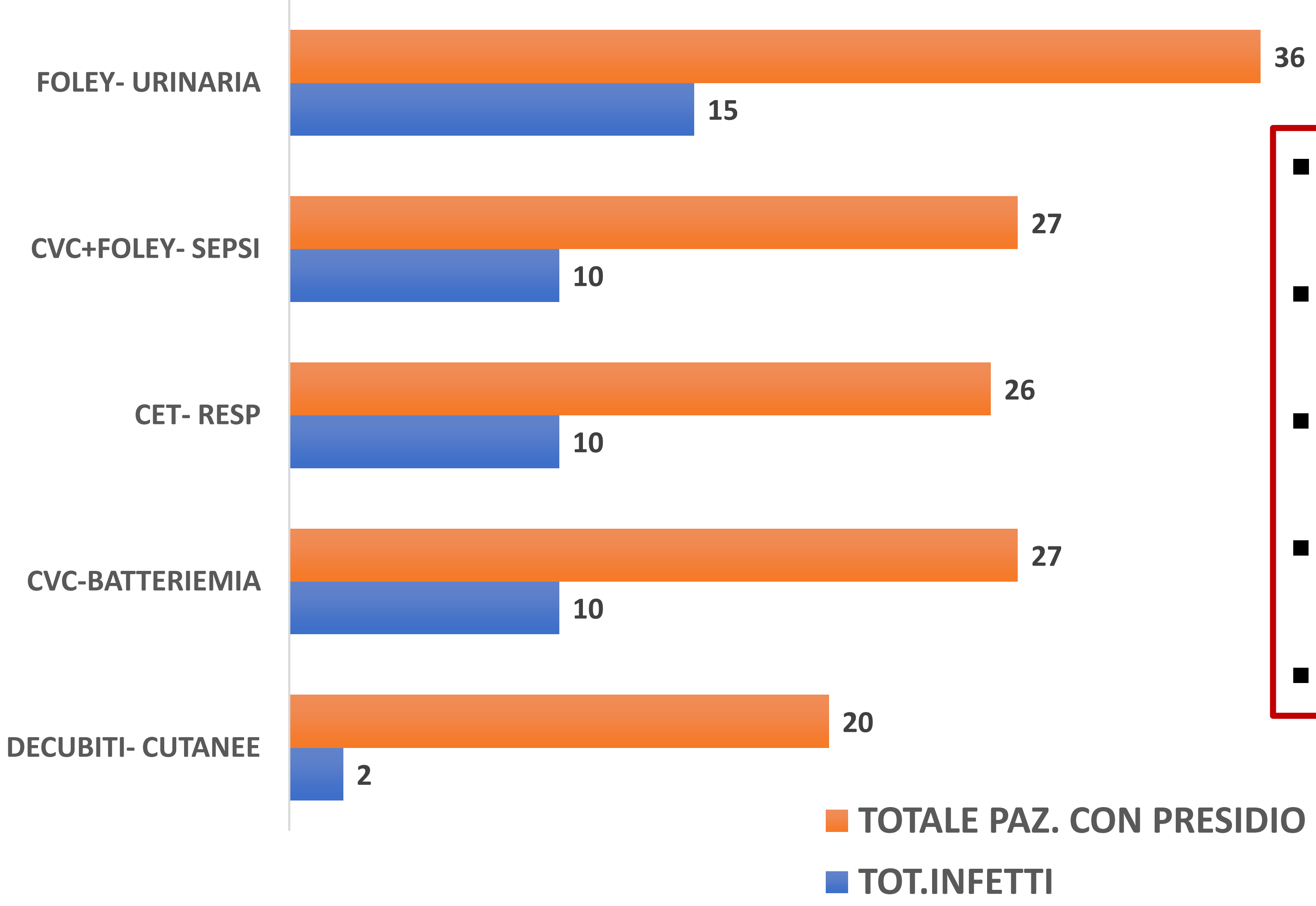
Sede infezione



- 48% Clostridium Difficile
- 40% infezione urinaria
- 36% infezione respiratoria
- 30% sepsi
- 24% setticemia
- 6% infezione cutanea
- 6% infezione PEG
- 4% infezione genitali
- 2% infezione liquorale

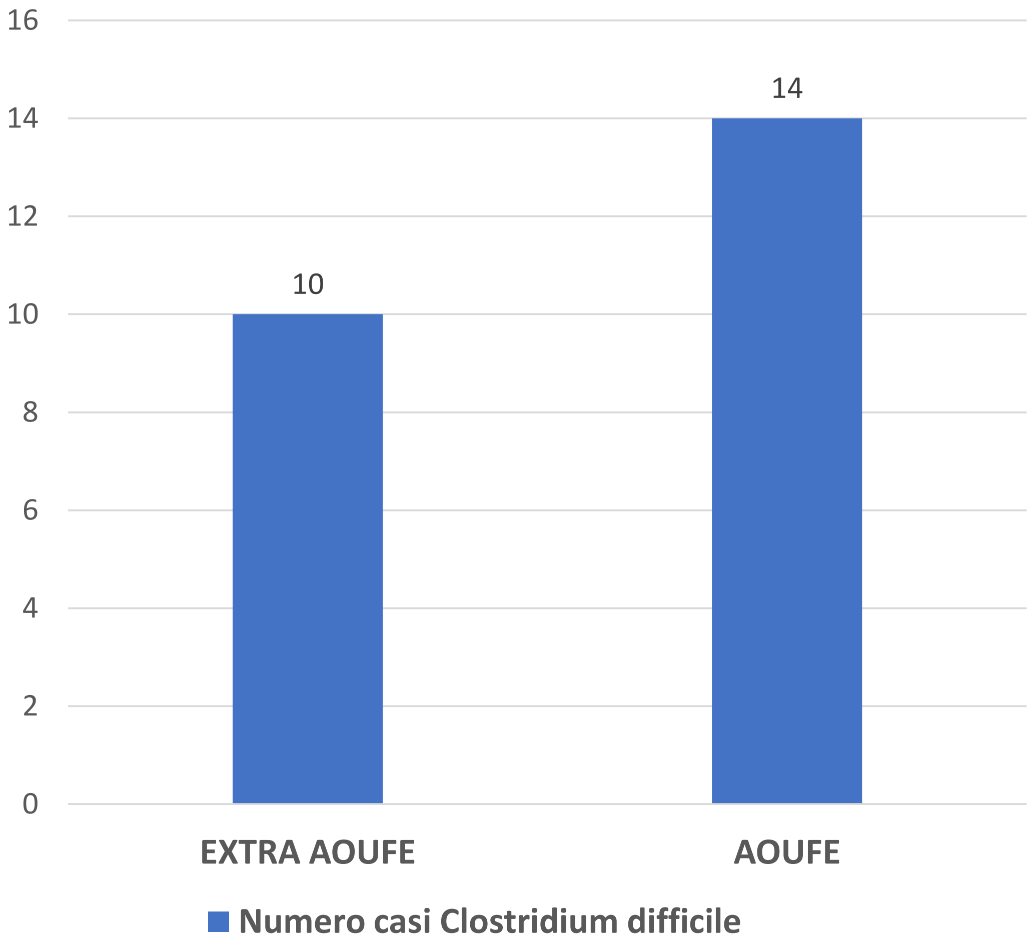


Relazione tra presidi e tipo di infezione



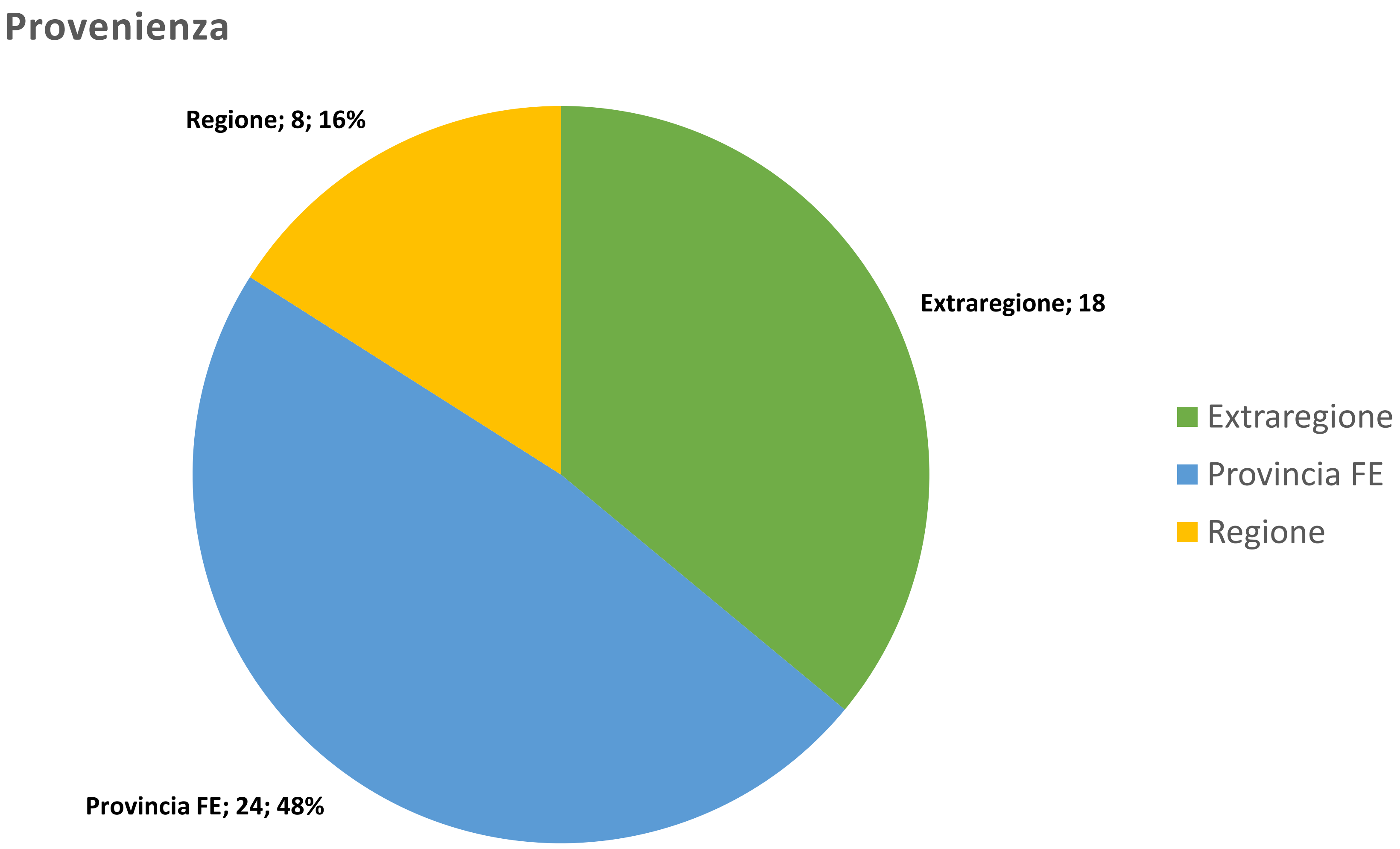
- 41,6% FOLEY- Sede Urinaria
- 40% CVC+FOLEY- Sepsi
- 38% CET- Sede Respiratoria
- 37% CVC- Batteriemia
- 10% LDD- Sede Cutanea

Clostridium difficile

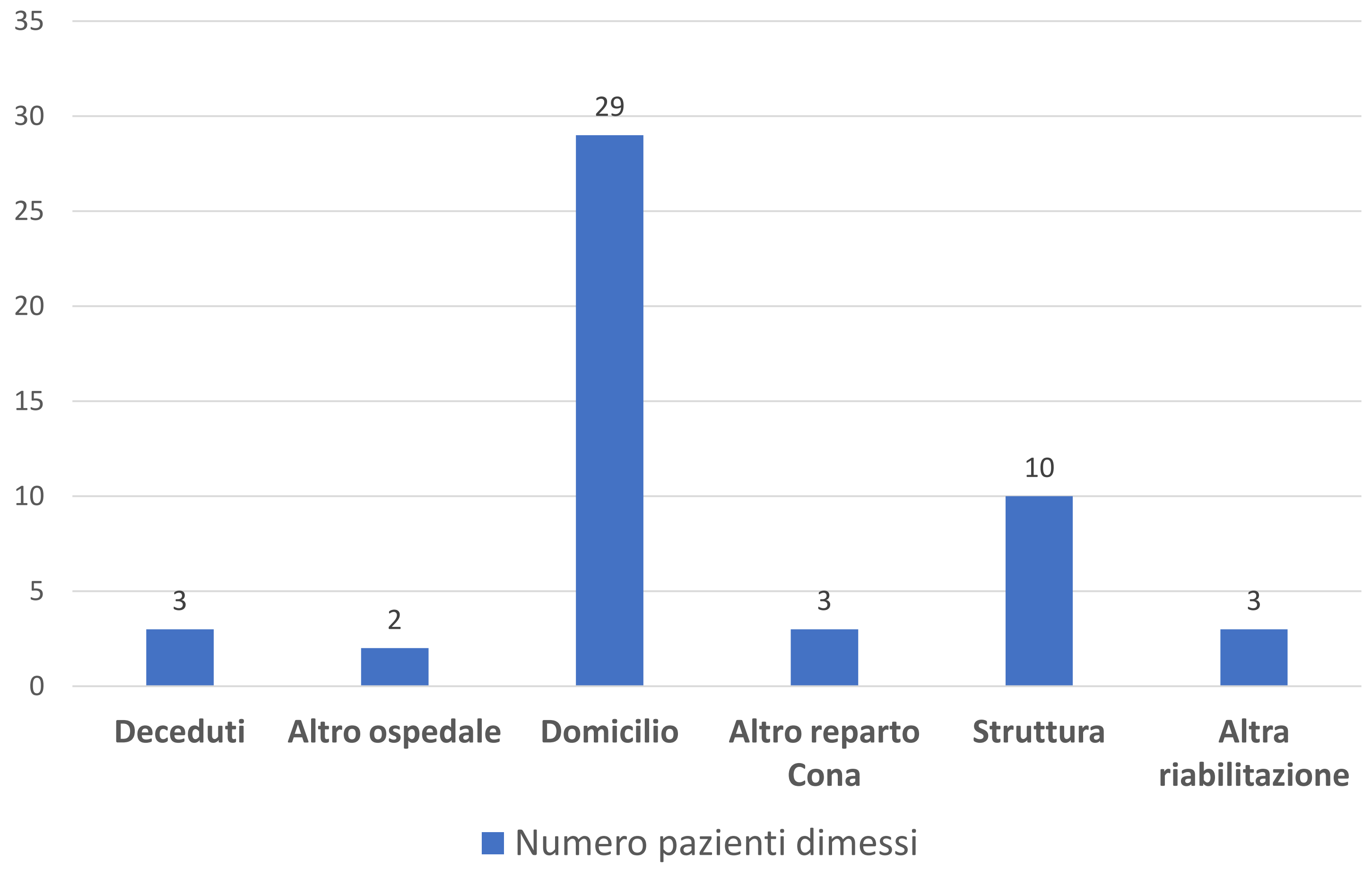


Clostridium difficile
Centers for Disease Control and Prevention

Provenienza pazienti infetti

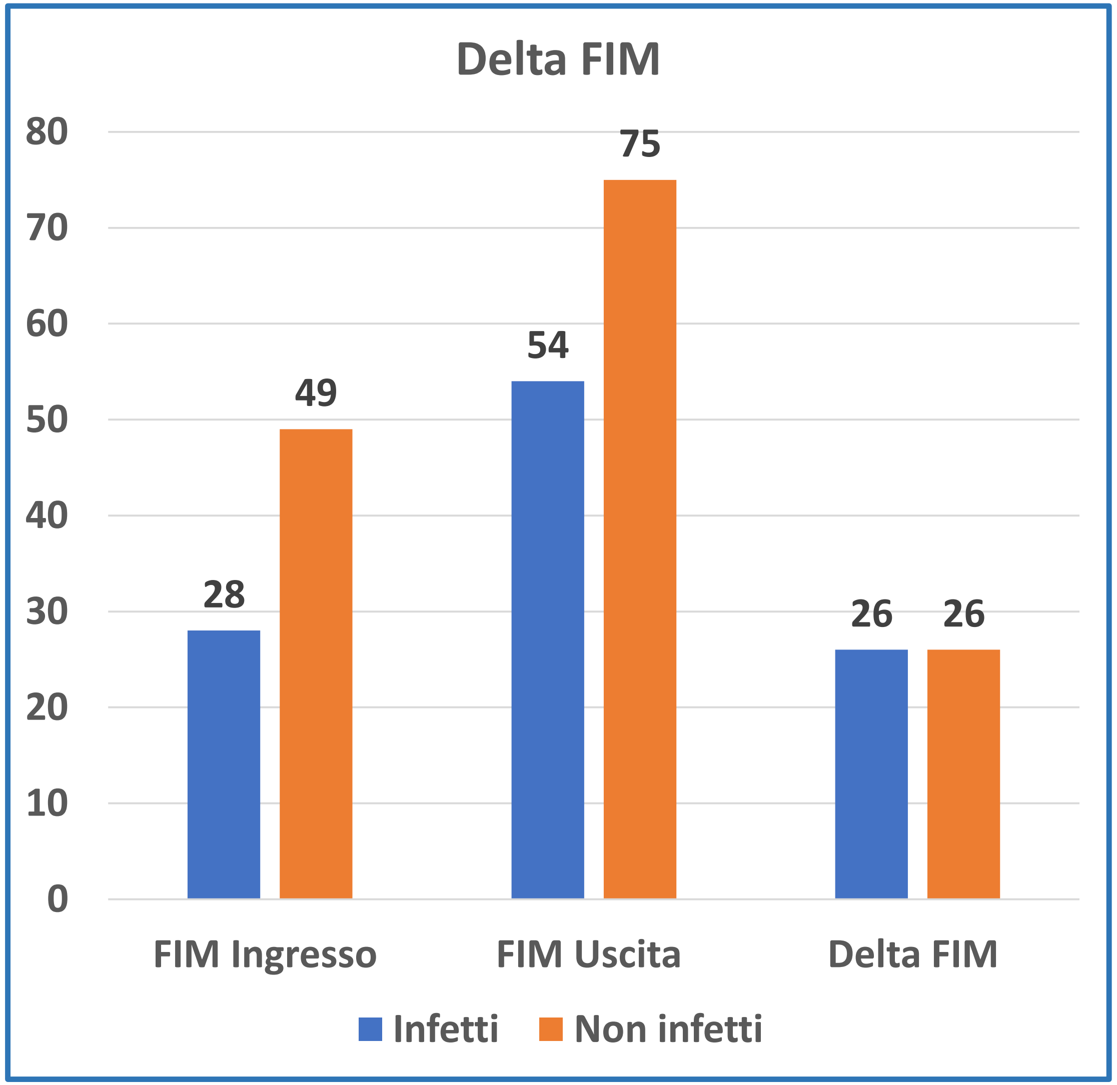


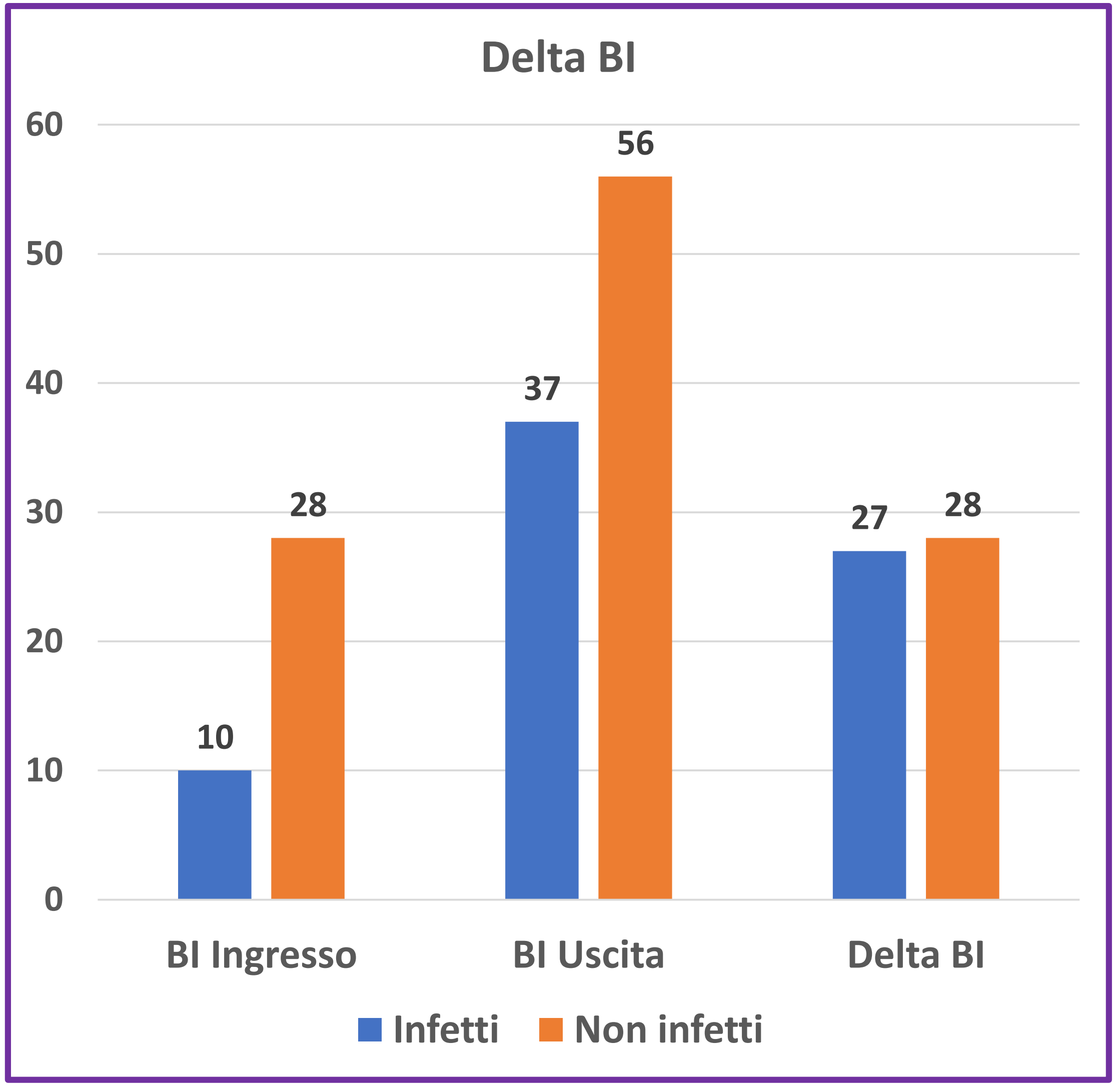
Destinazione alla dimissione pazienti infetti



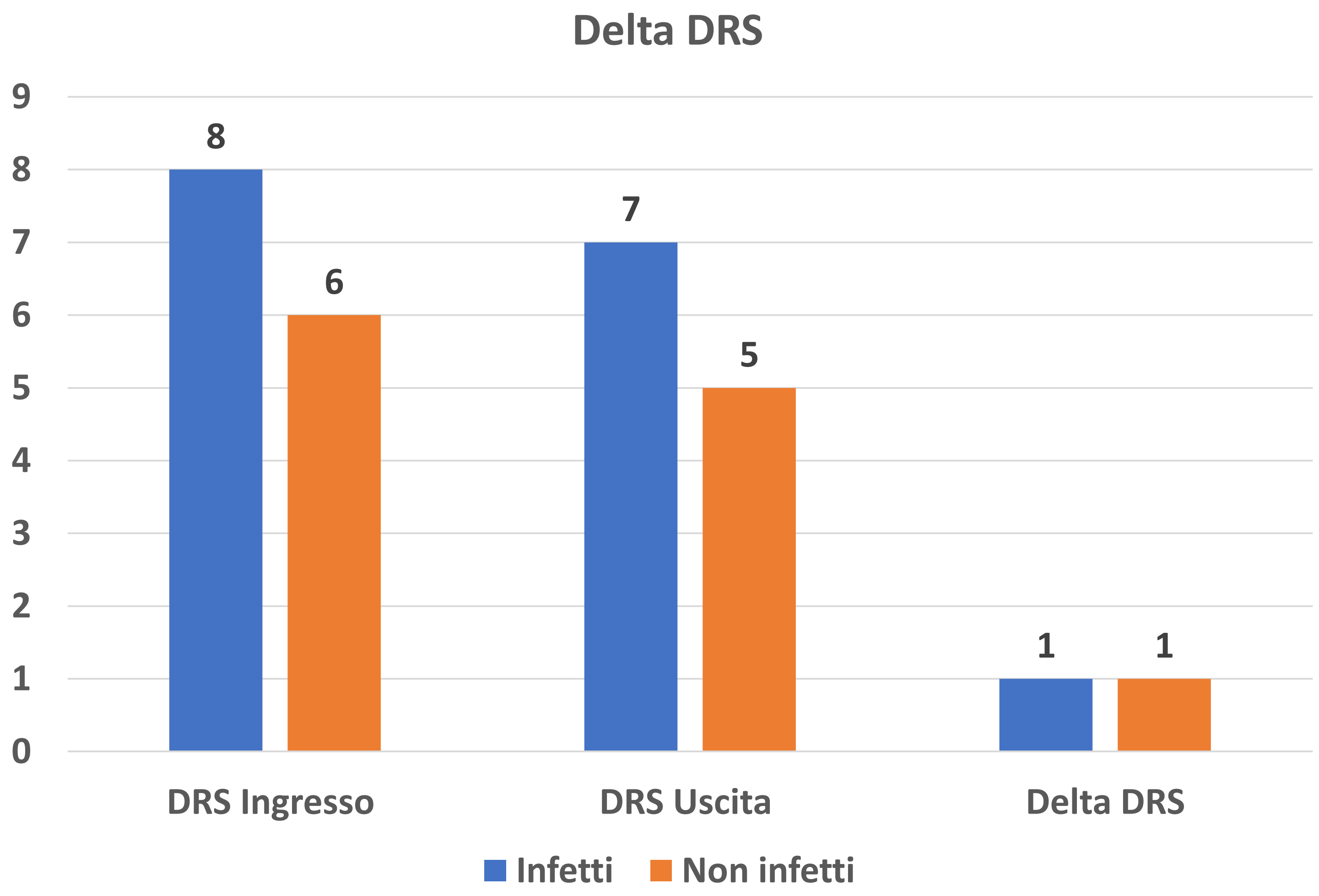
- 6% deceduti
- 3% trasferiti presso altro ospedale
- 58% dimessi a domicilio
- 6% trasferiti presso altro reparto a Cona
- 20% trasferiti in struttura
- 7% trasferiti presso altre strutture riabilitative

Outcome FIM-Barthel Index

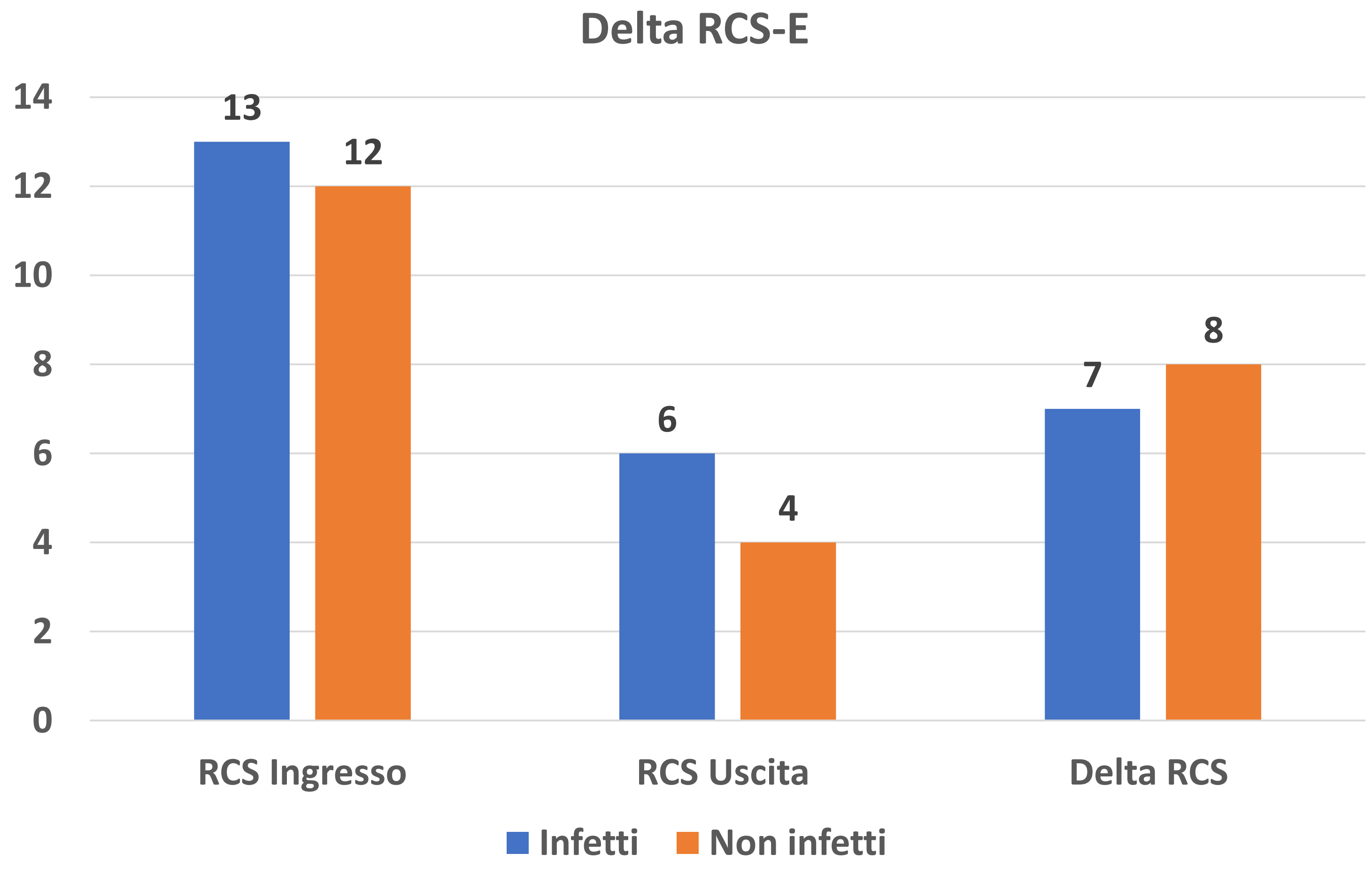




Outcome DRS


Delta DRS
9
8
7
6
5
4
3
2
1
0
8
6
7
5
1
1
DRS Ingresso
DRS Uscita
Delta DRS
Infetti
Non infetti

Complessità clinico-riabilitativa RCS



Conclusioni

analisi osservazionale retrospettiva di 2 anni (2017/2018)

Implementazione analisi prospettica fenomeno infezioni in riabilitazione

Sviluppo di studi multicentrici

Attenzione particolare a variabili specifiche percorso riabilitativo

Grazie per l’attenzione!