**Table 1. Characteristics of the participating hospitals**

|  |  |  |
| --- | --- | --- |
|  | **Geneva University Hospitals** | **Ente Ospedaliero Cantonale** |
| **Lugano (L)** | **Bellinzona (B)** |
| Type of hospital | University tertiary care hospital | Regional hospital |
| Number of acute-care beds in 2019 | 1100 | 306 | 229 |
| Approximate overall admissions to acute-care medicine or surgery wards in 2019 | 26000 | 8000 | 6000 |
| Acute care defined daily doses per 100 patient days, 2017 | 48 | 50 | 42 |
| Electronic health record | In-house development of EHRs and first elements of electronic health records in place since the 1970s, current clinical part of the EHR implemented since 2000 | Based on the in-house system from Geneva University Hospitals |
| Computerised Physician Order Entry | Since 2006 | Since 2016 |
| Antibiotic stewardship activities | Antibiotic-stewardship programme since 2007: local guidelines updated every 2 years; infectious disease consultations on demand; review of positive blood cultures; dedicated rounds in some divisions and real-time review of antibiotic prescriptions (ICU, HSCT, and SOT units); internal and external benchmarking of antibiotic usage and resistance; regular teaching sessions for physicians; advice on therapeutic drug monitoring on demand; no dedicated rounds in geriatric and internal medicine departments; and no real-time review of antibiotic prescriptions in geriatric and internal medicine departments | Local guidelines updated every 2 years; review of every positive blood culture; regular teaching sessions for physicians; realtime review of antibiotic prescriptions during infectious disease specialists rounds, once per week in Lugano and in selected wards in Bellinzona; and advice on therapeutic drug monitoring on demand in Lugano |

EHR=electronic health record. ICU=intensive care units. HSCT=hematopoietic stem cell transplantation. SOT=solid organ transplantation.

**Table 2. Baseline characteristics of the study participants (all admissions to a participating ward, regardless if they received antibiotics during their stay in the ward)**

|  |  |  |  |
| --- | --- | --- | --- |
|  | Control(N= 9673 in 12 clusters) | COMPASS(N= 11384 in 12 clusters) | Total(N= 21057 in 24 clusters) |
| Age, years | 76 (63-85) | 75 (61-84) | 76 (62-85) |
| Gender, Female | 4811 (49.8%) | 5 438 (47.9%) | 10 249 (48.7%) |
| Comorbidities |  |  |  |
| Chronic cardiac disease | 2 774 (28.7%) | 3 641 (32.0%) | 6 415 (30.5%) |
| Chronic lung disease | 2 069 (21.4%) | 2 232 (19.6%) | 4 301 (20.4%) |
| Diabetes | 1 952 (20.2%) | 2132 (18.7%) | 4 084 (19.4%) |
| Chronic kidney disease | 1 865 (19.3%) | 1 979 (17.4%) | 3 844 (18.3%) |
| Neoplasia | 390 (4.0%) | 542 (4.8%) | 932 (4.4%) |
| Chronic liver disease | 272 (2.8%) | 292 (2.6%) | 564 (2.7%) |
| Immunosuppression | 146 (1.5%) | 161 (1.4%) | 307 (1.5%) |
| HIV/AIDS | 2 (<0.1%) | 20 (0.2%) | 22 (0.1%) |

Data are n (%) or median (IQR). All admissions were to a participating ward, regardless of whether they received antibiotics during their stay in the ward.

**Table 3: Summary statistics for the primary outcome for the ITT population and effect of the intervention**

|  |  |  |
| --- | --- | --- |
|  | Control | Computerised decision support system |
| **DOT by admission for the entire population** |
| Number of observations | 9673 | 11384 |
| Mean (SD) | 3.5 (6.8) | 3.2 (6.2) |
| Median (IQR) | 0.0 (0.0-5.0) | 0.0 (0.0-5.0) |
| **DOT by admission only for patients who received antibiotics** |
| Number of observations, n (%) | 4 142 (42.8%) | 4 578 (40.2%) |
| Mean (SD) | 8.1 (8.4) | 7.9 (7.6) |
| Median (IQR) | 6.0 (4.0-10.0) | 6.0 (3.0-10.0) |
| Geometric mean (SD) | 5.8 | 5.6 |
| **Effect of the intervention** | **OR / IRR** | **Lower and Upper 95% CI** |
| Any antibiotic | 1.12 | 0.94 - 1.33 |
| DOT for those who received antibiotics | 0.98 | 0.90 - 1.07 |

DOT=days of therapy

ITT=intention-to-treat

Calculation based on non-missing values. The DOT present the summary based on strictly positive values.

**Table 4. Effect of intervention on qualitative antimicrobial outcomes, clinical outcomes and microbiological outcomes**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Control1(N=572) | Computerised decision support system 1(N=619) | Total1(N=1191) | OR2 | 95% CI |
| **Qualitative antimicrobial outcomes** |
| Appropriate choice of the molecule3 | 337/455 (74.1%) | 370/503 (73.6%) | 707 (73.8%) | 1.03 | 0.71 - 1.49 |
| Appropriate duration | 356/430 (82.8%) | 389/460 (84.6%) | 745 (83.7%) | 1.12 | 0.78 - 1.60 |
| De-escalation performed whenever possible4 | 90/115 (78.3%) | 98/121 (81.0%) | 188 (79.7%) | 1.05 | 0.53 - 2.05 |
| Oral switch by day 7 | 154/201 (76.6%) | 187/215 (87.0%) | 341 (82.0%) | 1.91 | 1.12 - 3.26 |
| Treatment adapted to microbiological results | 203/228 (89.0%) | 228/245 (93.1%) | 431 (91.1%) | 1.60 | 0.83 - 3.07 |
| **Clinical outcomes** |
| 30-day in-hospital mortality N (%) | 368/6142 (6.0%) | 444/7808 (5.7%) | 812 (5.9%) | 1.02 | 0.86- 1.21 |
| Readmission within 18 days N (%) | 413/7 276 (5.7%) | 448/8 680(5.2%) | 861/15 956 (5.4%) | 0.90 | 0.74-1.09 |
| Transfer to ICU or to IMC N (%) | 284/9 619 (3.0%) | 370/11 269 (3.3%) | 654 (2.7%) | 1.20 | 0.80-1.79 |
| Infectious diseases consultation4 N (%) | 405/2 390 (14.5%) | 388/2 889 (14.4%) | 793 (15%) | 0.86 | 0.59-1.25 |
| LOS in the ward5 (median) | 7 | 6 | 6 | 0.95 | 0.84-1.08 |
| **Microbiological outcomes** |
| Facility onset of *Clostridioides difficile* infection per 1000 admissions | 2 | 2.8 | 2.2 | 1.17 | 0.81-1.68 |

ICU= intensive care unit, IMC =intermediate care unit, LOS=length of stay.

Length of stay shows the results of all available data.

*1 Denominators varies by outcomes*

*2 Adjusted*

*3 Assess only indications for which local guidelines are available*

*4 Geneva only, the denominator is admissions receiving antimicrobials*

*5 For the analysis, 0.5 days was added to length of stay and then log-transformed. A linear mixed-effect model was used. Endpoint was log (length of stay plus 0.5). Estimate was then ratio of geometric means.*