SDC Table 1: Baseline characteristics of the study cohort (n=4556) stratified by SSI.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **No SSI** |  | **SSI** | | **P value** | | | **Missing (%)** |
| n | 4328 |  | 228 |  | | | | |
| Age (mean (sd)) | 56.94 | (18.63) | 62.76 | (15.77) | | <0.001 | 0.0 | |
| Sex = Female (%) | 2009 | (46.4) | 84 | (36.8) | | 0.006 | 0.0 | |
| BMI (mean (sd)) | 27.05 | (6.38) | 28.31 | (7.20) | | 0.004 | 1.2 | |
| Smoking = yes (%) | 1063 | (40.6) | 68 | (42.8) | | 0.651 | 39.1 | |
| ASA-class (%) |  |  |  |  | | <0.001 | 0.0 | |
| 1 | 796 | (18.4) | 16 | ( 7.0) | |  |  | |
| 2 | 2329 | (53.8) | 87 | (38.2) | |  |  | |
| 3 | 1157 | (26.7) | 119 | (52.2) | |  |  | |
| 4 | 44 | ( 1.0) | 6 | ( 2.6) | |  |  | |
| Wound class (%) |  |  |  |  | | <0.001 | 0.2 | |
| 1 | 3414 | (79.0) | 135 | (59.2) | |  |  | |
| 2 | 668 | (15.5) | 61 | (26.8) | |  |  | |
| 3 | 190 | ( 4.4) | 24 | (10.5) | |  |  | |
| 4 | 47 | ( 1.1) | 8 | ( 3.5) | |  |  | |
| Insurance type (%) |  |  |  |  | | 0.029 | 0.0 | |
| Private | 504 | (11.6) | 15 | ( 6.6) | |  |  | |
| Semiprivate | 566 | (13.1) | 25 | (11.0) | |  |  | |
| Compulsory | 3257 | (75.3) | 188 | (82.5) | |  |  | |
| Emergency surgery = Emergency (%) | 1708 | (39.5) | 62 | (27.2) | | <0.001 | 0.0 | |
| Department (%) |  |  |  |  | | <0.001 | 0.0 | |
| Visceral Surgery | 2095 | (48.4) | 151 | (66.2) | |  |  | |
| Trauma | 1684 | (38.9) | 39 | (17.1) | |  |  | |
| Vascular Surgery | 549 | (12.7) | 38 | (16.7) | |  |  | |
| OP-length (h) (mean (SD)) | 1.76 | (1.18) | 3.02 | (1.93) | | <0.001 | 0.0 | |
| ICU admission (mean (SD)) | 0.15 | (0.36) | 0.40 | (0.49) | | <0.001 | 0.0 | |
| Pre-op hospitalization (%) |  |  |  |  | | 0.006 | 0.0 | |
| 0 | 1807 | (41.8) | 71 | (31.1) | |  |  | |
| 1 | 1712 | (39.6) | 106 | (46.5) | |  |  | |
| >1 | 809 | (18.7) | 51 | (22.4) | |  |  | |
| Multi-resistant **bacteria** SSI = Yes (%) | 0 | ( 0.0) | 8 | ( 3.5) | | <0.001 | 0.0 | |
| Revision surgery = Yes (%) | 0 | ( 0.0) | 16 | ( 7.0) | | <0.001 | 0.0 | |

SSI: Surgical Site Infection

BMI: Body Mass Iindex

ASA: American Society of Anesthesiologists

OP: Operation

ICU: Intensive Care Unit

SD: Standard Deviation

d: days

SDC Table 2: Analysis of the change in contribution margin over continuous confounders. Estimates show the increase in contribution margin (x1000 CHF) per one unit increase in the relevant predictor. For each predictor an interaction with SSI status is reported, followed by an analysis by SSI status. Estimates represent slopes, assuming a linear association. The 10, 50 and 90th quantiles were assessed.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Level** | **Variable** | **Est. (Tau = 0.1)** | **CI** | **p** | **Est. (Tau = 0.5)** | **CI** | **p** | **Est. (Tau = 0.9)** | **CI** | **p** |
| **Age (cent.)** | Interaction test |  |  | 0.331 |  |  | 0.764 |  |  | 0.065 |
| **No SSI** | (Intercept) | -6.70 | [-7.27; -6.34] | <0.001 | 0.91 | [0.77; 1.11] | <0.001 | 8.45 | [7.92; 8.80] | <0.001 |
|  | Age (year) | -0.08 | [-0.10; -0.06] | <0.001 | 0.01 | [-0.00; 0.02] | 0.132 | 0.03 | [0.02; 0.06] | 0.002 |
| **SSI** | (Intercept) | -28.64 | [-44.06; -23.25] | <0.001 | -2.01 | [-4.16; -0.69] | 0.062 | 13.90 | [11.54; 18.18] | <0.001 |
|  | Age (year) | -0.57 | [-0.77; 0.42] | 0.092 | 0.01 | [-0.08; 0.11] | 0.868 | 0.23 | [0.01; 0.36] | 0.046 |
| **BMI (cent.)** | Interaction test |  |  | 0.113 |  |  | 0.191 |  |  | 0.071 |
| **No SSI** | (Intercept) | -6.68 | [-7.34; -6.19] | <0.001 | 0.91 | [0.75; 1.07] | <0.001 | 8.17 | [7.85; 8.54] | <0.001 |
|  | BMI | -0.02 | [-0.14; 0.04] | 0.614 | 0.02 | [-0.01; 0.05] | 0.163 | 0.07 | [0.04; 0.10] | <0.001 |
| **SSI** | (Intercept) | -35.49 | [-44.84; -27.59] | <0.001 | -2.04 | [-4.08; -0.43] | 0.024 | 14.20 | [11.61; 18.95] | <0.001 |
|  | BMI | 0.80 | [-0.59; 1.25] | 0.011 | -0.21 | [-0.49; 0.15] | 0.270 | -0.46 | [-0.54; 0.08] | 0.028 |
| **OP-time** | Interaction test |  |  | 0.009 |  |  | <0.001 |  |  | 0.529 |
| **No SSI** | (Intercept) | -5.46 | [-5.89; -5.17] | <0.001 | 0.94 | [0.74; 1.11] | <0.001 | 7.83 | [7.55; 8.20] | <0.001 |
|  | OP-time (h) | -2.98 | [-3.39; -2.50] | <0.001 | -0.65 | [-0.89; -0.35] | <0.001 | 1.81 | [1.24; 2.34] | <0.001 |
| **SSI** | (Intercept) | -16.65 | [-28.98; -14.09] | <0.001 | -0.03 | [-1.04; 1.83] | 0.968 | 13.68 | [10.01; 24.08] | <0.001 |
|  | OP-time (h) | -8.38 | [-12.32; -5.99] | <0.001 | -2.79 | [-3.98; -1.64] | <0.001 | 0.97 | [-3.14; 4.29] | 0.589 |

SSI Surgical Site Infection

BMI Body Mass Index

SDC Table 3: Summary of the effect of predictors which can appear only in SSI patients and their contribution over that of SSI contribution margin (x1000 CHF). The 10, 50 and 90th quantiles assessed.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Level** | **Variable** | **Est. (Tau = 0.1)** | **CI** | **p** | **Est. (Tau = 0.5)** | **CI** | **p** | **Est. (Tau = 0.9)** | **CI** | **p** |
| Multi-resistant **bacteria** | (Intercept) | -6.75 | [-7.32; -6.28] | <0.001 | 0.89 | [0.76; 1.06] | <0.001 | 8.29 | [7.96; 8.71] | <0.001 |
|  | Multiresistant **bacteria**= Yes | -120.08 | [-Inf; -17.70] | 0.02 | -26.24 | [-49.52; -19.87] | 0.014 | -23.32 | [-38.05; Inf] | 0.008 |
|  | SSI | -25.01 | [-34.76; -16.10] | <0.001 | -2.7 | [-4.75; -1.09] | 0.002 | 7.2 | [4.00; 10.19] | <0.001 |
| Revision surgery | (Intercept) | -6.75 | [-7.32; -6.28] | <0.001 | 0.89 | [0.76; 1.06] | <0.001 | 8.29 | [7.96; 8.71] | <0.001 |
|  | Revision surgery= Yes | -29.66 | [-Inf; -14.10] | 0.49 | -12.72 | [-43.36; 3.95] | 0.383 | 39.44 | [2.06; Inf] | 0.186 |
|  | SSI | -23.84 | [-34.76; -15.57] | <0.001 | -2.83 | [-4.83; -1.33] | <0.001 | 5.54 | [2.57; 8.40] | 0.001 |

SDC Table 4 Multiple regressions for the effects of various confounders and SSI status on the median contribution margin (x1000 CHF). The full model includes all interactions determined to be relevant; the ’No interactions’ model excludes the interactions. Models are nested.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Model** | **Full** | | | **No interactions** | | |
| **Variable** | Est. (Tau = 0.5) | CI | p | Est. (Tau = 0.5) | CI | p |
| **(Intercept)** | -0.76 | [-1.09; -0.41] | <0.001 | -0.75 | [-1.12; -0.35] | <0.001 |
| **Age (year)** | -0.02 | [-0.03; -0.02] | <0.001 | -0.02 | [-0.03; -0.02] | <0.001 |
| **BMI** | 0.03 | [0.00; 0.05] | 0.023 | 0.03 | [0.00; 0.05] | 0.014 |
| **Hosp. entry= Emergency** | -1.09 | [-1.33; -0.76] | <0.001 | -1.13 | [-1.42; -0.83] | <0.001 |
| **Pre-OP LOS (d)= 1** | 0.22 | [-0.15; 0.45] | 0.156 | 0.24 | [-0.13; 0.54] | 0.124 |
| **Pre-OP LOS (d)= >1** | -0.87 | [-1.42; -0.46] | <0.001 | -0.86 | [-1.32; -0.41] | <0.001 |
| **Multiresistant** bacteria**= Yes** | -29.40 | [-48.28; -8.17] | 0.012 | -25.22 | [-51.09; -13.76] | 0.044 |
| **Revision surgery= Yes** | 9.63 | [-17.38; 18.49] | 0.440 | 0.11 | [-26.31; 14.54] | 0.992 |
| **Wound class2** | 1.36 | [0.82; 1.83] | <0.001 | 1.31 | [0.78; 1.84] | <0.001 |
| **Wound class3** | 0.44 | [-0.08; 1.01] | 0.144 | 0.44 | [-0.13; 1.01] | 0.082 |
| **Wound class4** | 0.46 | [-0.17; 1.91] | 0.374 | 0.38 | [-0.31; 1.95] | 0.547 |
| **Department= Traumatology** | 0.66 | [0.40; 1.00] | <0.001 | 0.67 | [0.43; 1.00] | <0.001 |
| **Department= Vascular Surgery** | 3.53 | [2.85; 4.64] | <0.001 | 3.73 | [2.91; 4.70] | <0.001 |
| **OP-time (h)** | -0.70 | [-0.92; -0.51] | <0.001 | -0.79 | [-1.04; -0.61] | <0.001 |
| **SSI** | -0.39 | [-2.12; 1.47] | 0.637 | -1.76 | [-3.37; -0.39] | 0.019 |
| **ASA = 2** | 0.19 | [-0.18; 0.49] | 0.304 | 0.18 | [-0.25; 0.53] | 0.337 |
| **ASA = 3** | 0.47 | [0.04; 0.99] | 0.072 | 0.41 | [-0.14; 0.95] | 0.142 |
| **ASA = 4** | 0.46 | [-5.18; 2.28] | 0.829 | 0.65 | [-4.25; 2.78] | 0.752 |
| **Had ICU admission** | -0.30 | [-1.01; 0.25] | 0.413 | -0.66 | [-1.35; 0.11] | 0.080 |
| **Insurance= Private** | 4.46 | [4.22; 4.79] | <0.001 | 4.51 | [4.23; 4.93] | <0.001 |
| **Insurance= Semiprivate** | 3.63 | [3.31; 4.00] | <0.001 | 3.71 | [3.40; 4.13] | <0.001 |
| **OP-time (h):SSI** | -0.72 | [-2.54; 0.37] | 0.404 |  |  |  |
| **SSI:ASA = 2** | 1.00 | [-2.17; 4.32] | 0.593 |  |  |  |
| **SSI:ASA = 3** | -2.92 | [-7.43; -1.34] | 0.080 |  |  |  |
| **SSI:ASA = 4** | 3.60 | [-8.00; 10.53] | 0.804 |  |  |  |
| **SSI:Had ICU admission** | -6.94 | [-11.63; -1.85] | 0.008 |  |  |  |
| **SSI:Insurance= Private** | 8.40 | [2.98; 23.79] | 0.127 |  |  |  |
| **SSI:Insurance= Semiprivate** | 5.34 | [2.51; 10.05] | 0.017 |  |  |  |

LOS Length of Stay

ICU Intensive Care Unit

SSI Surgical Site Infection

ASA American Society of Anesthesiologists

BMI Body Mass Index

SDC Table 5A: Multiple regressions for the effects of various confounders and SSI status on the *10th percentile* of the income-costs balance (x1000 CHF) excluding variables only relevant for patients with SSI. The full model includes all interactions determined to be relevant; the ’No interactions’ model excludes the interactions. Models are nested.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Model** | **Full (no spec.)** | | | **No interactions** | | |
| **Variable** | Est. (Tau = 0.1) | CI | p | Est. (Tau = 0.1) | CI | p |
| **(Intercept)** | -4.71 | [-5.27; -4.09] | <0.001 | -4.64 | [-5.22; -4.06] | <0.001 |
| **Age (year)** | -0.05 | [-0.07; -0.03] | <0.001 | -0.05 | [-0.07; -0.03] | <0.001 |
| **BMI** | 0.00 | [-0.07; 0.06] | 0.896 | 0.00 | [-0.06; 0.07] | 0.944 |
| **Hosp. entry= Emergency** | -2.59 | [-3.63; -1.54] | <0.001 | -2.19 | [-3.33; -1.16] | <0.001 |
| **Pre-OP LOS (d)= 1** | 0.82 | [-0.16; 1.53] | 0.074 | 0.71 | [-0.42; 1.51] | 0.085 |
| **Pre-OP LOS (d)= >1** | -2.74 | [-4.68; -0.57] | 0.017 | -3.21 | [-5.14; -0.74] | 0.007 |
| **Wound class2** | 0.01 | [-0.76; 0.71] | 0.980 | -0.03 | [-0.94; 0.62] | 0.953 |
| **Wound class3** | 0.89 | [-0.16; 1.75] | 0.156 | 0.69 | [-0.21; 1.78] | 0.305 |
| **Wound class4** | 1.25 | [-42.41; 2.63] | 0.850 | 1.15 | [-41.53; 2.66] | 0.790 |
| **Department= Traumatology** | -0.50 | [-1.32; 0.49] | 0.252 | -0.51 | [-1.37; 0.44] | 0.202 |
| **Department= Vascular Surgery** | 1.26 | [-0.16; 2.39] | 0.059 | 1.36 | [0.11; 2.68] | 0.049 |
| **OP-time (h)** | -1.78 | [-2.13; -1.54] | <0.001 | -1.86 | [-2.21; -1.56] | <0.001 |
| **SSI** | -1.02 | [-Inf; 0.92] | 0.834 | -19.96 | [-26.36; -12.36] | <0.001 |
| **ASA = 2** | -0.09 | [-0.72; 0.59] | 0.785 | -0.12 | [-0.66; 0.50] | 0.707 |
| **ASA = 3** | -0.69 | [-1.89; 0.26] | 0.257 | -0.76 | [-1.65; 0.57] | 0.202 |
| **ASA = 4** | 1.64 | [-20.71; 2.78] | 0.651 | 1.68 | [-6.27; 3.83] | 0.541 |
| **Had ICU admission** | -6.64 | [-9.31; -4.18] | <0.001 | -7.73 | [-11.25; -5.49] | <0.001 |
| **Insurance= Privat** | 6.00 | [5.39; 6.58] | <0.001 | 6.01 | [5.37; 6.73] | <0.001 |
| **Insurance= Halbprivat** | 4.64 | [3.96; 5.18] | <0.001 | 4.62 | [3.82; 5.30] | <0.001 |
| **OP-time (h):SSI** | -2.08 | [-5.69; 0.82] | 0.293 |  |  |  |
| **SSI:ASA = 2** | -2.81 | [-8.30; Inf] | 0.588 |  |  |  |
| **SSI:ASA = 3** | -12.23 | [-15.59; Inf] | 0.034 |  |  |  |
| **SSI:ASA = 4** | -18.16 | [-Inf; 6.46] | 0.133 |  |  |  |
| **SSI:Had ICU admission** | -15.41 | [-34.65; -1.48] | 0.051 |  |  |  |
| **SSI:Insurance= Private** | 12.78 | [-Inf; 20.18] | 0.036 |  |  |  |
| **SSI:Insurance= Semiprivate** | 6.37 | [-Inf; 16.39] | 0.163 |  |  |  |

LOS Length of Stay

ICU Intensive Care Unit

SSI Surgical Site Infection

ASA American Society of Anesthesiologists

BMI Body Mass Index

SDC Table 5B: Multiple regressions for the effects of various confounders and SSI status on the *90th percentile* of the income-costs balance (x1000 CHF) excluding variables only relevant for patients with SSI. The full model includes all interactions determined to be relevant; the ’No interactions’ model excludes the interactions. Models are nested.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Model** | **Full (no spec.)** | | | **No interactions** | | |
| **Variable** | Est. (Tau = 0.9) | CI | p | Est. (Tau = 0.9) | CI | p |
| **(Intercept)** | 2.89 | [2.10; 4.03] | <0.001 | 2.78 | [2.10; 4.02] | <0.001 |
| **Age (year)** | -0.04 | [-0.06; -0.02] | <0.001 | -0.04 | [-0.06; -0.01] | <0.001 |
| **BMI** | -0.03 | [-0.07; 0.03] | 0.234 | -0.03 | [-0.06; 0.02] | 0.304 |
| **Hosp. entry= Emergency** | -0.85 | [-1.73; 0.17] | 0.073 | -0.84 | [-1.77; 0.24] | 0.104 |
| **Pre-OP LOS (d)= 1** | 0.54 | [0.05; 1.37] | 0.162 | 0.63 | [-0.04; 1.56] | 0.123 |
| **Pre-OP LOS (d)= >1** | 0.49 | [-0.28; 1.86] | 0.397 | 0.50 | [-0.37; 1.90] | 0.382 |
| **Wound class2** | 2.94 | [1.76; 4.41] | <0.001 | 2.95 | [1.79; 4.45] | <0.001 |
| **Wound class3** | -0.30 | [-1.51; 2.19] | 0.765 | -0.18 | [-1.65; 2.11] | 0.847 |
| **Wound class4** | 6.02 | [-0.97; 9.40] | 0.022 | 6.22 | [1.08; 9.52] | 0.140 |
| **Department= Traumatology** | 0.69 | [-0.24; 1.57] | 0.147 | 0.75 | [-0.30; 1.64] | 0.144 |
| **Department= Vascular Surgery** | 7.35 | [5.44; 9.85] | <0.001 | 6.84 | [5.17; 9.11] | <0.001 |
| **OP-time (h)** | 1.12 | [0.52; 1.54] | <0.001 | 1.09 | [0.54; 1.59] | <0.001 |
| **SSI** | 0.43 | [-2.05; Inf] | 0.824 | 3.60 | [0.92; 7.00] | 0.008 |
| **ASA = 2** | 1.58 | [0.74; 2.22] | <0.001 | 1.55 | [0.67; 2.21] | <0.001 |
| **ASA = 3** | 3.98 | [2.66; 5.21] | <0.001 | 3.85 | [2.31; 4.81] | <0.001 |
| **ASA = 4** | 4.04 | [1.27; 8.19] | 0.060 | 5.69 | [0.85; 8.20] | 0.013 |
| **Had ICU admission** | 1.02 | [-0.25; 2.94] | 0.276 | 1.52 | [0.11; 3.39] | 0.132 |
| **Insurance= Private** | 3.45 | [2.75; 4.37] | <0.001 | 3.61 | [3.01; 4.88] | <0.001 |
| **Insurance= Semiprivat** | 2.75 | [2.06; 4.50] | <0.001 | 2.82 | [2.18; 4.35] | <0.001 |
| **OP-time (h):SSI** | -1.26 | [-4.50; 2.54] | 0.328 |  |  |  |
| **SSI:ASA = 2** | 3.68 | [-Inf; 9.43] | 0.286 |  |  |  |
| **SSI:ASA = 3** | -2.08 | [-Inf; 3.83] | 0.519 |  |  |  |
| **SSI:ASA = 4** | 45.36 | [-5.55; Inf] | 0.092 |  |  |  |
| **SSI:Had ICU admission** | 5.83 | [-4.52; 22.05] | 0.390 |  |  |  |
| **SSI:Insurance= Private** | 36.05 | [19.79; Inf] | 0.009 |  |  |  |
| **SSI:Insurance= Semiprivate** | 1.33 | [-4.92; Inf] | 0.808 |  |  |  |

LOS Length of Stay

ICU Intensive Care Unit

SSI Surgical Site Infection

ASA American Society of Anesthesiologists

BMI Body Mass Index

SDC Figure 1: Scatter plots for the association of income-costs balance by continuous variables according to the presence of SSI. BMI is centered on its overall mean, and OP- time on its overall median



bmi c.i.: body mass index centered on mean

op.time:c: operation duration centered on median

SDC Figure 2 Association of length of stay and contribution margin, stratified by SSI status. Lines are LOESS smoothers



SDC Figure 3: Fit of NHS Cost and Tarif in US$



SDC Figure 4: Multivariable Model (Standard least squares) of influence of different confounders on contribution margin in 3893 patients in the NHS simulation cohort

| **Confounder** | **Log-Worth\*** |  | **P-Value** |
| --- | --- | --- | --- |
| ICU admission | 63,218 |  | 0,00000 |
| SSI | 2,716 |  | 0,00192 |
| Higher ASA Class | 1,706 |  | 0,01966 |
| BMI (centered) | 0,961 |  | 0,10944 |
| Age (centered) | 0,651 |  | 0,22347 |
| Sex | 0,017 |  | 0,96108 |
| Insurance class | . |  | . |

\* LogWorth for the model effect defined as -log10(*p*-value), A value that exceeds 2 is significant at the 0.01 level (because  - log10(0.01)=2).

ICU Intensive Care Unit

SSI Surgical Site Infection

ASA American Society of Anesthesiologists

BMI Body Mass Index

SDC Figure 5: Multivariable model of the balance between Swiss and NHS England simulated contribution margin in 2933 patients with compulsory insurance

| **Source** | **Log-Worth\*** |  | **P-Value** |
| --- | --- | --- | --- |
| ICU admission | 9,756 |  | 0,00000 |
| SSI | 7,291 |  | 0,00000 |
| Higher ASA Class | 4,218 |  | 0,00006 |
| BMI (centered) | 2,506 |  | 0,00312 |
| Age (centered) | 1,783 |  | 0,01650 |
| Sex | 1,183 |  | 0,06563 |

\* LogWorth for the model effect is defined as -log10(*p*-value), A value that exceeds 2 is significant at the 0.01 level (because  - log10(0.01)=2).

ICU Intensive Care Unit

SSI Surgical Site Infection

ASA American Society of Anesthesiologists

BMI Body Mass Index