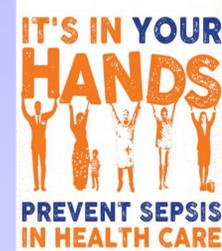




Hand Hygiene As A "Gold Standard" Of Infection Control Program In The Neuro-ICU

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BACKGROUND

Healthcare-associated infections (HAIs) negatively influence patients' outcomes by increasing the length of stay, healthcare cost, and lethality. The economic burden of HAIs in Russia is estimated at \$160-200 million per year. Broadly accepted that hand hygiene is an essential part of the hospital infection control and prevention (IPC) program. A study goal was to demonstrate the correlation between the hand hygiene compliance and the rate of HAIs in the neuro-ICU.

RESULTS

The rate of CNS infections decreased from a high of 15.8% (95% CI 13.8-17.8) in 2011 to 8% (95% CI 6.7-9.3) in 2017. The rate of bloodstream HAI decreased from 6.3% (95% CI 5-7.6) in 2011 to 3.4% (95% CI 2.6-4.2) in 2017. The rate of VAP had a declining tendency: it dropped from 34.3% (95% CI 29.2-39.4) in 2011 to 25.9% (95% CI 21.8-30.1) in 2017 (The 2011-2016 data shown at Figure 1 was published at [3]). The adherence to hand hygiene among the neuro-ICU staff significantly increased from 27% in 2011 to 81% in 2017 (Figure 2).

MATERIALS AND METHODS

A prospective observational study lasted for seven years (2011-2017) and included 2,607 patients staying in the neuro-ICU for >48 hours (Table 1). The case of HAI was defined based on a 2008 CDC guideline [1]. The IPC program was implemented in 2010. The hand hygiene compliance was studied by video recording. The measures to improve compliance included education, motivational challenges, skill-training sessions, support, and promotions [2].

Table 1 Baseline characteristics of the study population by years

Parameters	Total	2011	2012	2013	2014	2015	2016	p-value
		No of pts. (%)	No of pts. (%)					
Patients, total	2038	313 (100%)	350 (100%)	361 (100%)	341 (100%)	326 (100%)	347 (100%)	1.000
Children	345 (16.9%)	52 (16.6%)	57 (16.3%)	58 (16.1%)	65 (19.1%)	42 (12.9%)	71 (20.5%)	0.315
Male gender	1020 (50%)	154 (49.2%)	184 (52.6%)	186 (51.5%)	168 (49.3%)	164 (50.3%)	164 (47.3%)	0.976
Diagnosis								
Brain trauma	255 (12.5%)	43 (13.7%)	54 (15.4%)	51 (14.1%)	41 (12.0%)	28 (8.6%)	38 (11.0%)	0.192
Brain tumor	1271 (62.4%)	185 (59.1%)	221 (63.1%)	240 (66.5%)	200 (58.7%)	209 (64.1%)	216 (62.2%)	0.911
Congenital disorders	23 (1.1%)	4 (1.3%)	5 (1.4%)	3 (0.8%)	7 (2.1%)	2 (0.6%)	2 (0.6%)	0.436
Vascular brain diseases	454 (22.3%)	77 (24.6%)	60 (17.1%)	63 (17.5%)	89 (26.1%)	80 (24.5%)	85 (24.5%)	0.066
Other diseases	29 (1.4%)	3 (1.0%)	10 (2.9%)	4 (1.1%)	4 (1.2%)	4 (1.2%)	4 (1.2%)	0.302
Surgeries								
Craniotomy	1537 (75.4%)	230 (73.5%)	261 (74.6%)	279 (77.3%)	262 (76.8%)	245 (75.2%)	260 (74.9%)	0.998
INSD	650 (31.9%)	101 (32.3%)	130 (37.1%)	124 (34.3%)	112 (32.8%)	94 (28.8%)	89 (25.6%)	0.227
Endovascular surgery	194 (9.5%)	31 (9.9%)	37 (10.6%)	26 (7.2%)	40 (11.7%)	25 (7.7%)	35 (10.1%)	0.407
EETS	87 (4.3%)	13 (4.2%)	15 (4.3%)	15 (4.2%)	14 (4.1%)	15 (4.6%)	15 (4.3%)	1.000
Spinal surgery	4 (0.2%)	1 (0.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (0.6%)	1 (0.3%)	0.377
Other surgeries	873 (42.8%)	151 (48.2%)	161 (46.0%)	156 (43.2%)	146 (42.8%)	127 (39.0%)	132 (38.0%)	0.523
Outcomes								
Recovery	80 (3.9%)	15 (4.8%)	14 (4.0%)	170 (47.1%)	159 (46.6%)	150 (46.0%)	169 (48.7%)	0.934
Positive dynamics	934 (45.8%)	133 (42.5%)	153 (43.7%)	170 (47.1%)	159 (46.6%)	150 (46.0%)	169 (48.7%)	0.934
No dynamics	210 (10.3%)	34 (10.9%)	41 (11.7%)	37 (10.2%)	30 (8.8%)	29 (8.9%)	39 (11.2%)	0.818
Negative dynamics	505 (24.8%)	81 (25.9%)	67 (19.1%)	78 (21.6%)	92 (27.0%)	96 (29.4%)	91 (26.2%)	0.153
Death	307 (15%)	50 (16.0%)	75 (21.4%)	62 (17.2%)	41 (12.0%)	41 (12.6%)	38 (11.0%)	0.009
Median [Q1;Q3]								
Age, years	46 [26.0; 59.0]	44 [25.0; 57.0]	44 [25.0; 58.0]	47 [26.0; 60.0]	44 [25.0; 57.0]	50 [30.0; 59.75]	48 [24.5; 60.5]	0.099
CCI score	3 [2.0; 5.0]	3 [2.0; 4.0]	3 [2.0; 5.0]	3 [2.0; 5.0]	3 [2.0; 4.0]	3 [2.0; 5.0]	3 [2.0; 4.0]	1.000
Length of stay in ICU, days	10 [6.0; 22.0]	13 [7.0; 27.0]	12 [6.0; 25.0]	10 [6.0; 24.0]	8 [6.0; 22.0]	9 [6.0; 22.0]	8 [5.0; 17.0]	0.010

Abbreviations: INSD Implantation of neurosurgical devices, EETS Endoscopic endonasal transsphenoidal surgery, CCI Charlson comorbidity index

Figure 1 Incidence Rates of Healthcare-Associated Infections per 100 Admissions in the Neuro-ICU Patient Population in 2011-2016

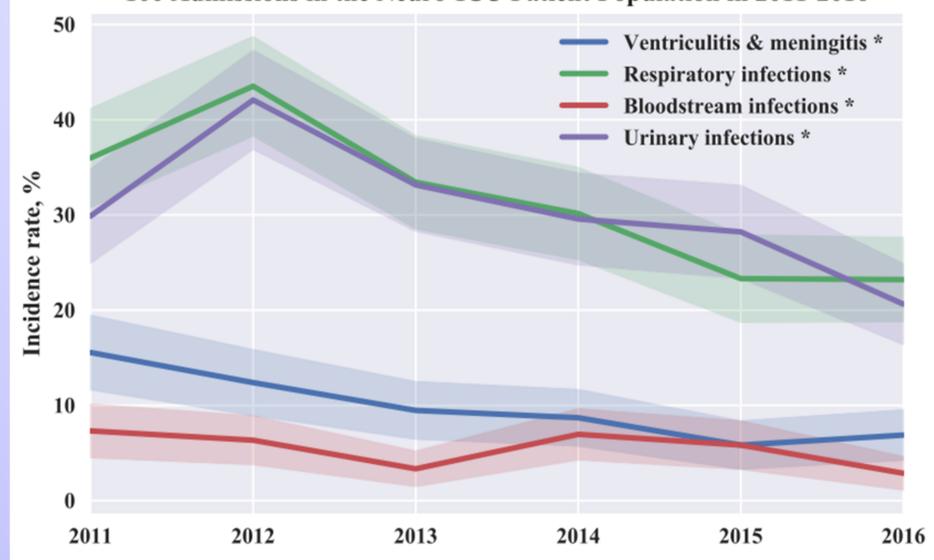
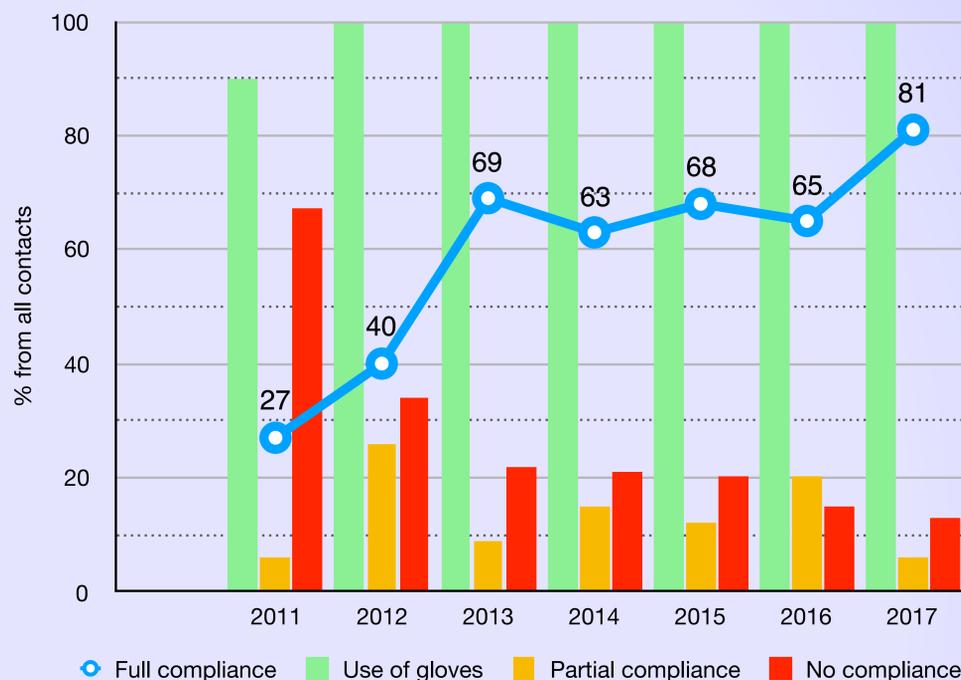


Figure 2 Compliance to hand hygiene among medical personnel in the neuro-ICU, Burdenko Neurosurgery Institute, 2011-2017



CONCLUSION

Our results demonstrate a strong negative correlation (Pearson's coefficient = -0.84) between the hand hygiene compliance and the rate of HAIs in the neuro-ICU during the seven years of observation.

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