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Population Standardized Infection Ratio (pSIR): A More Meaningful Reflection of Performance With Reduction in Device Use

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Background: Interventions to reduce unnecessary device use may select a higher-risk population, leading to a paradoxical increase in SIR for some high-performing facilities. The standardized utilization ratio (SUR) adjusts for device use for different units and facilities. We evaluated the performance of a population SIR (pSIR) metric compared to device SIR (dSIR) in the situations of increased, decreased, and no change in SUR for a large system. **Methods:** We evaluated hospitals that had a reduction, increase, and no substantial change ($\pm 5\%$ relative change) in their SUR in FY2019 (July 2018–June 2019) compared to baseline FY2017 (July 2016–June 2017). The dSIR (defined as Σ observed events divided by Σ predicted events based on actual device days) and pSIR (defined as Σ observed events divided by Σ predicted events based on predicted device days). We calculated the cumulative attributable difference (CAD) for catheter-associated urinary tract infections (CAUTIs) for the same facilities based on dSIR and pSIR. **Results:** Overall, the system SUR dropped from 0.92 in 2017 to 0.85 in 2019 (7.3% decrease). Of the 48 hospitals included, 25 (52%) exhibited a drop, 13 (27%) exhibited an increase, and 10 (21%) had no change in SUR during 2019. For hospitals in which

Table 1. The Effect on dSIR, and pSIR in the Setting of Changes in SUR Over the 2 Periods

Change In	SUR	SUR			dSIR			Observed Events		pSIR		
		FY17	FY19	% Change	FY17	FY19	% Change	FY17	FY19	FY17	FY19	% Change
Decrease	25	0.971	0.781	-19.5%	0.879	0.739	-15.9%	251	161	0.853	0.577	-32.3%
Increase	13	0.820	0.911	11.1%	0.902	0.712	-21.1%	131	104	0.740	0.649	-12.3%
No change	10	0.955	0.955	0.0%	0.789	0.627	-20.5%	66	58	0.753	0.599	-20.5%
System	48	0.920	0.852	-7.3%	0.871	0.708	-18.7%	448	323	0.801	0.603	-24.7%

SUR decreased, the dSIR decreased by 15.9% from 0.88 to 0.74, and the pSIR decreased by 32.3% from 0.85 to 0.58 (Table 1). In 2019, the CAD for CAUTI to a target SIR of 1 was 133 for the dSIR compared to 181 for the pSIR, and 36% more events were avoided. **Conclusions:** The traditional SIR (dSIR) underestimated improvements in infection rates compared to the pSIR because it failed to account for reduced device utilization associated with infection prevention interventions. The pSIR accounts for overall risk of infection associated with device exposure in a population and better reflects the efficacy of prevention efforts compared to dSIR. The pSIR should be considered in situations in which interventions have led to substantial reductions in device use.

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