



EFFECTIVENESS OF A NEW SURFACE DISINFECTING CONCEPT FOR REDUCING THE RISK OF NOSOCOMIAL CLOSTRIDIUM DIFFICILE INFECTION

Author(s): Hell M.^{1,3}, Bernhofer C¹, Voith M¹, Chmelizek G^{1,3}, Berr F², Kern JM³, Maass M³, Huhulescu S⁴, Indra A^{3,4}, Allerberger F^{3,4}, Schmid D⁴

¹Department of Hospital Epidemiology and Infection Control, University Hospital Salzburg, Austria, ²Department of Internal Medicine I, ³Institute of Medical Microbiology, Hygiene and Infectious Diseases, University Hospital Salzburg, Salzburg, Austria, ⁴National Reference Laboratory for Clostridium difficile, Department of Infectious Disease Epidemiology, Austrian Agency for Health and Food Safety (AGES)- Vienna, Austria

Background and Objective:

Clostridium difficile, an important nosocomial pathogen is the leading cause of hospital-acquired diarrhea associated with high risk of fatal outcome.

A conventional, sporocidal surface disinfection applied in response to the occurrence of CDI was compared with daily application of a new sporocidal agent at two wards of a university hospital with respect to the risk reduction of CDI.

Methods:

The routine CDI-surveillance data indicated a high endemic incidence of community-acquired (CA)-CDI and hospital-associated (HA)-CDI (n_{total}=118) at two wards (A, B) of an internal medicine department. CDI patients were classified into CA-CDI and HA-CDI according to ECDC definitions.

Two intervention studies with a before-after design were performed at the wards A and B: ward A including four to six-bed-rooms and ward B single or two-bed-rooms.

At ward A the “pre-intervention phase”, in which the hospital policy based usual disinfection procedure (sporocidal surface disinfection in response to occurrence of nosocomial CDI only) was applied, took place from November 2007 to April 2009; the intervention phase, in which a new liquid oxygen releaser disinfectant with high sporocidal activity was daily used regardless of CDI occurrence, took place from May 2009 to July 2010. [Fig. 1]
At ward B the pre-intervention phase lasted from August 2009 to June 2010 and the intervention phase from July 2010 to May 2011. [Fig. 2]

On laboratory level CDI was ascertained by toxigenic cultures of stool samples. For detecting clusters, 53,5% of the cultures (31 out of 58) additionally were sent to the national reference laboratory for PCR-ribotyping.

Results:

A total of 67 cases of CDI (including 26 CA- and 41 HA-CDI cases) occurred at ward A and 51 cases (including 34 CA- and 17 HA-CDI cases) at ward B.

At ward A, the incidence rate difference of nosocomial CDI cases (0.4/1.000 hospital days) observed was insignificant.
At ward B, the incidence rate of nosocomial CDI at the end of the pre-intervention phase was 1.84/1.000 hospital days compared with an incidence rate of 0.77/1.000 at the end of the intervention phase, resulting in a rate difference of 1.07/1.000 hospital days at borderline significance (p=0.10). [Table 1]

The ribotyping results, stratified for HA- and CA-CDI cases demonstrated no clustering of community-acquired cases and hospital-acquired cases [Fig. 3] during the intervention period. However, we documented a cluster of PCR-ribotype 053 at ward A during the pre-intervention period. [Fig. 4]

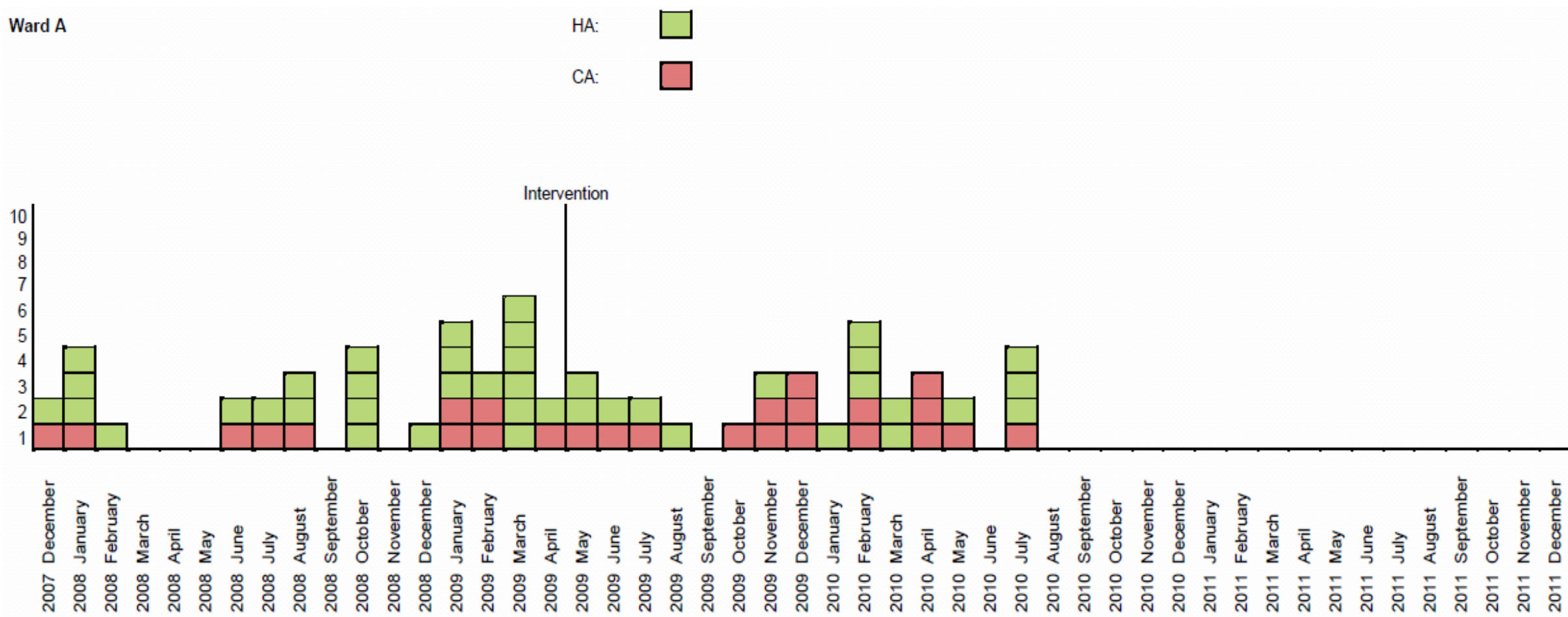


Fig. 1: Ward A; HA – Hospital Acquired Cases, CA – Community Acquired Cases

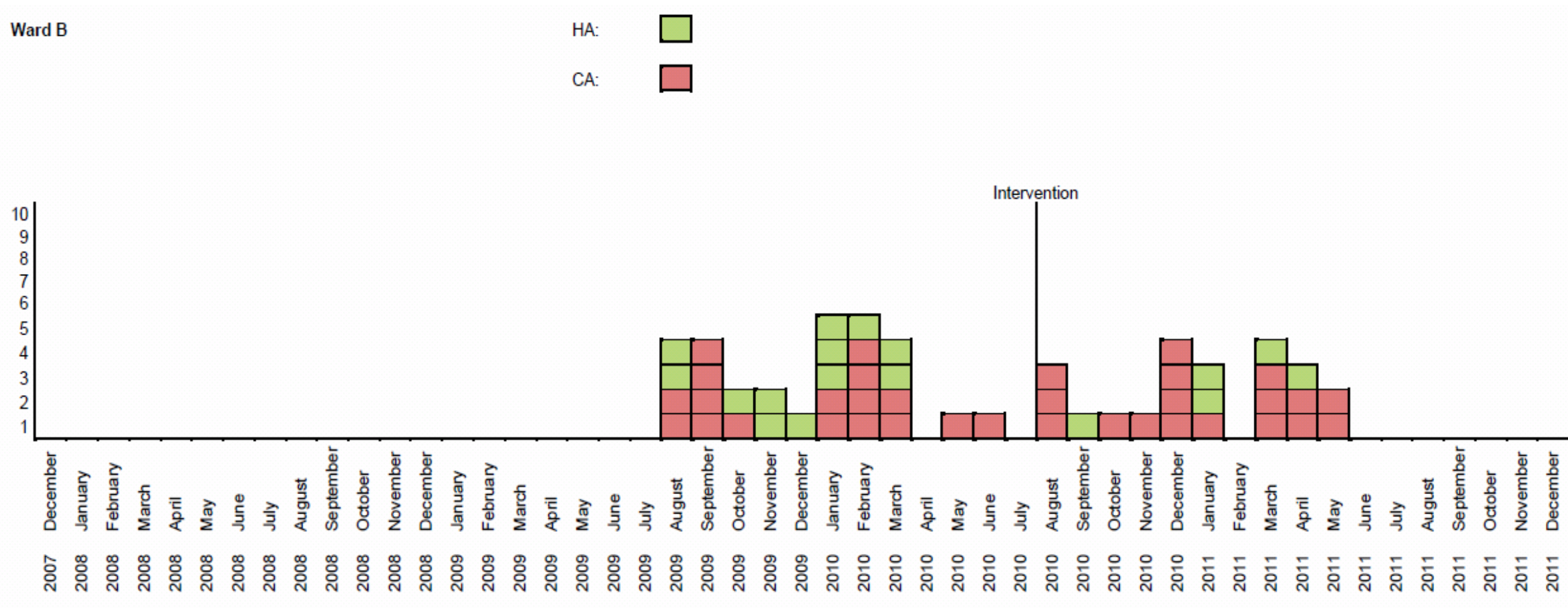


Fig. 2: Ward B; HA – Hospital Acquired Cases, CA – Community Acquired Cases

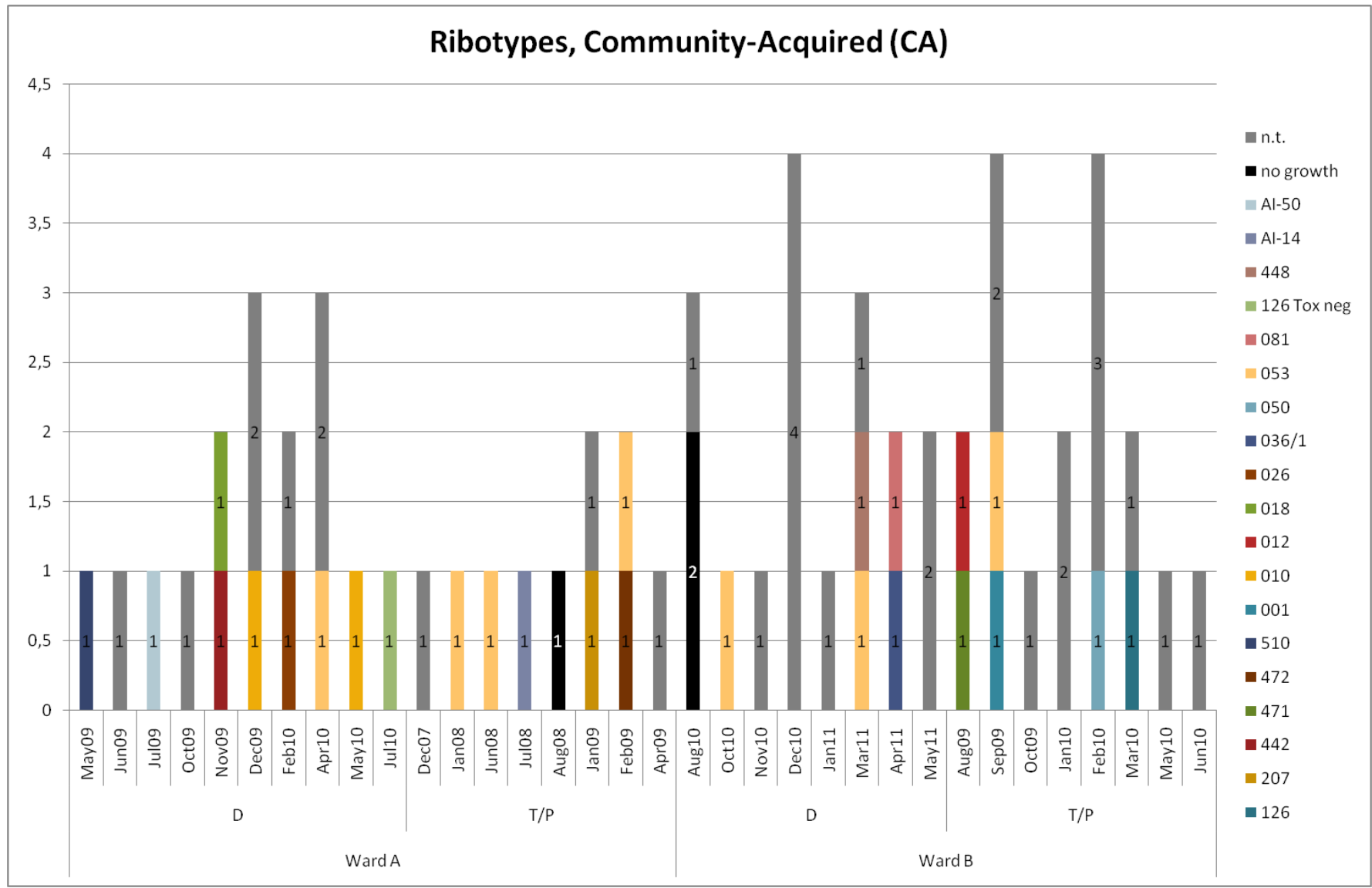


Fig. 3: Ribotypes in Community Acquired Cases

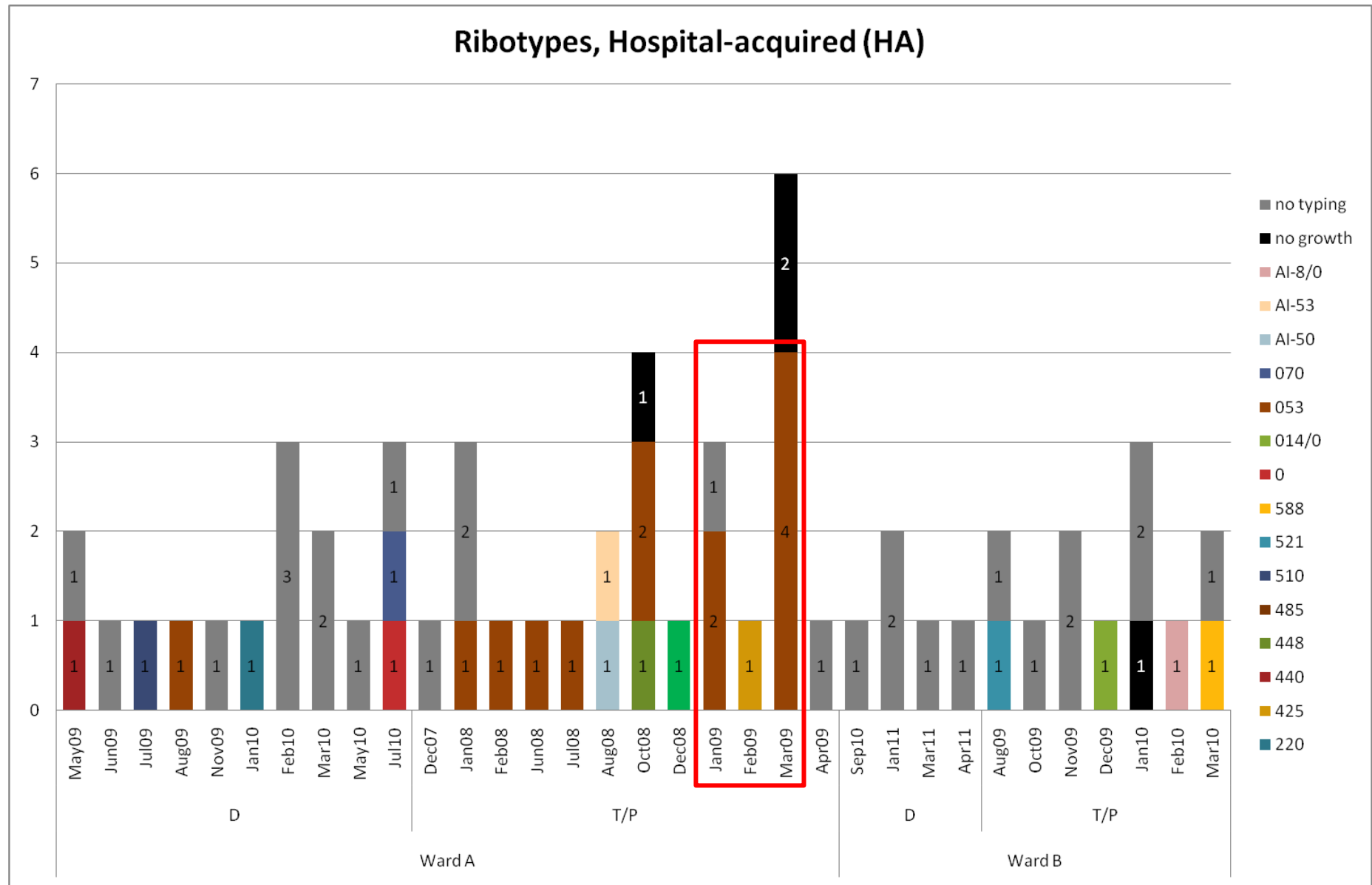


Fig. 4: Ribotypes in Hospital Acquired Cases

Conclusion:

We concluded that the daily use of a liquid oxygen releaser disinfectant with high sporocidal activity at a ward with single or two bed-rooms was superior in preventing occurrence of nosocomial CDI to the sporocidal surface disinfection, applied as needed.

This conclusion is supported by ribotyping results, indicating a cluster of HA-CDI during the preintervention period at ward A but no clustering during the intervention periods.

				*Per 1000 Person Time Units			*Two-Tailed
Ward B		Nosocomial CDI cases	Beddays	Rate*	Rate Ratio	Rate Difference	P-value
Intervention	Y	5	6462	0.77	0.42 (0.15-1.19)	-1.07 (-2.31, 0.17)	0.10
	N	12	6512	1.84			
Ward A							
Intervention	Y	16	11030	1.45	0.78 (0.41-1.46)	-0.40 (-1.42, 0.61)	0.45
	N	25	13500	1.85			

Table 1: