

# Appropriateness of using a Mobile Application for Choosing Antibiotic Therapy in Hospitalized Patients at Siriraj Hospital

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**Background:** Development of facility-specific clinical practice guidelines and incorporation of computerized clinical decision support have been recommended as the effective antimicrobial stewardship strategies. The DigitalAMS™ is a mobile-based application used to guide choosing empirical antibiotics. Before the hospital-wide implementation of DigitalAMS™, the appropriateness and limitation of such an application needs to be evaluated.

**Material and methods:** From January to June 2018, a cross-sectional study was conducted among 401 hospitalized adults who received ≥1 dose of antimicrobials and had ≥1 documented site-specific infection. The antimicrobial regimen prescribed by the ward physician (WARD regimen), recommended by the DigitalAMS™ (APP regimen), and recommended by two independent infectious disease (ID) physicians before (Emp-ID regimen) and after (Def-ID regimen) the final microbiological results became available were compared in a pair-wise fashion. The percent agreement of the APP and Emp-ID regimens was considered to be the appropriateness of the application, which was the primary outcome.

**Results:** A total of 401 patients of the targeted infections i.e. 98 subjects with pneumonia, 103 subjects with urinary tract infection (UTI), 98 subjects with bacteremia and 102 subjects with skin and soft tissue infection (SSTI) were enrolled. Table 1 shows the clinical characteristics of study patients while the table 2 shows percent agreement of each comparison group stratified by the infection site. The percent agreement between the APP and the WARD was less than half in all sites of infection. The APP regimen provided nearly 80% agreement with the Emp-ID regimen among subjects with UTI (78.6%), bacteremia (85.7%) and SSSI (85.2%), while the percent agreement of the WARD regimen and the Emp-ID was approximately half in all sites of infection. The lowest percent agreement between the APP regimen and the Emp-ID regimen was found among subjects with pneumonia (59.1%). Univariate analysis did not reveal any association between subjects who received the antibiotic regimen matching to the APP recommendation and the 28-day mortality.

**Discussion:** The implementation of DigitalAMS™ seems useful but needs some revisions. Dissemination of this ready-to-use application with the customized clinical practice guidelines to other hospital settings may be beneficial.

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**Table 1.** Clinical characteristics of study patients

Variables	Bacteremia (n=98)	Pneumonia (n=98)	UTI (n=103)	SSSI (n=102)	p-value
<b>Male</b>	42 (50.9%)	59 (60.2%)	44 (42.7%)	52 (50.9%)	0.04
<b>Mean age (+/-SD), year</b>	69.05±15.20	72.35±16.82	71.81±14.42	62.59±19.90	0.006
<b>Previous hospitalizations</b>	12 (12.2%)	7 (7%)	9 (8%)	15 (14.7%)	0.37
<b>Type of infections</b>					
• <b>Community-acquired infection</b>	34 (34.6%)	45 (45.9%)	29 (28.1%)	51 (50%)	0.001
• <b>Hospital-acquired infection</b>	56 (57.1%)	44 (44.9%)	63 (61.1%)	33 (32.3%)	
<b>Ventilator dependency</b>	15.3% (15)	36.7% (36)	14.5% (15)	6.8% (7)	<0.001
<b>ARDS</b>	2 (2%)	3 (3%)	1 (0.9%)	0 (0%)	0.23
<b>Treatment outcomes</b>					
• <b>Favorable clinical outcome</b>	77 (78.6%)	67 (68.4%)	90 (87.4%)	94 (92.2%)	<0.001
• <b>Favorable micro. outcome</b>	52 (53%)	10 (10.2%)	38 (36.9%)	16 (15.7%)	<0.001
• <b>28-day over mortality</b>	30 (30.6%)	13 (12.6%)	22 (22.4%)	7 (6.8%)	<0.001
• <b>28-day ID-related mortality</b>	23 (23.7%)	11 (10.6%)	20 (20.4%)	7 (6.8%)	<0.001
• <b>Length of hospital stay, days</b>	16.45 ± 18.41	14.40 ± 10.86	18.62 ± 14.47	13.99 ± 13.89	<0.001

**Table 2.** Percent agreement of each comparison group, stratified by the infection site

Variables	Comparator-1	Comparator-2	Percent agreement			
			Bacteremia (n=98)	Pneumonia (n=98)	UTI (n=103)	SSTI (n=102)
<b>Primary outcome</b>	APP	Emp-ID	84 (85.7%)*	58 (59.1%)	81 (78.6%)*	87 (85.2%)*
	WARD	Emp-ID	47 (47.9%)*	54 (55.1%)	39 (37.8%)*	41 (40.2%)*
<b>Secondary outcomes</b>	WARD	APP	48 (48.9%)	33 (33.6%)	35.9 (37%)	38 (37.2%)
	APP	Def-ID**	53/98 (54.1%)	22/44 (50.0%)	42/91 (46.2%)	31/48 (64.6%)
	Emp-ID	Def-ID**	54/98 (55.1%)	30/44 (68.2%)	39/91 (42.9%)	33/48 (68.8%)

\*p-value from the pairwise comparison <0.001 \*\*The causative pathogens were not identified in some study subjects.