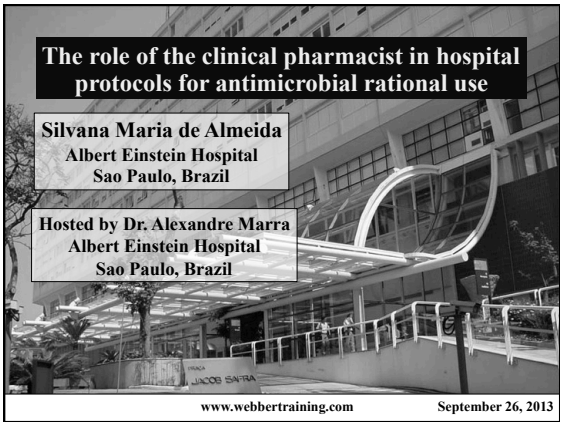
The Role of the Clinical Pharmacist in Hospital Protocols for Antimicrobial Rational Use

Silvana Maria de Almeida, Albert Einstein Hospital, Sao Paulo, Brazil

A Webber Training Teleclass



Brazil certification

- 55 Hospitals – ONA – National Acreditation Organization
- 54 health services –JCI – Joint Commission International

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Clinical Pharmacist x ADE

- The presence of a pharmacist on rounds as a full member of the patient care team in a medical ICU was associated with a substantially lower rate of ADEs caused by prescribing errors. Nearly all the changes were readily accepted by physicians. 1999 Jul 21;282(3):267-70
- On-ward participation of a hospital pharmacist in a Dutch ICU was associated with significant reductions in prescribing errors and related patient harm (preventable ADEs) at acceptable costs per monitored patient-day. Crit 2010;14(5):R174. doi: 10.1186/cc9278. Epub 2010 Oct 4.
- JAMA.

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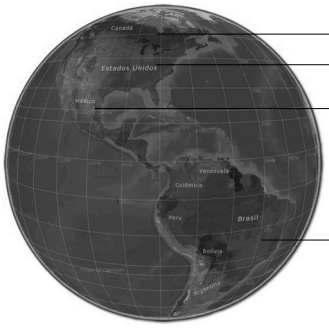

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Albert Einstein Hospital

Large tertiary hospital

Large tertiary hospital
600 beds ~ 40 ICU bed
6000 physicians
1200 nurses

São Paulo

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São Paulo

ICU EINSTEIN

- Intensivists
- Medical residents
- Multidisciplinary residents

- In 2000 - Joint Commission Certificate

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Clinical Pharmacy – Einstein Hospital

- 2000 – First clinical pharmacist - ICU
- 2003 –Geriatric and oncologic patients
- 2005 – All hospital´s units

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Nowaday

- 55 pharmacists - ~30 clinical pharmacists
- + 15 diferents activities and protocols
- Daily Analyse Antibiotics orders (prophylatics and treatments)
- Opioids use
- Human Albumin use
- Anticoagulants
- Drug interactions
- Adverse drugs reactions

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Pharmacy Service

- Unit dose
- Injectable preparations
- Orders analises
- Eletronic system - Pyxis
- Satelits Pharmacys

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Development Intervention Pharmacist– Albert Einstein Hospital

Year	Intervention (n)	Patient day	Intervention/ patient day
2003	1706	124736	0.014
2004	2577	137443	0.019
2005	6399	141941	0.045
2006	16971	140344	0.121
2007	22357	138799	0.161
2008	25369	150045	0.169
2009	25655	159740	0.161
2010	30727	183045	0.168

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einstein. 2011; 9(4 Pt 1):456-60

Development Clinical Pharmacist Albert Einstein Hospital

Year	Intervention (n)	Intervention Type	Pharmacist amount	Intervention number/pharmacist	Patient day
2003	1.706	7	10	171	124.736
2004	2.577	11	10	258	137.443
2005	6.399	12	16	400	141.941
2006	16.971	15	16	1061	140.344
2007	22.357	16	16	1397	138.799
2008	25.369	17	20	1268	150.045
2009	25.655	19	22	1166	159.740
2010	30.727	19	22	1397	183.045

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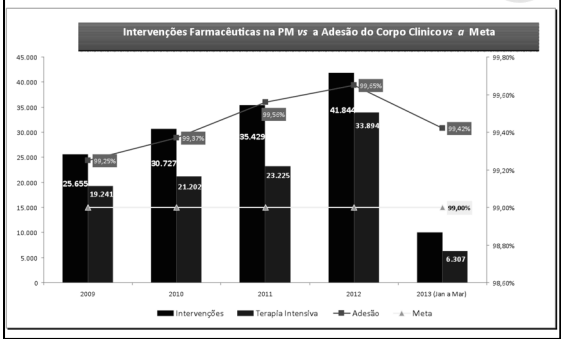
Interventions



Rational Use of Antibiotics

Antibiotic prophylaxis protocol

- Preintervention stage (2001 jan to may) a survey of all antimicrobial prescriptions in the ICU - 50.5% (53/105) of the surgical patients with antimicrobial prophylaxis in the ICU actually had discontinuation of prophylaxis within 48 hours after surgery

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Antibiotic prophylaxis protocol

- In 2001, a project was designed to improve compliance with discontinuation of antimicrobial agents within 48 hours after surgery in ICU patients

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Antibiotic prophylaxis protocol

• Pharmacist and an infectious diseases physician identified the surgical patients daily and followed up on the duration of antimicrobial prophylaxis.

•Goal: to improve compliance with discontinuation of antimicrobial agents within 48 hours after surgery in ICU

•Patients included: those with length of stay over 48 hours in the ICU

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Contents lists available at ScienceDirect
American Journal of Infection Control
journal homepage: www.ajicjournal.org

Major article

Implementation of an antibiotic prophylaxis protocol in an intensive care unit

Silvana Maria de Almeida PharmD [a,*], Alexandre R. Marra MD [a], Sergio B. Wey MD [b], Elivane da Silva Victor PhD [c], Oscar Fernando Pavão dos Santos MD [d], Michael B. Edmond MD, MPH, MPA [a]

- Q*uasi-experimental study*: on the discontinuation of prophylactic antimicrobial therapy
- Case-control study : to investigate the main reasons for not appropriately discontinuing prophylaxis
- Cohort study :to analyze the risk factors for death related to not discontinuing prophylactic antibiotic

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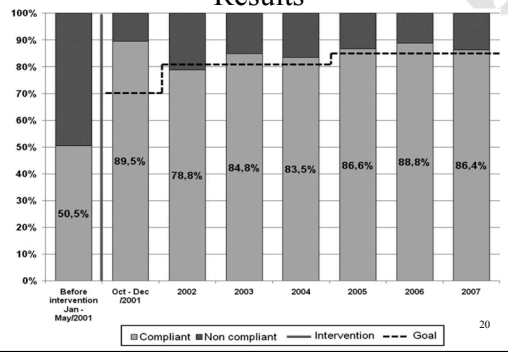
Results



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Results

Results of logistic regression used to identify factors associated with death

Characteristic	Univariate Odds ratio (95% CI)	Univariate *P* value	Multivariate Odds ratio (95% CI)	Multivariate *P* value
Sex (Female)	1.27 (0.43-3.72)	.67		
Age (yr)	1.05 (1.00-1.09)	.04	1.14 (1.05-1.24)	.01
APACHE II	0.98 (0.91-1.07)	.69		
Number of comorbidities	1.19 (0.79-1.77)	.41		
Length of stay	1.03 (1.01-1.04)	.01	1.04 (1.02-1.06)	<.01
Surgical time (hours)	1.21 (0.99-1.47)	.07	1.46 (1.09-1.96)	.01
Antimicrobials not discontinued within 48 hours of surgery	6.53 (1.43-29.79)	.02	4.93 (0.90-27.09)	.07
Antimicrobial after 1 hour	0.84 (0.28-2.46)	.75		
Repetition antimicrobial	1.36 (0.29-6.41)	.70		
Presence of urinary catheter	1.29 (0.39-4.24)	.68		
Endotracheal intubation	3.0 (0.88-10.21)	.08	3.47 (0.74-16.26)	.12
Presence of drain	0.91 (0.3-2.81)	.87		
Presence of pacemaker	1.96 (0.23-16.64)	.54		
First-generation cephalosporin	0.7 (0.23-2.16)	.54		
Second-generation cephalosporin	1.02 (0.33-3.14)	.97		
Third-generation cephalosporin	0.48 (0.06-3.78)	.48		
Penicillin	6.03 (0.59-62.00)	.13		
Quinolone	1.75 (0.21-14.76)	.61		
Rash	2.97 (0.33-26.56)	.33		

95% CI, confidence interval for odds ratio.

No associated increase in the SSI rates, and there was no impact on consumption of antimicrobials

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Independent predictors of death

- Patient age - an estimated increase of 14% in likelihood of death for each additional year of age
- Length of stay - an increase of 4% in likelihood of death for each hospital day
- Surgical time - and an increase of 46% in likelihood of death for each hour of surgery

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95% CI, confidence interval for odds ratio.

Dados descritos em n(%)

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Conclusion

- There was increased compliance with discontinuation of antimicrobials within 48 hours for surgical prophylaxis in the ICU of our institution,
- The results were sustained over time.
- There was no associated increase in the SSI rates, and there was no impact on consumption of antimicrobials.
- Implementation, maintenance, and follow-up of the protocol were activities that involved a multidisciplinary team, which is absolutely essential, considering the importance of continuing education to ensure sustained success

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limiting antimicrobial therapy duration

Antimicrobial therapy duration

- In phase 1 less than 50 % of the prescribed antibiotics in the ICU were discontinued before 14 days

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Antimicrobial therapy duration

- The prospective study - from November 2006 to August 2007.
- Antimicrobial therapy was reviewed on a daily basis by a physician and a pharmacist
- Interventions were performed in the use of antimicrobial agents when they had been prescribed for more than 14 days.
- Avoidance of carbapenems was emphasized.

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DDD/1000 patient days – Before and after protocol – difference of consumption.

	NNIS System*	Phase 1	Phase 2	% difference
1st generation cephalosporin	102.8	84.7	57.4	32.0% (-)
2nd generation cephalosporin	34.3	81.2	38.4	53.0% (-)
3rd generation cephalosporin	144.1	238.2	196.5	18.0% (-)
4th generation cephalosporin	-	194.7	233.6	20.0% (+)
Carbapenems	37.8	244.4	184.5	24.5% (-)
Ciprofloxacin	205.9	87.1	88.4	1.5% (+)
Vancomycin	85.8	158.5	135.9	14.3% (-)
Ampicillin	201.4	98.0	94.6	3.0% (-)
Inhibitor/b-lactam	-	78.2	83.0	6.0% (+)
TOTAL		1265.0	1112.3	12.1% (-)

* Data From NNIS System Report. AJIC 2004;32:470–485

Phase 1 – January to October 2006

Phase 2 – November 2006 to August 2007

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Marra AR.The effect of limiting antimicrobial therapy duration on antimicrobial resistance in the critical care setting .Am J Infect Control. 2009 Apr;37(3)

Proportion of antimicrobial resistant strains among pathogens causing nosocomial infection in the ICU

Table 4. Incidence rates of nosocomial infections due to resistant organisms before and after the intervention to limit antimicrobial therapy.

	Infections per 1000 patient days		
Microorganism	Phase 1	Phase 2	P
P. aeruginosa	24.9	24.8	1.0
ceftazidime (R) *P. aeruginosa*	14.3	5.0	0.04
imipenem (R) *P. aeruginosa*	13.1	5.7	0.39
ciprofloxacin (R) *P. aeruginosa*	11.9	6.2	0.15
A. baumannii	30.9	12.4	0.003
ceftazidime (R) *A. baumannii*	8.3	6.2	0.59
imipenem (R) *A. baumannii*	26.1	5.0	<0.001
ampicillin/sulbactam (R) *A. baumannii*	16.6	2.5	0.001
K. pneumoniae	14.3	34.7	0.002
ceftazidime (R) *K. pneumoniae*	14.3	18.6	0.38
cefepime (R) *K. pneumoniae*	14.3	21.1	0.23
imipenem (R) *K. pneumoniae*	4.8	3.7	0.74
ciprofloxacin (R) *K. pneumoniae*	13.1	19.8	0.22
MRSA*	8.3	16.1	0.10
VRE**	-	-	-

*methicillin resistant *Staphylococcus aureus*
** vancomycin R *Enterococcus* spp (no VRE cases)

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Marra AR.The effect of limiting antimicrobial therapy duration on antimicrobial resistance in the critical care setting .Am J Infect Control. 2009 Apr;37(3)

Conclusion

- Our results suggest that the intervention contributed to the use of antimicrobial agents in a more rational way and to the reduction of bacterial resistance in the ICU of the hospital

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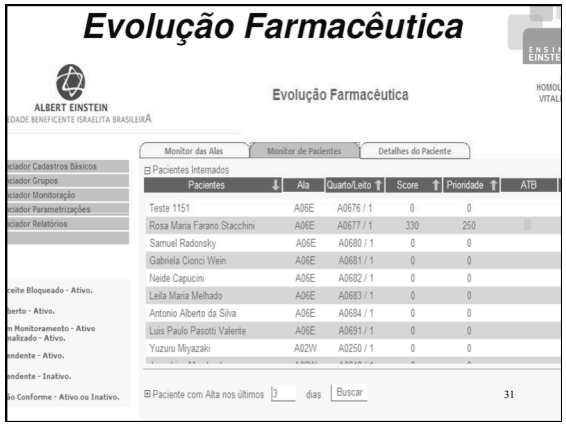
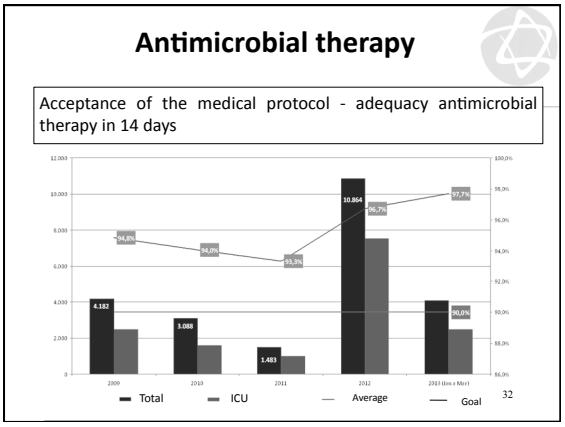
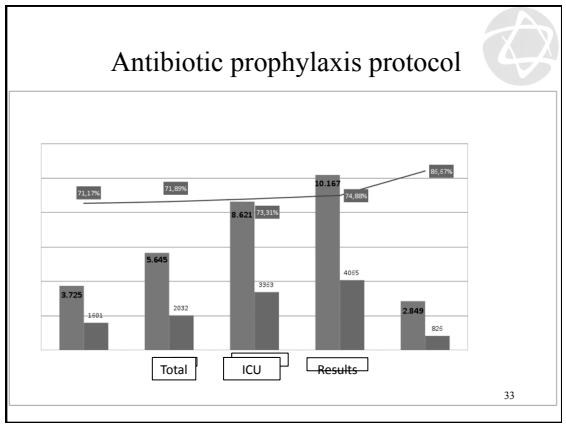
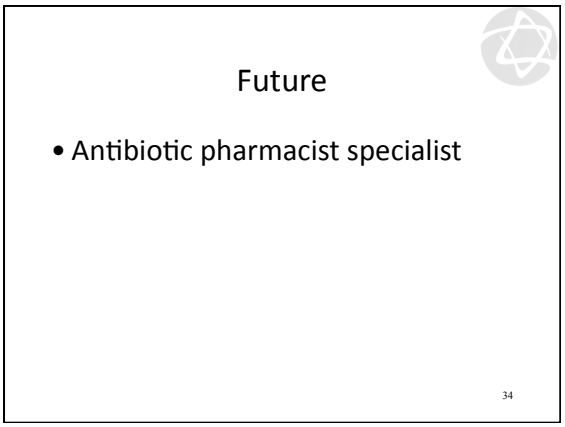

Evolução Farmacêutica
ALBERT EINSTEIN
Evolução Farmacêutica
Monitor das Alas
Monitor de Pacientes
Detalhes do Paciente
Pacientes Internados
Pacientes
Ala
Quarto/Leito
Score
Prioridade
ATB
Teste 1151 A06E A0676 / 1 0 0
Rosa Maria Farano Stacchini A06E A0677 / 1 330 250
Samuel Radonsky A06E A0680 / 1 0 0
Gabriela Cionci Wein A06E A0681 / 1 0 0
Neide Capucini A06E A0682 / 1 0 0
Leila Maria Melhado A06E A0683 / 1 0 0
Antonio Alberto da Silva A06E A0684 / 1 0 0
Luis Paulo Pasotti Valente A06E A0691 / 1 0 0
Yuzuru Miyazaki A02W A0250 / 1 0 0
Paciente com Alta nos últimos 3 dias Buscar
31


Antimicrobial therapy
Acceptance of the medical protocol - adequacy antimicrobial therapy in 14 days
4.182
3.088
1.483
10.864
94,8%
94,0%
93,3%
96,7%
97,7%
90,6%
Total
ICU
Average
Goal
32


Antibiotic prophylaxis protocol
71,17%
71,89%
73,31%
74,88%
85,67%
3.725
1.601
5.645
2.032
8.621
3.923
10.167
4.065
2.849
826
Total
ICU
Results
33


Future
• Antibiotic pharmacist specialist
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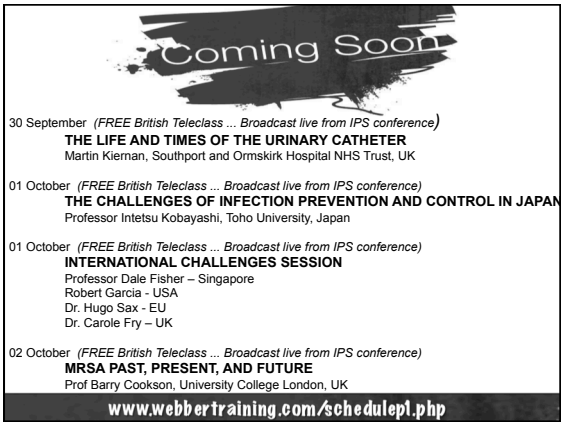
Thanks!
silvana.almeida@einstein.br


Coming Soon
30 September (FREE British Teleclass ... Broadcast live from IPS conference)
THE LIFE AND TIMES OF THE URINARY CATHETER
Martin Kiernan, Southport and Ormskirk Hospital NHS Trust, UK
01 October (FREE British Teleclass ... Broadcast live from IPS conference)
THE CHALLENGES OF INFECTION PREVENTION AND CONTROL IN JAPAN
Professor Intetsu Kobayashi, Toho University, Japan
01 October (FREE British Teleclass ... Broadcast live from IPS conference)
INTERNATIONAL CHALLENGES SESSION
Professor Dale Fisher – Singapore
Robert Garcia - USA
Dr. Hugo Sax - EU
Dr. Carole Fry – UK
02 October (FREE British Teleclass ... Broadcast live from IPS conference)
MRSA PAST, PRESENT, AND FUTURE
Prof Barry Cookson, University College London, UK
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