Formatting the medical order sheet improves security of antibiotics prescription in intensive care units

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Introduction

Medical prescription is a complex process [1] integrating several elements: a safe prescription must be legible and unequivocal. This is particularly true in intensive care units (ICUs) where medical orders change frequently. Therefore, this process is liable to errors, with potential serious consequences. Several strategies may minimize the risk of such errors.

Objective

To assess whether formatting the medical order sheet impacts on the accuracy and security of antibiotics (AB) prescription.

Material and Method

Prospective assessment in two adults ICUs: the surgical ICU, where a formatted sheet was introduced and the medical ICU as control.

- Two periods of observation:
  1. Baseline study in the two ICUs before the introduction of a formatted sheet between February 1st and April 30th 1997.
     Introduction of a formatted sheet in the surgical ICU at the end of 1998. Main characteristics of the formatted sheet: predefined orders including names, doses, route of administration and time interval (Table 1).
  2. Follow-up study between July 1st and August 31st 2000.
- Inclusion criteria: all patients hospitalised for more than 24h in the two ICUs, and to whom AB were prescribed.
- Analysis of AB prescriptions by a trained pharmacist according to the American Society of Hospital Pharmacists (ASHP) criteria for security [2]. Mandatory: patient's name; prescriber's name; drug's name; dose and unit; frequency of administration; route of administration; validity period. Optional (in special cases): drug dilution; infusion rate; time of administration; therapeutic goal.
- Classification of medical orders into 3 categories: safe, unsafe (in this case into unambiguous or ambiguous orders), and finally in term of missing criterion (Table 2)

Table 1. Format of medical order sheet used in the follow-up study for antibiotics prescription in the surgical intensive care unit

ANTIBIOTICS:	□ Prophylaxis □ Therapy		Duration: ……. days
Speciality /ICD name	dose	route	Since ……
	……every…..hours	i.v.	
	……every…..hours	i.v.	
	……every…..hours	i.v.	
	……every…..hours	i.v.	

Table 2. Definitions of the classification criteria used for assessing antibiotics prescription safety

Safe prescription	All ASHP (American Society of Hospital Pharmacists) criteria are present
Unsafe presecription - Unambiguous order - Ambiguous order	One or more ASHP criteria is missing Order with one missing security criterion at least, but without opening the way to a prescription error Order with an essential or more security criteria missing and leaving at least an alternative for understanding and carrying it out (for example only the name of the drug when different dosages exist)
Missing criterion	Lacuna: resulting in a normal but incomplete, understandable order, which would not lead to an administration error Error: resulting in a complete but wrong order, potentially leading to its implementation as such and compromising patient safety (for example: imipenem-cilastatin 4X500g).

Results

Baseline study.
The proportion of safe medical orders in the baseline study (Table 3) varied from 66 % in the medical ICU, and 48 % in the surgical ICU ($p < 0.0001$). Types of missing data were predominantly lack of frequency and route of administration in both units.

Follow-up study
The proportion of safe orders increased in both units (Table 4), but 4.6 times more in the surgical ICU: 74 % versus 66% in the medical ICU (+12 %), and 74 % versus 48 % in the surgical ICU (+55%): p <0,0001 medical vs surgical ICU. For unsafe orders, the proportion of ambiguous orders decreased by half in the medical ICU (9% versus 17 %) and nearly disappeared in the surgical ICU (1 % versus 30 %). Types of missing data were predominantly dose units, frequency of administration, and route of administration in the medical unit. The only missing criterion remaining in the surgical ICU was the drug dose unit, which could not be preformatted. The aim of antibiotics prescription (either prophylactic or therapeutic) was mentioned only in 51 % of the preformatted order sheets in the surgical ICU.

Comparison of the medical order for antibiotics between the medical and surgical ICU in baseline and follow-up studies

Table 3: Baseline study

	Medical Total	ICU (%)	Surgical Total	ICU (%)	Stat.signif. P value
Nb medical orders	**954**	**100**	**1117**	**100**	
Safe orders	633	66	536	48	<0,0001
Non safe orders	321	34	581	52	
Unambiguous	161	17	251	22	<0,0001
Ambiguous	160	17	330	30	
Missing criterion	**418**	**100**	**693**	**100**	**<0,0001**
Drug's name or dose	11	3	80	12	
Dose unit	108	26	31	4	
Frequency of adm.	136	33	321	46	
Route of administration	163	39	261	38	
Type of error	**418**	**100**	**693**	**100**	
« error »	14	3	109	16	<0,0001
« lacuna »	404	97	584	84	

Table 4: Follow-up study

	Medical Total	ICU (%)	Surgical Total	ICU (%)	Stat.signif. P value
Nb medical orders	**698**	**100**	**509**	**100**	
Safe orders	519	74	379	74	Ns
Non safe orders	179	26	130	26	
Unambiguous	117	17	127	25	<0,0001
Ambiguous	62	9	3	1	
Missing criterion	**196**	**100**	**133**	**100**	**<0,0001**
Drug's name or dose	11	6	1	1	
Dose unit	86	44	121	91	
Frequency of adm.	78	40	4	3	
Route of administration	21	11	7	5	
Type of error	**196**	**100**	**133**	**100**	
« error »	23	12	1	1	<0,0001
« lacuna »	173	88	132	99	

Conclusions

Formatting of the order sheet markedly increased the safety of antibiotics prescription, playing a significant contribution towards safer drug prescription: formatting reduced abnormal and equivocal medical orders, thus reducing the risks of clinically significant prescription errors. These findings must be confirmed in other settings and with different drug classes. Formatting the medical order sheet is an interesting simple step before full computerized prescription is available.

Références

[1] Raish DW. A model of methods for influencing prescribing. Part: 2 A review of educational methods, theories of human reference, and delineation of the model. DICP 1990;24:537-542

[2] American Society of Hospital Pharmacists: ASHP guidelines of preventing medication errors in hospitals. Am J Hosp Pharm 1993;50;305-314

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