



Effects of clinical decision support on the TDM of gentamicin and vancomycin in newborns

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Background

- Gentamicin dosing scheme, and gentamicin and vancomycin therapeutic drug monitoring (TDM) in newborns is very heterogeneous in our institution.
- Once daily dosing (ODD) of gentamicin and trough levels measurement is recommended in the literature for most patients.

Purpose

To evaluate the impact of guidelines on dosing practices, blood sampling, therapeutic levels of gentamicin and vancomycin



Material and Method

- Newborns (< 28 days of life) receiving either gentamicin or vancomycin
- Retrospective case (01.2010-12.2010) – control (04.2008 – 03.2009) study
- Before and after guidelines implementation
- Chart analysis criteria:
 - % of ODD gentamicin dosing schemes
 - % of peak levels, mean (+/-SD) number of levels sampled
 - % of therapeutic levels defined as : gentamicin trough level ≤ 1mg/L; vancomycin trough level: 5-15 mg/L
- Statistical analysis: Fisher's exact, Wilcoxon ranksum tests (STATA® 1.0)

GUIDELINES

Clinical decision support distributed as a pocket card and implemented in the electronic prescription system (Centricity™ Critical Care Clinisoft)

GENTAMICINE chez le NOUVEAU-NE et PRÉMATURÉ			
Carte de poche			
Posologie et administration			
Gentamicine	Age gestationnel (semaines)	Jours de vie	Intervalle (heures)
Taux résiduel cible : < 1 mg/L	< 29	6-20	4-5
	29-34	2-9	4-5
	35-42	3-9	4-5
	≥ 43	10-15	4-5

VANCOMYCINE chez le NOUVEAU-NE et PRÉMATURÉ			
Carte de poche			
Posologie et administration			
Vancomycine	Age gestationnel (semaines)	Dose (mg/kg/dose)	Intervalle (heures)
Taux résiduel cible : 5-15 mg/L	< 27	15	24
	27-34	15	18
	35-42	15	12
	≥ 43	15	8

http://pharmacie.hug-ge.ch/infomedic/utilismedic/tdm_vanco_amino_neo_poche.pdf



Results

Gentamicin:

- 132 (case) vs 102 (control) patients included (fig.1)
- Guidelines implementation: → ODD scheme used, blood sampling reduced, significant higher % of trough levels ≤ 1 mg/L (tab.1, fig.2)

Vancomycin:

- 38 (case) vs 37 (control) patients included (fig.3)
- Guidelines implementation: → blood sampling reduced, no difference in the % of therapeutic levels, trough levels > 15 mg/L more frequent (tab.2, fig.4)

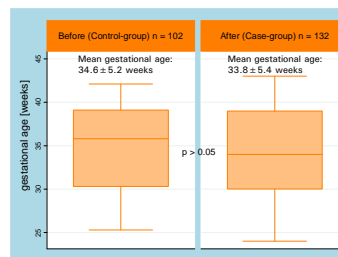


Fig. 1 Gestational age of gentamicin patients

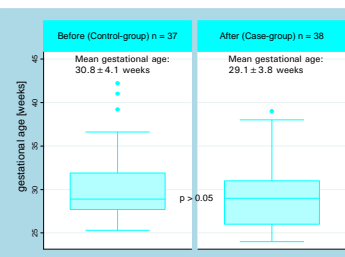


Fig. 3 Gestational age of vancomycin patients

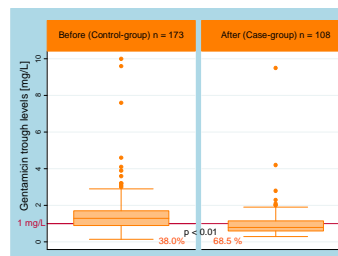


Fig. 2 Distribution of gentamicin trough levels

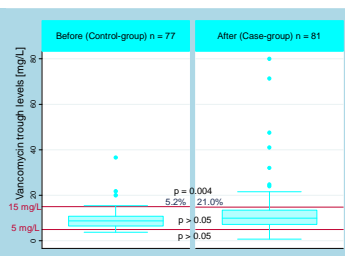


Fig. 4 Distribution of vancomycin trough levels

Tab. 1 Gentamicin results	BEFORE (Control-group)	AFTER (Case-group)	Statistical analysis
ODD scheme	61.6%	97.7%	p<0.001
% peak level measurement	17.2%	0.9%	p<0.001
mean number of levels sampled	1.7 ± 1.4	0.8 ± 1.0	p<0.001
% of trough levels ≤ 1 mg/L	33.0%	68.5%	p<0.001

Tab. 2 Vancomycin results	BEFORE (Control-group)	AFTER (Case-group)	Statistical analysis
% peak level measurement	25.2%	0%	p<0.001
mean number of levels sampled	2.6 ± 2.2	2.7 ± 3.4	p>0.05
% patients with < 2 levels sampled	29.7%	52.6%	p=0.06
% of trough levels 5-15 mg/L	57.1%	45.7%	p>0.05
% trough levels < 5 mg/L	9.1%	4.9%	p>0.05
% trough levels > 15 mg/L	5.2%	21.0%	p=0.004

Inaccuracy in the guideline

VANCOMYCINE	Age gestationnel (semaines)	Dose (mg/kg/dose)	Intervalle (heures)
Taux résiduel cible : 5-15 mg/L	< 20	15	24
	21-26	15	18
	27-34	15	12
	≥ 43	15	8

Dosing of patients with 26 weeks of age not defined in the first version of the guideline
 → 8 cases, physicians choosed an interval of 18 hours instead of 24h

Explanation?

Conclusion

Our guidelines implementation induced a strong reduction in blood sampling among newborns. Gentamicin dosing and TDM were highly improved. In the future, clinical and economical effects of the guidelines should be evaluated.