

PR Blank^{1,2} and TD Szucs²

¹Institute of Social- and Preventive Medicine, University of Zurich, Switzerland
²Institute of Pharmaceutical Medicine (ECPM), University of Basel, Switzerland

Correspondence:
Patricia R. Blank, Ph.D MPH.
Klingelbergstrasse 61
CH-4056 Basel
Phone: +41 61 267 1941/50
Fax: +41 61 267 1948
E-mail: patricia.blank@unibas.ch
www.ecpm.ch

BACKGROUND & AIM

The prescription of inadequate drugs combination can introduce a significant risk of adverse drug related events, especially in renal insufficiency patients. The objective of the present study was to assess the epidemiology of potentially dangerous medical therapies among patients with concomitant renal insufficiency in a hospital setting.

METHODS

By using administrative medical records from a Swiss hospital, demographic (gender, age), clinical (length of stay (LOS), drug units administered) and potentially dangerous drug combinations were analyzed and the association to present renal insufficiency was measured.

Univariate analyses determined the association of all factors associated with present renal insufficiency. A multivariate regression model assessed independent factors associated with the outcome. Unadjusted and adjusted ORs will be shown with according 95% confidence intervals (CIs). A two-sided p-value of <0.05 was considered as statistically significant.

RESULTS

During the study period (October 2011-June 2013), 21'199 patients above 18 years were admitted (male gender: 49.9%; mean age: 62.4 years). In total, 941 patients with renal insufficiency were identified (Table 1). An average patient stayed for 5.3 days (median: 6.0 days) and received 52 drug units (median: 27.0 units) per episode. One or more dangerous drug combinations were found in 2'025 (9.6%) patients.

The unadjusted univariate regression analyses indicated for several factors higher odds of concomitant renal insufficiency (Tables 2-3).

All significant variables in the univariate analyses were considered as candidates for the multivariate analysis. Independent factors for renal insufficiency were:

- Male gender
- Age above 65 years
- Longer LOS (>3 days)
- Higher number of drug units (>27 units)
- Drug-drug combinations: high-ceiling diuretics + thiazides, acetylsalicylic acids + glucocorticoids, paracetamol + vitamin K antagonists.

SUMMARY & CONCLUSION

This study is a first study assessing the epidemiology of potentially dangerous drugs in patients with renal insufficiency using a large data-set of Swiss inpatients. Gender, age, LOS, drug units and various drug-drug interactions showed significant association with the presence of renal insufficiency. Further research is needed to improve the drug prescription management of patients with kidney insufficiency in the hospital setting.

Age	
• Mean (years, 95%CI)	62.4 (62.2, 62.7)
• Range (years)	18- 103
• ≥ 65 years (% 95%CI)	51.0 (50.0, 52.0)
• ≥ 80 years (% 95%CI)	13.8 (13.3, 14.2) (n=2915)
Male gender % (95%CI)	49.9 (49.2, 50.5)
Death (n, %)	49 (0.2%)
Liver failure (n, %)	174 (0.8%).
Renal insufficiency (n, %)	941 (4.4%)
• Acute renal failure	75
• Chronic renal disease	824
• Renal failure (not specified)	42
Total days of observation (days, cumulative)	111'780

Table 1. Patient demographics

	OR (chi-square test)	95% CI	p-value
Demographic factors			
Age (years)	Δmean (t-test): 17.4*	16.39, 18.49	<0.001
Male gender	1.60*	1.40, 1.83	<0.001
Clinical factors			
Higher lengths of stay (>3 days)	4.06*	3.40, 4.84	<0.001
Higher number of drug units administered (>27 units)	2.82*	2.44, 3.28	<0.001

Table 2: Factors associated with present renal insufficiency (*p<0.05)

Drug-drug combinations	renal insufficiency (n=202)	Renal insufficiency (n=94)	Odds ratio	95%CI	p-value	Total (n)
High ceiling diuretics+Thiazids	252	15	*11053	8.77,1398	<0.001	367
Beta-blocker+Nonsteroidal anti-inflammatory drug(NSAID)	8	2	*5.391	1.14,25.42	0.017	10
Glucocorticoids+NSAID	215	5	.498	.2,1.21	0.117	220
Acetylsalicylic acid (Antiplatelet drug)+ Glucocorticoids	724	128	*4.248	3.48,5.19	<0.001	852
Escitalopram+ QT-prolonging drugs	75	11	*3.163	1.69,6.01	<0.001	86
Paracetamol+ Vitamin K antagonist	691	133	*4.661	3.82,5.68	<0.001	824
Citalopram+Protonpumpinhibitor (PPI)	93	16	*3.751	2.20,6.40	<0.001	109
Citalopram+QT-prolonging drugs	76	12	*3.430	1.86,6.33	<0.001	88
Escitalopram+Protonpumpinhibitor (PPI)	96	13	*2.942	1.64,5.27	<0.001	109
ACE-inhibitor/Angiotensin II receptor antagonist+NSAID	13	1	1.657	.26,12.68	0.623	14

Table 3. Drug-drug interaction pairs associated with present renal insufficiency (*p<0.05)

Acknowledgement: The authors gratefully acknowledge Prof. Sebastian Schneeweiss and Dr. Fran Cook, Harvard School of Public Health, Boston, USA for their scientific support in this project and the ERA-EDTA organisation for the travel grant.