

A peer-reviewed version of this preprint was published in PeerJ on 28 July 2016.

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Castillo-Guzman S, González-Santiago O, Delgado-Leal IA, Lozano-Luévano GE, Reyes-Rodríguez MJ, Elizondo-Solis CV, Nava-Obregón TA, Palacios-Ríos D. 2016. Perception of the risk of adverse reactions to analgesics: differences between medical students and residents. PeerJ 4:e2255 <https://doi.org/10.7717/peerj.2255>

Perception of the risk of adverse reactions to analgesics: Differences between medical students and residents

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Background. Medications are not exempt from adverse drug reactions (ADR) and how the physician perceives the risk of prescription drugs could influence their availability to report ADR and their prescription behavior. **Methods.** We assess the perception of risk and the occurrence of ADR associated with COX2-Inbitors, paracetamol, NSAIDs, and morphine in medical students and residents. **Results.** The analgesic with the highest risk perception was morphine, while the drug with the least risk perceived was paracetamol. Addiction was perceived as the most probable adverse effects developed by morphine. In the case of NSAIDs, the main adverse effect perceived was GI bleeding. **Discussion.** Our findings show that medical students give higher risk scores than residents toward risk due to analgesics. It is probable that both groups of students have morphinophobia, although more studies are necessary to confirm this. Continuing training and informing physicians about ADRs is necessary since the lack of training is known to induce inadequate use of drugs.

1 **Perception of the risk of adverse reactions to analgesics: Differences between medical**
2 **students and residents**

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19 **Abstract**

20

21 **Background.** Medications are not exempt from adverse drug reactions (ADR) and how the
22 physician perceives the risk of prescription drugs could influence their availability to report ADR
23 and their prescription behavior.

24 **Methods.** We assess the perception of risk and the occurrence of ADR associated with COX2-
25 Inhibitors, paracetamol, NSAIDs, and morphine in medical students and residents.

26 **Results.** The analgesic with the highest risk perception was morphine, while the drug with the
27 least risk perceived was paracetamol. Addiction was perceived as the most probable adverse
28 effects developed by morphine. In the case of NSAIDs, the main adverse effect perceived was GI
29 bleeding.

30 **Discussion.** Our findings show that medical students give higher risk scores than residents
31 toward risk due to analgesics. It is probable that both groups of students have morphinophobia,
32 although more studies are necessary to confirm this. Continuing training and informing
33 physicians about ADRs is necessary since the lack of training is known to induce inadequate use
34 of drugs.

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44 Introduction

45 Analgesics are the cornerstone of pain management and their availability is critical for the
46 alleviation of unnecessary chronic and acute pain, especially in developing countries (Lohman,
47 schleifer and Amon 2010). However, these medications are not exempt from adverse reactions
48 (ADR). The use of opioids is associated with a variety of ADRs ranging from nausea and
49 vomiting to urinary retention and respiratory depression. Paracetamol is relatively safe when
50 taken in a therapeutic dose (≤ 4 g/day for adults). However, overdosage leads to hepatotoxicity
51 and also nephrototoxicity.(Chun et al 2009; Waring et al 2010; Hodgman and Garrard 2012)
52 Non-Steroidal Anti-inflammatory-drugs (NSAIDs) can result in gastrointestinal (GI)
53 complications, ranging from dyspepsia to peptic ulcer and GI bleeding (Castellsague et al 2012).
54 On the other hand, COX2 inhibitors could create an ulcerogenic dual-COX inhibitor when
55 administered with low-dose aspirin. Moreover, by inhibiting COX2, they could delay ulcer
56 healing. Similar to traditional NSAIDs, COX2 inhibitors compromise the glomerular filtration
57 rate in patients at increased risk, and also may cause peripheral oedema and hypertension. In
58 combination with an oral anticoagulant they increase the international normalized ratio (Mattia
59 and Coluzzi 2005).

60

61 On the other hand, how the physician perceives the risk of prescription drugs could influence
62 their availability to report ADR and their prescription behavior. In the case of opioids, an
63 apprehensive attitude when using morphine as an analgesic could lead to resistance to administer
64 morphine to patients suffering from severe pain. Such reluctance can have a negative impact on
65 pain management as well as quality of life (Joranson et al 200; Bandieri et al 2009).

66 With this in mind the aims of this study was 1) to investigate the risk perception of medical
67 students and residents towards opioid and non-opioid analgesics, 2) to evaluate the perception of
68 common ADR caused by these analgesics.

69

70 **Methods**

71 This study was conducted in the Faculty of Medicine of the Autonomous University of Nuevo
72 León (UANL) and the Dr José E. Gonzalez University Hospital located in the Metropolitan area
73 of Monterrey, Mexico. The sample of medical students was conformed only by those who had
74 already taken a pharmacology course while resident from all specialties were included.

75 **Instrument.** A visual analogue scale was used to assess the perception of risk and the occurrence
76 of ADR associated with COX2-Inbitors, paracetamol, NSAIDs, and morphine. ADRs were
77 assessed by measuring the distance between the left side of the scale (equal to zero) and the mark
78 made by the participant. Since each scale measured 10 cm, the perceived risk of ADRs could be
79 considered as a quantitative score ranging from 0 to 10. The following ADRs were assessed to
80 each class of analgesic: gastrointestinal (GI) bleeding, kidney damage, liver damage, sedation,
81 bronchospasm and addiction

82 **Statistical analysis.** Mean and 25th -75th centiles were calculated. The Mann-Whitney U-test was
83 used for comparison of the two groups of students. The statistical package SPSS V20 was used
84 for all analyses.

85 **Ethical approval and consent.** This study was approved by the Ethical committee of the
86 Faculty of Medicine of the Autonomous University of Nuevo León. The reference number is
87 AN15-011. The questionnaire was completed after obtaining written consent.

88

89 Results

90 Five hundred and five students were interviewed. Women and men represented 39.7% and
91 60.3%, respectively. Medical students on the other hand, represented 58.9% and residents 41.1%.

92 Overall, the analgesic with the highest risk perception was morphine, while the drug with the
93 least risk perceived was paracetamol (Figure 1). This pattern was observed in both genders.

94 According to the level of study, undergraduate students had a greater perception of risk than
95 residents (Table 1). This difference was significant for all individuals only in the case of
96 morphine and NSAIDs. In the case of men and women, this difference was significant in the four
97 drugs studied (Table 1).

98 Addiction and GI bleeding were perceived as the most and least probable adverse effects
99 developed by morphine. This pattern was similar in undergraduates, residents, and both genders.

100 However, undergraduates perceived a major risk more often than residents independent of
101 gender and type of adverse effect (Table 2). In the case of NSAIDs, the main adverse effect
102 perceived by undergraduates and residents was GI bleeding (7.20 and 6.60, respectively), while
103 the least adverse effect was addiction (3.23) and sedation (2.02) for undergraduates and
104 residents, respectively. The main adverse effect perceived by undergraduates and resident men
105 was GI bleeding (7.12 and 6.35 respectively). The less adverse effect perceived by NSAIDS was
106 addiction (3.09) for undergraduates and sedation (1.79) for residents, respectively. In the case of
107 females, the main adverse effect perceived by undergrads and residents was GI bleeding (7.31
108 and 7.03 respectively) and the least adverse effect was addiction (3.44 and 2.16, respectively).

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111 Discussion

112 Previous studies have investigated the risk perception of health professionals, students and
113 patients toward drugs (Durrieu et al 2007; Durrieu et al 2010; Cullen et al 2006; Bongard et al
114 2002); however, differences between medical students of different levels has been poorly
115 studied. In this study, we searched for differences in the risk perception due to drugs between
116 medical students and residents. Our findings show that medical students give higher risk scores
117 than residents toward risk due to analgesics. This was independent of the class of analgesic and
118 gender. We speculate that this difference could be explained by the recent courses of
119 pharmacology taken by medical students (Durrieu et al 2007; Durrieu et al 2010). As has been
120 previously demonstrated the pharmacology course increases global perception of risk. Others
121 factors, such as the persuasive methods of pharmaceutical representatives, could affect these
122 perceptions especially in residents who are more in touch with them than medical students.
123 In both groups of students, the decreased order of risk perceived was as follows: morphine,
124 NSAIDS, COX2 inhibitors and finally, paracetamol. The low risk perceived for paracetamol
125 could have serious implications. Clearly, they underestimated its risk in spite of being the single
126 most important cause of acute fulminant hepatic failure. Until now, there are no studies that
127 report the risk perception due to paracetamol using the measurement instrument of this study.
128 The score assigned to NSAIDS is similar to that of other studies with mean values of 6.2 (4 –
129 7.6) (Cullen et al 2006; Bongard et al 2002).
130 Although it is not possible to demonstrate with our results, it is probable that both groups of
131 students have morphinophobia, this due to the highest risk score assigned to morphine. The term
132 morphibophobia can be defined as either a number of beliefs based on the side effects of
133 morphine prescribed for pain management, or an inadequate management of chronic pain due to
134 lack of knowledge on how to use morphine (Ferreira et al 2013). More studies in this respect are

135 necessary in Mexican physicians. With regard to specific ADRs due to NSAIDs, GI bleeding
136 was identified as the most common. In the case of morphine, addiction was perceived as more
137 frequent. As with paracetamol, there are no studies, similar to this that allow us to compare the
138 magnitude of GI bleeding and addiction. Continuing training and informing physicians about
139 ADRs is necessary since the lack of training is known to induce inadequate use of drugs
140 (McDowell et al 2009). In addition, poor training could complicate the transmission of
141 information to their patients regarding ADRs. Studies suggest that the increase of information to
142 patients will lead to a reduction in ADR and therefore hospital admissions and associated
143 morbidity and cost.

144

145 **Conclusions**

146 There is a difference in the risk perception toward analgesics between medical students and
147 residents. The former have a major risk perception toward analgesics than latest. In both groups
148 of students, the decreasing level of risk was as follows: morphine, NSAIDs and paracetamol. GI
149 bleeding and addiction were the more frequent ADR perceived to NSAIDs and morphine
150 respectively by both groups of students.

151 We should encourage the rational use of analgesics by physicians to decrease opiophobia, over-
152 prescription and self-prescription of NSAIDs. A good strategy will be the impartation of pain
153 and palliative care courses in the curricula of physicians.

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156

157 **Acknowledgement**

158 We thank Sergio Lozano-Rodriguez, M.D. for his help in editing the manuscript.

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Risk perception toward different analgesic between medical students and residents

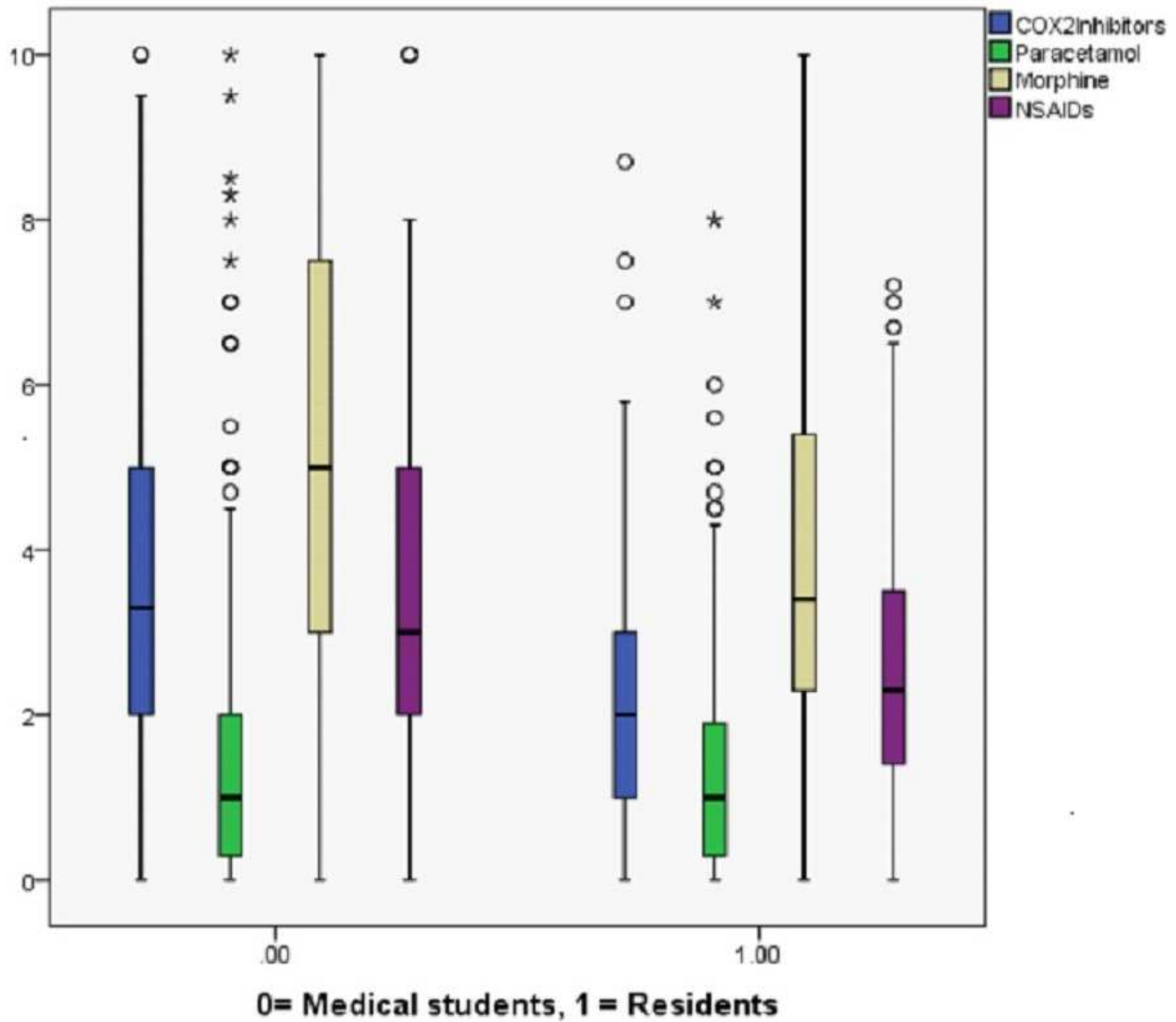


Figure 1. Risk perception toward different analgesics between medical students and residents

Table 1 (on next page)

Risk perception toward the analgesics according the gender between medical students and residents

MS = medical students, R = residents, P = <0.05, S = significant, NS = Non significant

Table 1.- Risk perception toward the Analgesics according the gender between medical students and residents

	COX2 Inhibitors			Paracetamol			Morphine			NSAIDs		
	MS	R	P	MS	R	P	MS	R	P	MS	R	P
Total	3.7	2.41	S	1.5	1.3	N	5.2	3.9		3.3	2.5	
				8	6	S	7	2	S	5	5	S
				1.7	1.4		5.2	3.9		3.4	2.6	
Male	3.88	2.21	S	4	3	S	6	5	S	9	0	S
				1.3	1.2		5.2	3.8		3.1	2.4	
Female	3.46	2.02	S	6	4	S	8	6	S	6	8	S

MS = Medical student, R = Resident, P = <0.05, S = Significant

Table 2 (on next page)

Risk perception toward different ADR

MS = medical students, R = residents, P = <0.05, S = significant, NS = non significant

Table 2.- Risk perception toward different ADR

Drugs	GI Bleeding			Kidney Damage			Liver Damage			Sedation			Bronchospasm			Addiction		
	MS	R	P	MS	R	P	MS	R	P	MS	R	P	MS	R	P	MS	R	P
Morphine																		
Total	4.50	2.72	S	4.78	3.38	S	5.24	3.87	S	7.35	5.92	S	5.44	3.98	S	7.72	5.89	S
Male	4.23	2.78	S	4.60	3.15	S	5.22	3.78	S	7.14	5.96	S	5.44	4.00	S	7.61	5.92	S
Female	4.88	2.62	S	5.03	3.78	S	5.27	4.03	S	7.64	5.85	S	5.44	3.94	S	7.88	5.84	S
NSAIDs																		
Total	7.20	6.60	S	6.34	6.14	NS	6.09	4.11	S	3.82	2.02	S	3.55	2.30	S	3.23	2.23	S
Male	7.12	6.35	S	6.18	6.26	NS	6.10	3.90	S	3.83	1.79	S	3.43	2.20	S	3.09	2.27	S
Female	7.31	7.03	NS	6.57	5.93	NS	6.08	4.48	S	3.81	2.41	S	3.72	2.48	S	3.44	2.16	S

MS = Medical students, R = Residents, P = <0.05, S = Significant