



ORIGINAL ARTICLE

Cross-national analysis of estimated narcotic utilization for twelve Arabic speaking countries in the Middle East



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Abstract *Background:* Access to narcotics has been described as suboptimal in the Middle East. The objectives of this study were to characterize estimated narcotic use in twelve Arabic-speaking nations and compare across world regions.

Methods: This was a population-based cross-sectional analysis of estimated average consumption of narcotic drugs in defined daily doses per million inhabitants, as provided by the International Narcotics Control Board Technical Reports (2008–2012). Five years of data (2008–2012) were extracted from reports for 12 Arabic-speaking countries: Lebanon, Jordan, Syria, Qatar, United Arab Emirates, Saudi Arabia, Oman, Bahrain, Kuwait, Iraq, Egypt, and Yemen. Data were also obtained for world regions.

Results: In 2012, Bahrain and Kuwait had the highest estimates (364 and 352 defined daily doses per million inhabitants per day, respectively), while Yemen and Iraq had the lowest (9 and 6 defined daily doses per million inhabitants per day, respectively). North America, Oceania, and Europe had the highest rates (32,264, 9978, and 7937 defined daily doses per million inhabitants per day, respectively), while Arabic-Countries were only ahead of Africa and Central America (128, 91, 87 defined daily doses per million inhabitants per day, respectively).

Conclusions: Great variability was observed in estimates between 12 Arabic countries and even larger disparity when Arabic-Countries were benchmarked against world regions, suggesting a need for future studies to determine reasons for these discrepancies.

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1. Introduction

Patterns and trends in drug utilization fuel high-level decisions in both public and private settings (WHO, 2003; Doodoo et al., 2009). Governments may use data to alter funding programs, while other entities may use data to produce generic medicines or fund research programs relating to highly used drug classes

(WHO, 2003; Schneeweiss and Avorn, 2005). Characterizing this information is essential for monitoring health and economic outcomes of such decisions over time. These data can also be used to assess the potential impact of world events, publication of influential clinical trials, media reports, or other considerations that affect medication usage in society (Lee and Bergman, 2012). International comparisons of utilization data provide benchmarking opportunities for countries to assess regional and global trends, as well as signaling suboptimal or overuse of target medications.

Drug utilization is determined by a number of factors, including disease prevalence, prescriber habits, patient demand and access to medications (Bradley, 1992). Other patient-level characteristics such as education, socioeconomic status, cultural beliefs, and even geographical region may also influence patterns of use (Bradley, 1992; Vermeire et al., 2001; Chia et al., 2006). Cross-national trending allows for identification of signals that may warrant further study of these conditions. Recently, there has been an increase in published literature describing cross-national trends in drug utilization for a variety of drug classes (Feng et al., 2009; Wilby et al., 2013; Mamdani and Wilby, 2013). Despite well-established roles for rational opioid prescribing in the management of pain states, utilization of narcotic medications has often been subject to scrutiny due to real risks of addiction, dependence, and diversion for illicit use (Zacny et al., 2003). However, little is known from a cross-national perspective, including countries in the Middle East.

The Middle East is representative of a region that greatly varies in both population and wealth, with many countries, especially those belonging to the Gulf Cooperation Council (GCC), enjoying recent affluence due to natural resource interests. Qatar is one such country having recently launched plans to address several deficit areas in the health system, notably medication and patient safety issues. Specifically, the current Qatar National Health Strategy has outlined the need to educate health professionals regarding appropriate use of narcotics as inadequate pain management approaches has resulted in opioid administration almost exclusive to inpatient-based care settings (Qatar National Health Strategy, 2014). It is unknown whether this pattern occurs throughout the Middle Eastern region, or is limited to Qatar and other GCC countries. Prior work has described palliative care initiatives in Qatar; however, there is a scarcity of published experience among other countries and across additional suitable medical indications to fully determine the overall/general status of opioid prescribing in the region (Bingley and Clark, 2009; Charalambous et al., 2012; Al-Kindi et al., 2013; Abu Zeinah et al., 2013).

In order to provide a baseline assessment of narcotic utilization in Arabic-speaking countries, our objective was to characterize narcotic use in twelve Arabic-speaking nations located in the GCC and surrounding Middle Eastern nations. We also sought to explore and compare Middle East narcotic use with other geographical regions.

2. Methods

Annual narcotic utilization estimates were used for analysis. These estimates are generated according to each country's actual utilization data obtained from the prior three years

and are self-reported. For example, the 2013 estimates incorporated actual utilization data obtained from 2009 through 2011. Data were obtained from the International Narcotics Control Board (INCB) Narcotic Drugs – Technical Reports which are freely available online (INCB, 2015). Each annual report compiles member countries' estimates of their national narcotic requirements for the subsequent year.

Annual estimates are given as average consumption of narcotic drugs in defined daily doses per million inhabitants per day. The opioids included in this estimate are listed in Table 1. For ease of comparison, the INCB transforms overall drug weight estimates into defined daily doses and the doses used for this transformation are also given in Table 1. It is important to note that this transformation occurs for statistical purposes only and does not necessarily reflect the usual prescribed dose for each agent. However, it allows for a means of comparison between agents that accounts for differences in drug potency. It is also the best measure to assess countries, such as those in the Middle East, where actual prescribing data are unavailable.

Table 1 Narcotic drug and defined daily dose (mg) as per INCB (INCB, 2015).

Narcotic drug	Defined daily dose (mg)
Acetyldihydrocodeine	40
Alphaprodine	120
Anileridine	65
Bezitramide	15
Codeine (cough suppressant)	100
Codeine (analgesic)	240
Dextromoramide	20
Dextropropoxyphene hydrochloride	200
Dextropropoxyphene napsylate	300
Difenoxin	3
Dihydrocodeine (cough suppressant)	100
Dihydrocodeine (analgesic)	150
Diphenoxylate	15
Dipipanone	75
Ethylmorphine	50
Fentanyl	0.6
Heroin	30
Hydrocodone	15
Hydromorphone	20
Ketobemidone	50
Levorphanol	6
Methadone	25
Morphine	100
Nicomorphine	30
Normethadone	10
Norpipanone	18
Opium	100
Oxycodone	75
Oxymorphone	10
Pethidine	400
Phenazocine	20
Phenoperidine	4
Pholcodine	50
Piminodine	100
Piritramide	45
Propiram	100
Thebacon	15
Tilidine	200
Trimeperidine	200

Five years of data (2008–2012) were extracted from reports for 12 Arabic-speaking countries located within the Middle East region: Bahrain, Egypt, Iraq, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, United Arab Emirates and Yemen. Data for Iraq were not available in 2008. Annual narcotic utilization estimates extracted from each country’s INCB report were evaluated and an additional category, labeled *Arabic Countries* and comprised of all these nations, was calculated to facilitate further international comparisons. Data for the annual narcotic estimates available in the 2010, 2011, and 2012 INCB reports were obtained for other world regions (Africa, Asia, Central America, Europe, North America, Oceania, and South America).

Once data were extracted, we conducted a population-based cross-sectional analysis of estimated average consumption of narcotic drugs in defined daily doses per million inhabitants, as defined by INCB. The primary outcome of this study was to report the annual estimate of narcotic drugs for each country or region. A secondary outcome was the rate of growth of estimated annual narcotic drugs per country or region. This study was approved by the Institutional Review Board at Qatar University.

3. Results

3.1. Comparison of Arabic speaking countries

In 2012 (2013 estimate), the Gulf States of Bahrain and Kuwait had the highest estimates (364 and 352 defined daily doses per million inhabitants per day, respectively), while Yemen and Iraq had the lowest estimates (9 and 6 defined daily doses per million inhabitants per day, respectively) (Fig. 1). Resource-rich countries such as Saudi Arabia, Qatar, and UAE had average estimates (250, 198, and 215 defined daily doses per million inhabitants per day, respectively). All countries had positive rates of growth, except Jordan and Lebanon (−1.75, −16.25 defined daily doses per million inhabitants per day, respectively). The countries with the highest rates of growth were again, Kuwait and Bahrain (52.75 and 43.75 defined daily doses per million inhabitants per day, respectively).

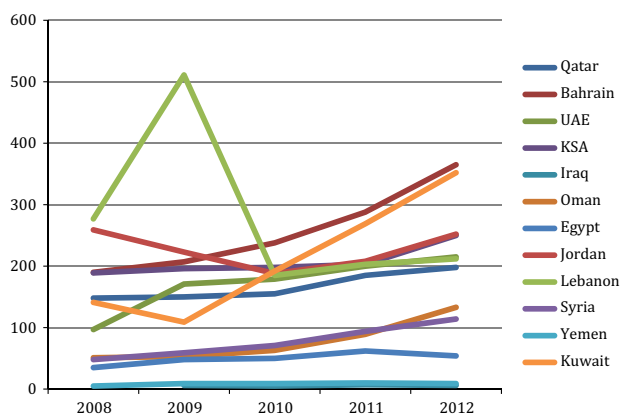


Figure 1 Estimated narcotic requirements for the 12 Arabic speaking countries in the Middle East (defined daily doses per million inhabitants per day vs. year).

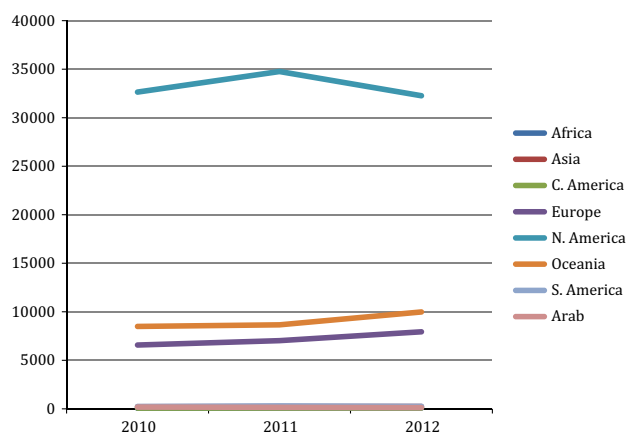


Figure 2 Worldwide comparisons of estimated narcotic requirements by geographical region (defined daily doses per million inhabitants per day vs. year).

3.2. Comparison of Arabic speaking countries to world regions

There were substantial differences observed between world regions in narcotic utilization from 2010 through 2012 (see Fig. 2). The regions of North America, Oceania, and Europe had the highest observed values (32,264, 9978 and 7937 defined daily doses per million inhabitants per day, respectively). South America and Asia had slightly higher values (253 and 231 defined daily doses per million inhabitants per day, respectively) than Africa and Central America (91 and 87 defined daily doses per million inhabitants per day, respectively) in 2012. When the 12 Arabic-speaking countries were pooled, the calculated estimate was lower than all regions except for Africa and Central America (128 defined daily doses per million inhabitants per day). Of note, the only regions with declining rates in narcotic requirement estimates were North America and Arabic-speaking countries (−191.5 defined daily doses per million inhabitants per day and −26.1 defined daily doses per million inhabitants per day, respectively). The highest growth rates were observed in Oceania and Europe (745.5 defined daily doses per million inhabitants per day and 680.5 defined daily doses per million inhabitants per day, respectively).

4. Discussion

This study assessed estimated narcotic requirements in 12 Arabic-speaking countries in the Middle East and compared these requirements to other geographic regions in the world. Great variability was found among these Arabic-speaking countries, with Kuwait and Bahrain having the highest estimates. Similarly, these two countries had the highest rates of growth in estimates from 2008 through 2012. When compared to seven other global regions, Arabic-speaking countries in the Middle East had one of the lowest estimates of annual narcotic requirements, only higher than Africa and Central America. Arabic-speaking countries, along with North America, had the only negative growth rate in estimates from 2010 through 2012.

These findings imply patient access to opioid therapy in the Middle East is disparate from most other places in the world

and should be of concern. Specific implications of documented low estimates, relative to other regions, are not clear, yet patient health outcomes may be adversely influenced. Inadequate pain control is known to lead to other chronic medical problems such as anxiety and depression and is associated with higher rates of addiction and dependence (Cleeland, 1984). Productivity may decrease, due to increased recovery times from poor mobilization and rehabilitation (Cohen et al., 2004). These considerations would also heavily burden healthcare systems in terms of patient management and disposition of care. As such, studies assessing low estimated narcotic use with patient-level outcomes are needed to establish baseline understanding of the importance of these implications in practice.

This study raises important points regarding the rationale for low narcotic use in Arabic-speaking countries versus other world regions. Culture and religious explanations have been previously suggested and should be further explored (Qatar National Cancer Strategy, 2011–2016). These countries predominantly follow Islamic principles, laws, and customs. Narcotic prescribing and/or consumption may be greatly influenced by religion, especially in situations where multiple non-opioid analgesic choices exist. Even when deemed medically necessary, considerations of prescribers or their patients may limit appropriate narcotic use by choice of drug, dose, or duration of therapy. For example, a survey of senior medical students completing their study in Saudi Arabia found poor knowledge and antiquated attitudes regarding opioid analgesia prescribing; nearly half considered pain a minor problem for cancer patients (41%) and believed it to be untreatable (46%). Sixty-eight percent limited opioid prescribing to patients with poor prognosis (Kaki, 2011). It is also possible that cultural positions may influence governments and regulatory bodies when developing policies and procedures restricting use of narcotics in practice. Studies are needed to further explore these considerations and to determine facilitators and barriers for optimizing use.

Observed discrepancies in estimated narcotic requirements between Arabic-speaking countries are also of concern. Affluent countries, such as GCC member states (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates), are investing efforts to develop world-class health systems based on Western standards and could be credited to the higher utilization rates among these countries. Iraq and Yemen had the lowest estimates, which may be a reflection of political instability present during the years of study (Size et al., 2007). The low estimates for Egypt may potentially be explained in part by previous reports commenting on the limited accessibility and availability of narcotics for medical use (Alsirafy et al., 2012). Of course, country-specific laws and regulations regarding narcotic manufacturing, importation, and distribution will also greatly influence utilization patterns. Governmental-level concerns of addiction and abuse risk may foster system-wide disincentives for appropriate opioid prescribing (such as compelling physicians to submit to a health ministry the patient documentation for each narcotic prescription). Costs of importing opioid agents to developing countries may also be prohibitive.

The findings of this study are important for future research. As suggested above, studies are needed to determine whether associations exist between low narcotic utilization and poor patient outcomes. Additionally, rationale for the findings must

be investigated to determine facilitators and barriers for use of narcotics in practice. In order to do this, strong collaborations are required between regulatory bodies, health institutions, and researchers. Future opportunities may be development of educational programs or health promotion strategies in order to optimize the use of these agents in these countries.

Limitations of this study should be addressed. First, data used for this study were estimates only and did not reflect actual narcotic consumption or prescribing data. However, these are the best estimates available for these countries. Secondly, it is difficult to draw conclusions regarding rationale for discrepancies observed. Instead, as discussed above, this study generated many hypotheses for future testing relating to narcotic utilization in Arabic speaking countries. Lastly, it is unknown what optimal narcotic estimates should be for these countries. Although it seems use may be suboptimal when compared to other regions, there is no evidence that this is actually true. Future studies should address this point by assessing patient-level outcomes in target populations.

5. Conclusions

This is the first study to examine narcotic utilization in the Middle East. It provides a baseline assessment for capturing trends and changes occurring over time. The primary finding of this study, that narcotic use is low in Arabic speaking countries, should be assessed further to determine whether patients are being adequately treated for pain. Facilitators and barriers can be examined in other studies designed to determine why international differences exist based on the hypotheses presented in this paper. If use is determined to be suboptimal, health promotion and education programs can be developed for target groups resistant to narcotic use and/or consumption with an overall goal of optimizing patient outcomes relating to pain management.

References

- Abu Zeinah, G.F., Al-Kindi, S.G., Hassan, A.A., 2013. Attitudes of medical oncologists in Qatar toward palliative care. *Am J Hosp and Palliat Care* 30, 548–551.
- Al-Kindi, S.G., Abu Zeinah, G.F., Hassan, A.A., 2013. Palliative care knowledge and attitudes among oncology nurses in Qatar. *Am J Hosp Palliat Care* 31, 469–474. <http://dx.doi.org/10.1177/1049909113489874>.
- Alsirafy, S.A., Ibrahim, N.Y., Abou-Elela, E.N., 2012. Opioid consumption before and after the establishment of a palliative medicine unit in an Egyptian cancer centre. *J Pain Palliat Care* 28, 135–140.
- Bingley, A., Clark, D., 2009. A comparative review of palliative care development in six countries represented by the Middle East Cancer Consortium (MECC). *J. Pain Symptom Manage.* 37, 287–296.
- Bradley, C.P., 1992. Factors which influence the decision whether or not to prescribe: the dilemma facing general practitioners. *Br. J. Gen. Pract.* 42, 454–458.
- Charalambous, H., Protopapa, E., Gavrielidou, D., et al, 2012. Physicians' prescribing habits for cancer pain in Cyprus. *Ann. Oncol.* 23, iii79–iii83. <http://dx.doi.org/10.1093/annonc/mds094>.
- Chia, L., Schlenk, E.A., Dunbar-Jacob, J., 2006. Effect of personal and cultural beliefs on medication adherence in the elderly. *Drugs Aging* 23, 191–202.
- Cleeland, C.S., 1984. The impact of pain on the patient with cancer. *Cancer* 54, 2635–2641.

- Cohen, S.P., Christo, P.J., Moroz, L., 2004. Pain management in trauma patients. *Am. J. Phys. Med. Rehabil.* 83, 142–161.
- Dodoo, A.N.O., Fogg, C., Asiimwe, A., et al, 2009. Pattern of drug utilization for treatment of uncomplicated malaria in urban Ghana following national treatment policy change to artemisinin-combination therapy. *Malar J* 8, 2. <http://dx.doi.org/10.1186/1475-2875-8-2>.
- Feng, Z., Hirdes, J.P., Smith, T.F., et al, 2009. Use of physical restraints and antipsychotic medications in nursing homes: a cross-national study. *Int. J. Geriatr. Psych.* 24, 1110–1118. <http://dx.doi.org/10.1002/gps.2232>.
- INCB. INCB Technical Publications. International Narcotics Control Board, 1995–2013. Retrieved 14th May 2015 from <<http://www.incb.org/incb/en/publications/technical-reports.html>> .
- Kaki, A.M., 2011. Medical students' knowledge and attitude toward cancer pain management in Saudi Arabia. *Saudi Med. J.* 32, 628–632.
- Lee, D., Bergman, U., 2012. Studies of drug utilization. In: Strom, B. L., Kimmel, S.E., Hennessy, S. (Eds.), *Pharmacoepidemiology*, fifth ed. John Wiley & Sons, Chichester, West Sussex, England.
- Mamdani, M.M., Wilby, K.J., 2013. International variation in drug utilization: antidepressant utilization in North America, Greece, and Ireland. *J. Health Spec.* 1, 78–83.
- Qatar National Cancer Strategy, 2011–2016. State of Qatar Supreme Council for Health (2014). Retrieved 14th May 2015 from <<http://www.nhsq.info/strategy-goals-and-projects/national-cancer-strategy/national-cancer-strategy-home>> .
- Qatar National Health Strategy 2011–2016, 2014. Qatar General Secretariat for Development Planning. Doha, Qatar. Retrieved 14th May 2015 from <<http://www.nhsq.info>> .
- Schneeweiss, S., Avorn, J., 2005. A review of uses of health care utilization databases for epidemiologic research on therapeutics. *J. Clin. Epidemiol.* 58, 323–337. <http://dx.doi.org/10.1016/j.clinepi.2004.10.012>.
- Size, M., Soyannwo, O.A., Justins, D.M., 2007. Pain management in developing countries. *Anaesthesia* 62, 38–43.
- Vermeire, E., Hearnshaw, H., Van Royen, P., Denekens, J., 2001. Patient adherence to treatment: three decades of research. A comprehensive review. *J. Clin. Pharm. Therap.* 26, 331–342.
- WHO. Introduction to Drug Utilization Research. World Health Organization, 2003. Retrieved 14th May from <<http://apps.who.int/medicinedocs/en/d/Js4876e/>> .
- Wilby, K.J., Herrmann, N., Mamdani, M.M., 2013. Cross-national comparison of antidepressant utilization in North America and Europe. *J. Clin. Psychopharm.* 33, 585–587.
- Zacny, J., Bigelow, G., Crompton, P., et al, 2003. College on problems of drug dependence taskforce on prescription opioid non-medical use and abuse: position statement. *Drug Alcohol Depend.* 69, 215–232.