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FROM THE EDITOR

Abdulrazak Abyad
MD, MPH, AGSF, AFCHS
(Chief Editor)

In this first issue of the journal this year a landmark paper dealt with medication errors in emergency departments where another issue that was addressed is physical inactivity.

Al- Harbi M.F.A did a descriptive cross-sectional study to describe the perception of nurses and examine its relationship with the profile characteristics. 200 registered nurses were conveniently selected from the two of the major tertiary healthcare facilities in Riyadh which were equipped with pediatric emergency department. This study highlights the significant role nurses play in the medication administration process. It has been found out that the 3 top rank factors contributing to medication errors were interruptions during medication pass (M= 2.32), shortage of nursing staff (M= 2.13), and caring for high acuity patients (M= 2.11). Whereas, hostile work environment (M= 1.56) as the least among all factors. Moreover, all four types of medication technologies: barcode medication administration (M= 1.79), computerized physician order entry (M= 1.9), automated medication dispensing (M= 2.28), and smart infusion pumps (M= 2.34) were perceived as very helpful in reducing medication errors. The authors concluded that based on the findings of the current study, a multidisciplinary approach with the administration and research, is needed to solve the problems of medication errors in the pediatric departments.

Mehmet Rami Helvaci, M.R et al; attempt to understand possible effects of physical inactivity and an excessive eating habit on excess weight. The authors took consecutive patients between the ages of 35 and 70 years to be able to see possible consequences of excess weight on health and to avoid debility induced weight loss in elder individuals. The study included 270 cases (145 females) with normal weight, 270 cases with overweight, and 270 cases with obesity. Female ratio was 53.7% in the three groups. Mean ages were 47.1, 46.3, and 48.9 years in the three groups, respectively ($p>0.05$ for both). The authors concluded that parallelto its severity, excess weight is associated with greater prevalences of HT, DM, and dyslipidemia. As a pleasure point in life, smoking may also show the weakness of volition to control eating in cases with excess weight. But excess weight may actually be a consequence of physical inactivity instead of an excessive eating habit because prevalences of smoking were similar in the normal weight, overweight, and obesity groups in the present study.

We also offer some CNE on problems of pain control in care of terminal cancer patients as confronted by Palliative Care Nurses.

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NURSES' MEDICATION ERRORS IN THE PEDIATRIC EMERGENCY DEPARTMENTS IN SAUDI ARABIA

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Abstract

Purpose: **Medication errors have been identified as a major concern in the healthcare industries. The purpose of the current study was to assess nurses' perceived contributory factors of medication errors perceptions on the use medication technology as a strategy to reduce its occurrence.**

Methods: **A descriptive cross-sectional design was used to describe the perception of nurses and examine their relationship with the profile characteristics. 200 registered nurses were conveniently selected from the two of the major tertiary healthcare facilities in Riyadh which were equipped with pediatric emergency department.**

Findings: **This study highlights the significant role nurses play in the medication administration process. It has been found out that the 3 top rank factors contributing to medication errors were interruptions during medication pass (M= 2.32), shortage of nursing staff (M= 2.13), and caring for high acuity patients (M= 2.11). Whereas, hostile work environment (M= 1.56) was the least among all factors. Moreover, all four types of medication technologies: barcode medication administration (M= 1.79), computerized physician order entry (M= 1.9), automated medication dispensing (M= 2.28), and smart infusion pumps (M= 2.34) were perceived as very helpful in reducing medication errors. Lastly, the several demographic characteristics, years of clinical experience (p= 0.01), and the years of attending pharmacology courses (p= 0.04) were found significantly related with medication errors. Results of this study have implications for the staff nurses, hospital administration, and the health care system in planning for interventions which reduce medication error and promote establishing of a safety culture.**

Conclusion: **Based on the findings of the current study, a multidisciplinary approach with administration and research, is needed to solve the problems of medication errors in the pediatric departments.**

Key words: **Pediatric nurses, medication, medication errors, emergency department, patient safety, Saudi Arabia**

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Clinical Relevance

Studies on medication errors are scarce in developing countries, and the present study was one of the first few relevant studies which explored medication administration errors in the pediatric wards in Saudi Arabia. Therefore, the study will ignite awareness concerning medication safety in Saudi Arabia and also encourage and ignite interest for future relevant studies. which promote medication safety.

Introduction

Medication errors (MEs) are the most common type of faults in the clinical environment. Each year, hospitalized patients experience 1.5 million preventable MEs related injuries and hospitals incur an additional $3.5 billion in costs. Several organizations now support measures to study and improve the safety of administering medications to promote patient safety (1) . MEs may be classified according to where they occur in the medication use cycle, i.e. at the stage of prescribing, dispensing, or administration of a drug (2) . One of the most important healthcare workers' last line of defense to protect against MEs are the nurses. Aside from checking the prescription and dispensing of drugs which are crucial, nurses ensure the right calculation, measurement and medication administration. A study from the nurses in America reported that potential adverse drug events in pediatric population were three times more than in adults. Thus, the risk of MEs tend to be higher in pediatric patients and more likely to lead to serious or fatal consequences as compared to adults (3) . Among all MEs, cases involving pediatric patients attract special attention due to their high incidence and injury rates. The Lan study reported that insufficient knowledge on pharmacology is the leading obstacle nurses encountered when administering medications, which are commonly due to inaccurate doses (4) . Thus, providing continuing education and double-checking dosages among nurses is highly recommended(1) .

For healthcare providers working in the emergency departments (EDs), rapid and accurate measurement of a child's height and weight upon arrival is critical for accurate medication dosing (5) . A misplaced decimal point can result in a tenfold dosing error. In addition, the weights of pediatric patients can change dramatically, thus frequent recalculation of drug doses is required. Children are a vulnerable group and have limited communication skills to warn their healthcare providers of the adverse effects that they experience. In addition, all children, especially neonates, have limited internal reserves that are vital for buffering (6) . The risk of medication errors tends to be higher in pediatric patients than in adults. Pediatric dosage of medicine is usually calculated individually according to the child age, weight, and body surface area as well as his/ her clinical condition. Even though many errors are caught before a drug is administered, MEs when not intercepted by nurses can result in adverse events. Because nurses are the ones who predominantly administer medications, they are often the last potential barrier between a medication error and harm. Nurses must ensure that patients receive the right medication, right dose, right route, right time and right evaluation for therapeutic and possible adverse events (6). Many hospitals have check and balance systems to promote patient safety during medication administration, however, there are still possibilities for error. The issues in MEs requires an examination of the causes and identifying methods for improving nurse competency and the administration process (7,8). Furthermore, the process of medication administration takes many steps, and in any of them, the nurse may commit MEs which are psychologically devastating to the nurse and harmful to the patient.

Nowadays with different accreditation bodies for hospitals, attention been given to different aspects of patient safety including medication administration and medication errors. MEs have been under-reported in the Middle Eastern regions including in Saudi Arabia since 1999 (9). Recently, safety issues in medication administration have started to gain attention by different nursing scholars and academics. A retrospective study was conducted among pediatric physicians' medication orders in Saudi Arabia and results showed MEs occur frequently with dosage error (10) . Tobaiqy and Stewart's study(11) showed wrong medications, wrong dose, inappropriate prescribing, inappropriate route, prescription duplication, and equipment failure were some of the reported MEs in Saudi Arabia. An Iranian MEs study identified that the rate of medication errors was found to be much more than what had been reported by nurses(12) . Studies on MEs as perceived by nurses are scarce in developing countries and this present study is just one of the few studies to be conducted on medication administration errors by pediatric nurses in the kingdom. Therefore, this study would serve to ignite awareness and encourage relevant studies to be conducted in the region. Thus, this study aimed to describe the factors which contribute to MEs in pediatric EDs and their perceptions toward the use of medication technology in reducing medication error.

Methods

Research Design: A descriptive cross sectional approach was utilized to describe the perception of nurses regarding MEs, the use of technology for medication administration, and to establish correlation between variables and the demographic data of the respondents.

Settings: The study was conducted in the tertiary health care facilities in Riyadh which were equipped with pediatric EDs. The selection of the setting was done in two phases: a primary survey to assess the availability of such pediatric EDs and the number of working staff nurses. There were 7 hospitals with pediatric EDs in Riyadh city and only two were selected based on the number of admissions and number of nurses working in the pediatric ED.

Subjects: The eligible respondents passed the following inclusion criteria: (1) working in pediatric emergency units in Riyadh, (2) experience of ≥ 3 months (3) voluntary

participation as respondent. A convenience sampling technique was utilized since the population was generally homogeneous, or individual units which were accessible to the researcher. A power analysis was utilized through Raosoft Incorporated which was used to calculate the sample size of 200 with an Alpha of .05, power of .80, and effect size of .50.

Data collection instrument: A self-administered questionnaire was used for data collection which was developed by the researchers. Part one of the instrument focused on demographic characteristics such as gender, age, nationality, marital status, economic status, highest level of education, years of clinical experience, time since attending pharmacology course and their relationship with their family and with other health care professionals. The other parts of the questionnaire were designed after reviewing literature to assess pediatric emergency nurses' perceptions of medication errors and their barriers to report the medication error. Therefore, the second part was questions on factors contributing to MEs and designed after using the Haddon Matrix as a commonly used matrix in injury prevention to look at factors related to personal attributes, agent attributes and environmental attributes; before, during and after an injury(13). These items were dose calculation, depth of medication knowledge, interruptions during the medication process, usefulness of policies and procedures related to medication administration, nursing workload, patient acuity, overtime hours per day and week, incomplete medication orders, lack of clinical expertise in the area one is working, newness to nursing practice, hostile or tense feelings during medication administration. The third part were items about the number of medication errors made by the nurse or a colleague that resulted in harm to a patient over the past year, or did not harm the patient and evaluated the number of medication errors that were reported in the past 12 months including those that caused harm to a patient and those that did not cause harm. The fourth part of the instrument assessed technologies used in decreasing MEs. Technology included in questions were: bar coded medication administration, computerized physician order entry, automated medication dispensing, and smart infusion pumps. In part five, eight items were developed to address pediatric nurses' perceptions for barriers to reporting (focus on the individual rather than the system, thinking colleagues will feel the nurse is incompetent, feeling the error is not important to report, fear of blame, reporting is time consuming, afraid of a reprimand, afraid of consequences, and feeling a near miss is not an error). Part six included factors which might increase the likelihood of medication error reporting. Seven statements were developed about violation of any of the "five rights" of medication administration, anonymous reporting process, safety of the patient has been compromised, benefits of reporting are identified by nurse, no fear of retaliation in the workplace, positive relationship with supervisor, and positive relationship with physicians the nurse works with on the unit. The last part was about communication errors and the items were about reporting the medication error to the patient, or to a family member if appropriate, and use of medication error report cards. All scales throughout the survey were developed in closed format using Likert-type responses utilizing several responses which included: "Never to Always", "Major Barrier to Not a Barrier", "Highly Likely to Highly Unlikely", "Strongly Agree to Strongly Disagree", and "Very Helpful to Not Helpful.

Validity: Face validity of the instrument was established via a comprehensive review of the literature in the area of medication administration errors and was established by reviewing previously published survey instruments on MEs. To establish content validity, the questionnaire was sent to an expert panel (n = 4) of reviewers that had strong expertise in survey research and medication error knowledge based on their publication success and minor changes were recommended.

Reliability: A convenience sample of 25 registered nurses working in the Riyadh area was considered for pilot testing to test the internal consistency of the items. The instrument was given to the nurses on two separate occasions. Internal consistency reliability was tested using Cronbach alpha on appropriate sections of all returned surveys.

Data Collection Method: After getting the approval from the selected hospitals' ethical committees, data were collected between January to June, 2012. Posters, as advertisements were posted in the units and interested respondents were advised to contact the researcher. The researcher oriented the respondents about the objectives of the study, and confidentiality of their responses and the benefits. Written informed consent was obtained from each respondent.

Ethical Considerations: Ethical approval was secured from the Institute Review Board of the university. Confidentiality of the information obtained was maintained to the best of the researcher 's ability. The names of the nurse respondents were not solicited or written down. No record other than informed consent documents, were kept of the nurse respondents ' identities. Efforts were taken to minimize the likelihood that any data could be tied to the identity of any participant.

Data Analysis: Analysis of data was done using SPSS 17.0 statistical software. Descriptive statistics such as frequencies, range of frequencies, percentages, means, and standard deviations was used to describe demographic data of respondents. In addition, independent t-tests, and analysis of variance (ANOVA) was calculated with appropriate post-hoc tests to determine if there were significant differences between the means. A significance level of .05 was used for all of the analysis.

Results

Demographic profile of the respondents. Table 1 shows that majority were females (93%), belonged to 30-39 age group (41%), non-Saudi (72.5%), married (66%), in good economic status (70%), bachelor degree graduate (60.5%), working as a nurse for >10 years (69%), and (60%) has attended pharmacology courses for 1-2 years.

Table 1: Demographic profile of the respondents

Variables		f	%
Gender	Male	14	7
	Female	186	93
Age	20-29	61	30.5
	30-39	82	41
	40-49	40	20
	50-59	17	8.5
Nationality	Saudi	55	27.5
	Non-Saudi	145	72.5
Marital status	Single	63	32
	Married	131	66
	Divorce	6	3
Economic status	Fair	20	10
	Good	140	70
	Excellent	40	20
Highest level of education	Diploma	75	38
	Bachelor	120	60.5
	Master	3	1.5
Years of clinical experience	0-5	17	8.5
	6-10	45	22.5
	>10	138	69
Years since attending pharmacology courses			
	<1	22	11
	1-2	120	60
	3-4	33	16.5
	5-6	25	12.5

f- frequency, %- percentage

Factors Contributing to MEs

Table 2 shows that interruption during medication pass (M= 2.32, SD= 0.67) is considered the main factor causing most medication errors, followed by shortage of nursing staff (M= 2.13, SD= 0.74), and caring for high acuity patients (M=2.11, SD= 0.73). The least reason to contribute to medication error is when ED pediatric nurses perceived the working environment as hostile (M= 1.56, SD= 0.64).

Table 2: Primary factors of medication errors as perceived by the nurses

Items	Never/ Rarely		Sometimes		Most/ Always		Mean	Standard Deviation	Rank
	f	%	f	%	f	%			
Nurse must calculate the dose of the drug	52	27	120	60	28	14	1.88	0.63	7
Nurse knowledge of medication being administered	62	31	90	45	48	24	1.93	0.74	5
Interruptions during medication pass	24	12	90	45	86	44	2.32	0.67	1
Unclear policy and procedures regarding medication administration	88	45	92	46	20	10	1.66	0.65	11
Short RN staff	44	22	86	44	70	35	2.13	0.74	2
Nurse caring for high acuity patients	40	22	94	46	66	33	2.11	0.73	3
Nurse works more than 12 hours in one shift	62	31	88	44	50	25	1.94	0.75	4
Nurse works more than 40 hours in one week	72	36	92	46	36	18	1.82	0.71	10
Incomplete medication order	66	33	92	47	42	21	1.89	0.72	6
Nurse not familiar with unit environment	62	31	112	56	26	14	1.82	0.65	9
Nurse has limited clinical knowledge	60	30	120	55	30	15	1.85	0.66	8
Hostile work environment	104	52	80	40	16	8	1.56	0.64	12

f- frequency %- percentage

Barriers of reporting and communication of medication errors. The major barrier for nurses is shown in Table 3. The item of that the nurse will be blamed got the highest mean (2.83), followed by that nurses are afraid of the consequences if they report a medication error with a mean (2.75) and nurses are afraid of a reprimand if they report a medication error that had a mean of (2.71). In contrast, nurses think that Reporting is too detailed and time consuming is a minor barrier in reporting the medication error as the mean for this item (2.48). For communication of medication errors Table 4 shows that the majority of nurses overwhelmingly agreed that medication errors should be communicated to the patient (70.0%). Nurses also agreed that the patients' family should be notified of an error when the patient is not capable of understanding (69.0%). In addition, over one-half (58.0%) of the nurses surveyed, felt the hospital should publish medication error report cards for the public to review.

Table 3: Perceived Barriers to Reporting Medication Errors by nurses working at emergency paediatric department

Item	Not a barrier		Minor barrier		Moderate barrier		Major barrier		Mean	Standard Deviation	Rank
	No	%	No	%	No	%	No	%			
At our facility the blame is put on the individual rather than looking at the system as a potential cause of the error	40	20	50	25	70	35	40	20	2.55	1.026	5
Others will think nurses are incompetent	30	15	70	35	70	35	30	16	2.515	0.935	7
Nurses think most errors are not important enough to report	40	20	20	10	120	60	20	10	2.6	0.9188	4
If something happens to the patient due to a medication error, the nurse will be blamed	30	15	30	15	84	43	56	28	2.835	1.0014	1
Reporting is too detailed and time consuming	40	20	56	28	72	36	32	16	2.48	0.9872	8
Nurses are afraid of a reprimand if they report a medication error is made	32	16	48	24	66	33	54	27	2.71	1.035	3
Nurses are afraid of the consequences that may result if they report a medication error	32	16	44	23	64	32	60	30	2.755	1.0538	2
If an error is prevented before it reaches the patient (near miss), it is not necessary to report	40	20	56	29	60	30	44	22	2.535	1.0461	6

Table 4: Distribution of the sample according to importance of communication of medication errors

Items	Strongly Agree /Agree		Undecided		Disagree / Strongly Disagree	
	No	%	No	%	No	%
-Medication errors should be reported to the patient when they occur.	140	70	52	26	8	4
-Medication errors should be reported to the patient's family, when the patient is not capable of understanding what has occurred.	138	69	46	23	16	8
-Medication error report cards for hospitals should be published for the public to review.	116	58	60	3	24	12

Use of Medication Technology in Reducing Medication Error Rate: Looking in Table 5, the majority of nurses perceived that smart infusion pumps (M= 2.34), automated medication dispensing (M= 2.28), computerized physician order entry (M=1.90), and barcode medication administration (M= 1.79) all were helpful in decreasing MEs. In addition, around (20%) to (39%) of the sample said that most solutions suggested to reduce medication error, is not available at their hospital.

Table 5: Perception of Medication Technology associated with Decreasing Medication Errors

Item	Very Helpful / Helpful		Slightly Helpful		Not helpful at all		Do Not Have Item			
	f	%	f	%	f	%	f	%	Mean	Rank
Smart Infusion Pumps.	128	64	20	10	12	6	40	20	2.34	1
Automated medication dispensing	120	60	16	8	24	12	40	20	2.28	2
Computerized physician order entry	110	55	10	5	10	5	70	35	1.90	3
Barcode Medication Administration	100	50	14	7	8	4	78	39	1.79	4

f- frequency %- percentage

Relationship between MEs and Demographic Profile. As shown in Table 6 (next page), nationality (p= <0.001, p= 0.001), economic status (p= 0.02, p< 0.01), and age (p = 0.01, p=0.01) were significantly correlated to medication error whether not causing harm or harmed the pediatric patient. The number of years of clinical experience (p= 0.01), and years of attending pharmacology course were found to be significantly (p= 0.04) correlated with MEs which harmed the patients in the pediatric EDs.

Discussion

Several characteristics of the ED nurses were associated with the MEs which either cause harm or did not cause harm to the pediatric patients. Similar with the findings, the age of the ED pediatric nurses has been linked to MEs. According to Davis (14(, age is an essential factor on how pediatric nurses closely followed the policies in medication administration. Age was also found to be significantly correlated with medication administration errors among nurses coming from 2 regional hospitals in Riyadh Saudi Arabia(15). The correlation of nationality to MEs can be attributed to communication errors as non-Saudi nationals may be caring and giving medications to a Saudi national patient. In Saudi Arabia nursing care is a mixture of different nationalities. The cultural diversity of those nurses implies concern about their ability to communicate between themselves and with their patients, Alharbi's study identified that most of the nurses had used another language to give nursing care due to cultural diversity (16). According to Albougami(17), current literature of MEs in Saudi Arabia imply that communication and language maybe linked. The author added that the errors in health care service delivery in the kingdom may be attributed to communication challenges between non-Saudi and Saudi healthcare personnel as well as between non-Saudi and Saudi patients, however, the direct effect has not been comprehensively studied. No scientific literature can support the correlation of the economic status of the ED pediatric nurses to the probability of committing MEs. However, this present study identified that most of the ED nurses with lower salaries are the newly hired or novices who still lack working experience compared to those with higher salaries who have been promoted to a higher rank. The economic status of the ED pediatric nurses is parallel to the length of working experience. The correlation of years of working experience and MEs in this study was congruent with the study of Aboshaiqah(15) with nurses working in Saudi Arabia and in contrast with the study of Chang which showed that there was no significant relationship between number of errors and years of experience for either errors causing harm or "no harm"(18) .

Nurses need pharmacology knowledge for accurate medication administration, patient assessment, patient education, and for some nurses for prescribing; however, less time was spent in pharmacology education during the college program(19). Thus, the theory-practice gap leads to a number of identified anxieties related to insufficient preparation. In a clinical audit by Morrow-Frost (2006), the more experienced nurses are more knowledgeable than the nurses with less working experience. However, the less experienced nurses were more willing to admit that they cannot provide concrete and correct answers(20)

Also, new nursing interns and staff nurses have been found to have poorer mathematical skills than physicians and pharmacists(6) .

Factors that are contributing to medication errors

The reasons for MEs among ED pediatrics nurses were similar to the findings from other studies carried out in USA, Australia and Turkey. They identify the factors that

Table 6: Chi square test result between relationship with medication error

Nurse characteristics	Medication error that did not cause harm to patient		Medication error that caused harm to patient	
	chi-square value	p- value	chi-square value	p-value
Gender	2.91	0.23	0.55	0.76
Nationality	18.29	0.00*	9.77	0.01*
Marital status	5.32	0.26	3.19	0.53
Economic status	9.18	0.02*	23.69	0.00*
Degree	11.68	0.05	5.045	0.28
Age	18.06	0.01*	16.62	0.01*
Relationship with head nurse	0.17	0.92	2.89	0.24
Relationship with nurse colleagues	1.53	0.47	1.13	0.57
Relationship with physicians	1.26	0.54	4.49	0.12
Relationship with pharmacists	0.10	0.95	3.46	0.18
Relationship with family	1.47	0.48	0.14	0.93
Years of clinical experience since graduation	14.15	0.01*	9.36	0.05
Years since attending any pharmacology education	16.37	0.04*	9.11	0.33

*significant

contribute to errors such as work load, high patient: nurse ratio causes work-load time pressure leading to calculation errors and the medication could not be administrated at the right time. In the present study, the ED pediatric nurses perceived interruptions as the topmost reason for MEs. This finding agrees with international studies wherein pediatric nurses perceived interruptions or distractions as contributory factors to medications errors among pediatric patients(21,22). Interruption distracted the attention of the nurses during the preparation and administration of the medications and caused calculation errors. Correspondingly to previous studies, the high nurse to patient ratio and workload stress renders nurses unable to carry out their professional role (7) and will more likely contribute to MEs by the ED pediatric nurses (14,21,22,23,24. In nurse staffing, the high nurse to patient ratio will consequently lead to increased workload which commonly occurs in the tertiary health care facilities in Saudi Arabia. With the chronic shortage of nurses, the kingdom has been suffering from shortage of nurses and low production of Saudi nursing graduates with increasing turnovers of expatriate nurses. Furthermore, the shortage consequently demands an increasing number of hours by the other staff nurses as a compromise to staffing issues. Thus, overtime schedules become prevalent which is a determinant of burn-out and low work performance which contributes to MEs among pediatric nurses (25). Also, the finding that high acuity pediatric cases contribute to MEs was similar to the finding of Davis(14) which explained that due to the complexity of cases in pediatric patients, higher incidence of MEs was noticed compared to than adult patients. Several studies (22,26,27) showed that the overall experience of pediatric clients who are sensitive to drug reactions will more likely contribute to errors.

Barriers of reporting and communication of medication errors

The top three barriers to reporting errors identified in the current study were: nurses are afraid, the nurses will be blamed, and a reprimand if they reported medication error. Thesefindings are congruent with a study(28) which revealed that fear was found to be barrier for reporting MEs in addition to knowledge, burden of work, and excusing the error. Another study(29) identified four major subscales in relation to barriers to reporting medication errors, which included: disagreement over whether it was an error, reporting effort, fear, and administrative response. The barriers identified in the current study were included under the subscales, fear and administrative response. As most of the accreditation of healthcare organizations has required disclosure of adverse outcome as an ethical obligation(30). In the current study nurses agreed overwhelmingly that medication errors should be

contribute to errors such as work load, high patient: nurse ratio causes work-load time pressure leading to calculation errors and the medication could not be administrated at the right time. In the present study, the ED pediatric nurses perceived interruptions as the topmost reason for MEs. This finding agrees with international studies wherein pediatric nurses perceived interruptions or distractions as contributory factors to medications errors among pediatric patients(21,22). Interruption distracted the attention of the nurses during the preparation and administration of the medications and caused calculation errors. Correspondingly to previous studies, the high nurse to patient ratio and workload stress renders nurses unable to carry out their professional role (7) and will more likely contribute to MEs by the ED pediatric nurses (14,21,22,23,24. In nurse staffing, the high nurse to patient ratio will consequently lead to increased workload which commonly occurs in the tertiary health care facilities in Saudi Arabia. With the chronic shortage of nurses, the kingdom has been suffering from shortage of nurses and low production of Saudi nursing graduates with increasing turnovers of expatriate nurses. Furthermore, the shortage consequently demands an increasing number of hours by the other staff nurses as a compromise to staffing issues. Thus, overtime schedules become prevalent which is a determinant of burn-out and low work performance which contributes to MEs among pediatric nurses (25). Also, the finding that high acuity pediatric cases contribute to MEs was similar to the finding of Davis(14) which explained that due to the complexity of cases in pediatric patients, higher incidence of MEs was noticed compared to than adult patients. Several studies (22,26,27) showed that the overall experience of pediatric clients who are sensitive to drug reactions will more likely contribute to errors.

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The top three barriers to reporting errors identified in the current study were: nurses are afraid, the nurses will be blamed, and a reprimand if they reported medication error. Thesefindings are congruent with a study(28) which revealed that fear was found to be barrier for reporting MEs in addition to knowledge, burden of work, and excusing the error. Another study(29) identified four major subscales in relation to barriers to reporting medication errors, which included: disagreement over whether it was an error, reporting effort, fear, and administrative response. The barriers identified in the current study were included under the subscales, fear and administrative response. As most of the accreditation of healthcare organizations has required disclosure of adverse outcome as an ethical obligation(30). In the current study nurses agreed overwhelmingly that medication errors should be communicated to the patient or to the family if the patient is not capable of understanding what has occurred.

Conclusions

The results of the current study have implications for patient well-being and how to minimize MEs. Based on the findings, a multidisciplinary approach between the organization and research is needed to solve the problems of MEs among pediatric nurses working in the emergency pediatric units. In the clinical environment, institutional responsibility to prepare and implement educational strategies and the system can be strengthened by embedding training from orientation and continuing at all levels to meet the needs of the nurses. A quality review system to review drug use and MEs, and implementing computerized physician order entry (CPOE) or other technological innovations which is recommended by the American Academy of Pediatrics be implemented to reduce errors. An integrative approach such as increased communication through education forums, the presence of a clinical pharmacist as a team leader and no-punitive approach by medical and nursing leadership could be alternative changes that can positively affect patient outcomes. For future studies, identifying types of interruptions which may cause MEs and strategies to decrease errors to be used during medication preparation and administration, is recommended.

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PHYSICAL INACTIVITY OR AN EXCESSIVE EATING HABIT

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Abstract

Background: We tried to understand possible effects of physical inactivity and an excessive eating habit on excess weight.

Methods: We took consecutive patients between the ages of 35 and 70 years to be able to see possible consequences of excess weight on health and to avoid debility induced weight loss in elder individuals.

Results: The study included 270 cases (145 females) with normal weight, 270 cases with overweight, and 270 cases with obesity. Female ratio was 53.7% in the three groups. Mean ages were 47.1, 46.3, and 48.9 years in the three groups, respectively ($p>0.05$ for both). As a pleasure point in life, smoking did not show higher prevalences in the overweight or obesity groups, and its prevalences were similar in the three groups (35.9%, 32.9%, and 33.7%, respectively, $p>0.05$ for both). On the other hand, prevalences of hypertension (HT) (8.1%, 13.7%, and 21.8%), diabetes mellitus (DM) (9.6%, 20.0%, and 28.5%), and dyslipidemia (19.2%, 32.5%, and 40.3%) showed highly significant increases from the normal weight towards the overweight and obesity groups, respectively ($p<0.001$ nearly for all).

Conclusion: Parallel to its severity, excess weight is associated with greater prevalences of HT, DM, and dyslipidemia. As a pleasure point in life, smoking may also show the weakness of volition to control eating in cases with excess weight. But excess weight may actually be a consequence of physical inactivity instead of an excessive eating habit because prevalences of smoking were similar in the normal weight, overweight, and obesity groups in the present study.

Key words: Physical inactivity, excessive eating habit, excess weight, smoking, metabolic syndrome

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Introduction

Due to the prolonged survival of human being, systemic atherosclerosis may be the major health problem in this century, and its associations with some metabolic disorders and smoking are collected in the box of metabolic syndrome in the literature (1, 2). The syndrome is characterized by a chronic low-grade inflammatory process on vascular endothelium all over the body (3). The inflammatory process is exaggerated by some factors including aging, physical inactivity, excess weight, smoking, alcohol, chronic infection and inflammations, and cancers (4, 5). The inflammation can be slowed down with lifestyle changes, diet, and exercise (6). The syndrome contains some reversible indicators including overweight, white coat hypertension (WCH), impaired fasting glucose (IFG), impaired glucose tolerance (IGT), hypertriglyceridemia, hyperbetalipoproteinemia, dyslipidemia, alcohol, and smoking for the development of irreversible consequences including obesity, hypertension (HT), type 2 diabetes mellitus (DM), chronic obstructive pulmonary disease (COPD), cirrhosis, chronic renal disease (CRD), peripheric artery disease (PAD), coronary artery disease (CAD), and stroke (7). The syndrome has become increasingly common all over the world, and 50 millions of people in the United States were affected (8). The inflammation induced accelerated atherosclerosis all over the body may be the leading cause of early aging and premature death for both genders all over the world. Similarly, smoking kills one in every ten adults globally, and if the current trend continues, it will kill one in every six adults by 2030 (9). Some studies revealed that the increase in body weight by aging was found as lower in smokers (10), and there was an increase in body weight after smoking cessation (11). As a pleasure point in life, smoking may also show the weakness of volition to control eating in the metabolic syndrome. We tried to understand possible effects of physical inactivity and an excessive eating habit on the development of excess weight in the present study.

Material and methods

The study was performed in the Internal Medicine Polyclinic of the Dumlupinar University between January and October 2006. We took consecutive patients between the ages of 35 and 70 years to be able to see the possible consequences of excess weight on health. Cases above the age of 70 years were excluded to avoid debility induced weight loss in elder individuals. Their medical histories including smoking habit and already used medications were learnt, and a routine check up procedure including fasting plasma glucose (FPG), low density lipoproteins (LDL), triglycerides, and high density lipoproteins (HDL) was performed. Current daily smokers for the last 12 months, and cases with a history of smoking for five pack-years were accepted as smokers. Cigar or pipe smokers were excluded. Insulin using diabetics and patients with devastating illnesses including malignancies, acute or chronic renal failure, chronic liver diseases, hyper- or hypothyroidism, and heart failure were excluded to avoid their possible effects on weight. Body mass index (BMI) of each case was calculated by the measurements of the Same Internist instead of verbal expressions. Weight in kilograms is divided by height in meters squared, and obesity is defined as a BMI of 30 kg/m2 or greater, overweight between 25.0 and 29.9 kg/m2, and normal weight between 18.5-24.9 kg/m2 (12). Cases with a BMI of less than 18.5 kg/m2 were excluded. Office blood pressure (BP) was checked after a 5-minute of rest in the seated position with the mercury sphygmomanometer on three visits, and no smoking was permitted during the previous 2-hour. A 10-day twice daily measurement of blood pressure at home (HBP) was obtained in all cases due to the risk of masked HT after a 10-minute education about proper BP measurement techniques (13). The education included recommendation of upper arm while discouraging wrist and finger devices, using a standard adult cuff with bladder sizes of 12 x 26 cm for arm circumferences up to 33 cm in length and a large adult cuff with bladder sizes of 12 x 40 cm for arm circumferences up to 50 cm in length, and taking a rest at least for a period of 5-minute in the seated position before measurements. HT is defined as a BP of 135/85 mmHg or greater on average HBP measurements (14). Cases with an overnight FPG level of 126 mg/dL or greater on two occasions were defined as diabetics. An oral glucose tolerance test with 75-gram glucose was performed in cases with a FPG level between 100 and 125 mg/dL, and diagnosis of cases with a 2-hour plasma glucose level of 200 mg/dL or greater is DM. Additionally, dyslipidemia is diagnosed if the level of LDL is 160 mg/dL or greater and/or a triglyceride level of 200 mg/dL or greater and/or a HDL level of lower than 40 mg/dL (12). We detected cases with normal weight initially, and then age and sex-matched cases with overweight and obesity were included into the study. Prevalences of smoking, HT, DM, and dyslipidemia were detected in each group, and results were compared in between. Mann-Whitney U Test, Independent-Samples T Test, and comparison of proportions were used as the methods of statistical analyses.

Results

The study included 270 cases (145 females) with normal weight, 270 cases with overweight, and 270 cases with the obesity. Female ratio was the same (53.7%) in the three groups. Mean ages were similar in them (47.1, 46.3, and 48.9 years, respectively, $p>0.05$ for both). As a pleasure point in life, smoking did not show higher prevalences in the overweight and obesity groups, and its prevalences were similar in the three groups, too (35.9%, 32.9%, and 33.7%, respectively, $p>0.05$ for both). On the other hand, prevalences of HT (8.1%, 13.7%, and 21.8%), DM (9.6%, 20.0%, and 28.5%), and dyslipidemia (19.2%, 32.5%, and 40.3%) showed highly significant increases from the normal weight towards the overweight and obesity groups, respectively ($p<0.001$ nearly in all steps) (Table 1).

Table 1

Variables	Normal weight	*p*-value	Overweight	*p*-value	Obesity
Number	270		270		270
Female ratio	53.7%	Ns*	53.7%	Ns	53.7%
Mean age (year)	47.1 ± 6.3 (35-70)	Ns	46.3 ± 5.4 (35-70)	Ns	48.9 ± 6.7 (35-70)
Prevalence of smoking	35.9%	Ns	32.9%	Ns	33.7%
Prevalence of HT†	***8.1%***	***<0.001***	***13.7%***	***<0.001***	***21.8%***
Prevalence of DM‡	***9.6%***	***<0.001***	***20.0%***	***<0.001***	***28.5%***
Prevalence of dyslipidemia	***19.2%***	***<0.001***	***32.5%***	***<0.01***	***40.3%***

*Nonsignificant (p>0.05) †Hypertension ‡Diabetes Mellitus

Discussion

A chronic low-grade inflammation on vascular endothelium may actually be exaggerated by some metabolic factors for the development of systemic atherosclerosis, and the symptomatic atherosclerosis may be the leading cause of early aging and premature death for both genders all over the world. Aging, physical inactivity, excess weight, smoking, alcohol, chronic infection and inflammations, and cancers may be the most common causes of the systemic vascular endothelial inflammation at the moment (15). Definition of the metabolic syndrome or aging syndrome or accelerated endothelial damage syndrome includes reversible risk factor and indicators such as physical inactivity, overweight, smoking, alcohol, WCH, IFG, IGT, hypertriglyceridemia, hyperbetalipoproteinemia, and dyslipidemia for the development of irreversible consequences such as obesity, HT, DM, COPD, cirrhosis, CRD, PAD, CAD, stroke, early aging, and premature death (16, 17). In the previous study (18), prevalences of hypertriglyceridemia, hyperbetalipoproteinemia, dyslipidemia, IGT, and WCH had parallel fashions to excess weight by increasing until the seventh decade and decreasing afterwards ($p<0.05$ nearly in all steps). On the other hand, prevalences of HT, DM, and CAD always continued to increase without any decrease by decades ($p<0.05$ nearly in all steps) indicating their irreversible properties (18). After development of one of the terminal consequences, the nonpharmaceutical approaches will probably provide little benefit to prevent development of the others due to cumulative effects of the factors on the vascular endothelium for a long period of time all over the body (19, 20).

Obesity may also be found among one of irreversible consequences of the metabolic syndrome because after the development of obesity, nonpharmaceutical approaches provide limited success to heal obesity. Excess weight may also lead to a chronic low-grade inflammation on vascular endothelium all over the body, and risk of death from all causes including cardiovascular diseases and cancers increases parallel to severity of excess weight in all age groups (21). The chronic low-grade inflammation on vascular endothelium may even cause genetic changes in the cells, and the systemic atherosclerosis may decrease clearance of malignant cells by the immune system, effectively (22). Effects of excess weight on BP were shown previously that the prevalence of sustained normotension (NT) was significantly higher in the underweight (80.3%) than the normal weight (64.0%) and overweight cases (31.5%, $p<0.05$ for both) (23), and 52.8% of cases with HT had obesity against 14.5% of cases with sustained NT ($p<0.001$) (24). So the major component of the metabolic syndrome appears as excess weight, which is probably the main cause of insulin resistance, dyslipidemia, IGT, and WCH by means of a chronic low-grade inflammatory process on vascular endothelium (6). Stopping of weight gaining with physical activity or diet, even in the absence of a prominent weight loss, probably results with resolution of many parameters of the syndrome (25, 26). But according to our opinion, limitation of excess weight as an excessive fat tissue in or around abdomen under the heading of abdominal obesity is meaningless instead it should be defined as overweight or obesity by means of BMI since adipocytes function as an endocrine organ by producing a variety of cytokines and hormones in everywhere of the body (6). The resulting hyperactivities of sympathetic nervous system and renin-angiotensin-aldosterone system are probably associated with the chronic low-grade inflammation on vascular endothelium terminating with insulin resistance and an elevated BP. Similarly, the Adult Treatment Panel III reported that although some people classified just as overweight with a large muscular mass, most of them actually have excessive fat tissue, too (12).

Smoking is a major risk factor for the development of atherosclerotic endpoints such as CAD, PAD, COPD, cirrhosis, CRD, and stroke (22, 27). Its atherosclerotic effects are the most obvious in Buerger's disease which is an obliterative disease characterized by inflammatory changes in small and medium-sized arteries and veins.

It has never been seen in nonsmokers. Although the obvious strong atherosclerotic effects, some studies reported that smoking in human beings and nicotine administration in animals are associated with a decreased body weight (28). Evidence revealed an increased energy expenditure during smoking both on rest and light physical activity (29), and nicotine supplied by patch after smoking cessation decreased caloric intake in a dose-related manner (30). According to an animal study, nicotine may lengthen intermeal time, and simultaneously decreases amount of meal eaten (31). Additionally, body weight seems to be the highest in former, the lowest in current and medium in never smokers (32). Smoking may be associated with postcessation weight gain, but evidence suggests that risk of weight gain is the highest during the first year after quitting and declines over the years (33). Similarly, although the CAD was detected with similar prevalences in both genders (7), prevalences of smoking and COPD were higher in males with CAD against the higher prevalences of excess weight, WCH, hyperbetalipoproteinemia, hypertriglyceridemia, HT and DM in females with CAD. This result may indicate both the strong atherosclerotic and weight decreasing roles of smoking. Similarly, the incidence of myocardial infarction is increased six-fold in women and three-fold in men who smoke at least 20 cigarettes per day compared to the never smoked individuals (34). In another definition, smoking may be more harmful for women about atherosclerotic endpoints probably due to the associated excess weight. Eventually, smoking is a strong atherosclerotic risk factor with some suppressor effects on appetite.

Smoking-induced weight loss may actually be a result of the chronic low-grade inflammatory process on vascular endothelium all over the body (35) since loss of appetite is the major symptom of inflammations in the body. Physicians can even understand healing of the patients from their normalizing appetite. Several toxic substances found in cigarette smoke get into the circulation by means of the respiratory system, and they probably cause a subclinical vascular endothelial inflammation until clearance from the circulation. But due to the continuous smoking habit of the individuals, the clearance process never terminates. So the patients become ill with loss of appetite, continuously. In another definition, smoking-induced weight loss is an indicator of being ill instead of being healthy in smokers (30-32). After smoking cessation, lost appetite comes back with a prominent weight gaining in the patients but the returned weights are their physiological or actual weights. On the other hand, as a pleasure point in life, smoking may also show the weakness of volition to control eating in the metabolic syndrome, so it comes with additional excess weight and its consequences although some inhibitory effects on appetite. Similarly, prevalences of HT, DM, and smoking were the highest in the highest triglycerides having group as another significant indicator of the metabolic syndrome (17).

As a conclusion, parallel to its severity, excess weight is associated with greater prevalences of HT, DM, and dyslipidemia like significant health problems. As a pleasure point in life, smoking may also show the weakness of volition to control eating in cases with excess weight. But excess weight may actually be a consequence of physical inactivity instead of an excessive eating habit since prevalences of smoking were similar in the normal weight, overweight, and obesity groups in the present study.

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THE PALLIATIVE CARE NURSE

Palliative Care

medi+WORLD International 2013

Case Presentation

Mrs Hakouz was diagnosed with breast cancer six years prior to seeing you.

Her treating physician requests you provide at home care. She tells you her right hip has been painful for one week. You schedule a long home visit for that day.

There has been no history of trauma to Mrs Hakouz's hip. When the pain has been particularly bad, she has taken paracetamol tablets once or twice a day and they helped relieve the pain.

Your colleague saw Mrs Hakouz several days ago, when you were on leave and ordered an X-ray of her right hip. The X-ray findings were normal.

Given that Mrs Hakouz's pain has responded to prn doses of paracetamol, it is likely that 4 hourly paracetamol would control her pain. If 4 hourly paracetamol does not control her pain, then Mrs Hakouz needs to be told to report this to you.

If Mrs Hakouz's pain is not well controlled, initiate an opioid, such as morphine or oxycodone, rather than codeine. Morphine and oxycodone are much more flexible than codeine in terms of dose escalation.

Once the cause of the pain is established, appropriate adjuvant analgesics (e.g. corticosteroids) and other modalities (eg. radiotherapy) should be considered.

The bone scan confirms an isolated metastasis in Mrs. Hakouz's right hip.

Question

Which of the following statements about morphine are true?

One or more may be correct

1. Cancer patients commonly develop rapid tolerance to the analgesic effect of morphine.
2. There is a ceiling dose for morphine given to patients with cancer pain.
3. Oral morphine causes significant respiratory depression in the majority of cancer patients.
4. Morphine use in cancer patients carries a high risk of psychological dependence.
5. Under dosing with morphine is the main reason cancer patients suffer unrelieved pain.

Answers and Feedback

1. Cancer patients commonly develop rapid tolerance to the analgesic effect of morphine.
The authors disagree.

Increases in opioid doses in palliative care patients are probably due either to increasing nociceptive pain signals due to disease progression and/or tolerance. Tolerance is a pharmacodynamic property in which an increase in dose is required to produce the same level of effect. Some degree of tolerance probably occurs in most patients who receive opioids during the course of a terminal illness, so the therapeutic index may decrease. However this tends to be a gradual process rather than a rapid one. Tolerance is not considered to be a barrier to the provision of adequate analgesia.

2. There is a ceiling dose for morphine given to patients with cancer pain.

The authors disagree.

There is no ceiling dose for morphine in the management of cancer pain. The individual patient's analgesic needs should determine the way in which the morphine dose is titrated. The correct morphine dose is one that results in pain control without the presence of intolerable side effects. It is also important not to continue escalating the dose of morphine if the response is minimal or short term. In such cases, a different approach to pain management is required, ie. the use of other analgesic drug classes, route changes, interventions (eg. neurolysis) or treatment of the underlying disease.

3. Oral morphine causes significant respiratory depression in the majority of cancer patients.

The authors disagree.

In practice, significant respiratory depression is uncommon in patients where the morphine dose is gradually titrated according to individual needs. Respiratory pain can be reversed by giving naloxone, but this may precipitate severe pain.

Exceptions include:

- patients at risk of respiratory failure from other causes
- patients with impaired renal function
- opioid naïve patients
- patients receiving an excessive dose of morphine and/or too often
- patients who have had a procedure (eg. nerve block) to acutely relieve their pain.

4. Morphine use in cancer patients carries a high risk of psychological dependence.

The authors disagree.

As the risk of psychological dependence in cancer patients taking morphine is extremely low, fear of addiction should not be a reason to delay prescribing it. One needs to bear in mind that the majority of cancer patients will remain on a regular opioid until they die, so the issue of addiction does not arise. If the drug needs to be ceased, this can be done gradually (e.g. reducing the amount by 20-25% per day) so that effects of psychological dependence are avoided or minimised.

Exception: A small number of patients with a past history of drug abuse or psychiatric illness.

5. Under dosing with morphine is the main reason cancer patients suffer unrelieved pain.

The authors agree.

Unfortunately a varying degree of apprehension or reticence about using opioid drugs still exists amongst some doctors and patients. Doctors who still believe some or all of the common morphine myths may be reluctant to prescribe adequate doses.

Morphine, used appropriately, does not hasten death.

Morphine myths continued...

Question

Which of the following statements about morphine are true?

One or more may be correct

1. The early use of morphine for cancer patients reduces the likelihood of it being useful later.

2. A withdrawal syndrome is difficult to avoid if the dose of morphine is gradually reduced before complete cessation.

3. Severe pain requires parenteral morphine, even if a patient can swallow.

4. Morphine should be given on an 'as required' basis in chronic cancer pain.

5. Patients do not become tolerant to the sedative effects of morphine when it is used to treat chronic cancer pain.

Answers and Feedback

1. The early use of morphine for cancer patients reduces the likelihood of it being useful later.

The authors disagree.

Morphine has a wide therapeutic range, so it can be titrated according to the need of each individual patient.

There are many cancer patients who take morphine for several years before their death. The dose of morphine is simply increased as/if required.

2. A withdrawal syndrome is difficult to avoid if the dose of morphine is gradually reduced before complete cessation.

The authors disagree.

The main reason for ceasing morphine in a cancer patient would be that pain relief had been successfully achieved by another treatment, eg. surgery or radiotherapy. If the patient's dose of morphine was gradually reduced by 20-25% per day, then withdrawal symptoms should be minimised or avoided.

3. Severe pain requires parenteral morphine, even if a patient can swallow.

The authors disagree.

Analgesics should be prescribed orally whenever possible.

Oral morphine is as effective in providing analgesia as the equivalent dose of parenteral morphine. (The oral to parenteral conversion ratio for morphine is 3:1).

4. Morphine should be given on an 'as required' basis in chronic cancer pain.

The authors disagree.

To effectively prevent pain, analgesia is best given regularly rather than as required.

Analgesia also needs to be prescribed on as as needed (prn) basis for breakthrough or incident pain eg. prior to showering.

5. Patients do not become tolerant to the sedative effects of morphine when it is used to treat chronic cancer pain.

The authors disagree.

It is not unusual for patients to feel drowsy during the first few days of commencing morphine, however the drowsiness is generally mild and tends to settle within several days.

Further information

In order to facilitate compliance, it is important patients be informed of this side effect. They should also be assured the drowsiness is likely to improve in 2-5 days and it is worth perservering with the treatment.

In summary, it is essential the treating doctor dispels any myths their patient may have regarding the taking of morphine. It is also important to emphasise that patients can live for a long time while taking morphine, and how it can improve quality of life by providing good pain control.

(continued next page)

Further history

Mrs Hakouz agrees to commence oral morphine after her concerns have been addressed. She also continues to take Naproxen tablets, 500mg bd.

Question

Given that Mrs Hakouz is "opioid naive" (is not currently taking any opioids), what dose of morphine mixture (immediate release morphine = IRM) would you prescribe for the next 24 hours, and how often should it be administered?

Authors' answer

Morphine mixture 5 - 10 mg 4 hourly

10mg morphine mixture is the usual starting dose for a 50 year old opioid naive patient.

Morphine mixture is available in the following strengths: 1mg/ml., 5mg/ml., 10mg/ml, 20 mg/ml and 40 mg/ml.

Effective management of cancer pain involves giving analgesia at regular intervals rather than when required.

The aim is to prevent the pain recurring before the next dose of analgesia is taken.

Question

Which of the following is/are TRUE of the dose of morphine mixture in an opioid naive patient?

An elevated creatinine of 300 mmol/L would not alter my starting dose of morphine.

Authors' answer

The statement is FALSE.

The major metabolites of morphine are dependent on renal excretion. Therefore a patient with impaired renal excretion needs a lower starting dose of morphine than a patient with normally functioning kidneys.

Question

It is appropriate to initiate a lower than usual dose of morphine mixture eg. 2.5 - 5 mg 4 hourly for a frail 75 year old lady

Authors' answer

This statement is TRUE.

Start with a lower dose in an elderly and/or frail patient. The major metabolites of morphine are dependent on renal excretion. An elderly frail patient is more likely to experience side-effects such as confusion or drowsiness if they are commenced on the standard morphine dose. Reasons for this could include renal impairment, low body weight and multiple drug interactions.

Question

It is appropriate to make the same percentage increase in the daily dosage of morphine mixture in a frail 75-year-old patient as for a 50-year-old patient.

Authors' answer

This statement is FALSE.

Increasing the dose of regular 4 hourly morphine mixture slowly and gradually by approximately 30% rather then the usual 50% is appropriate in managing a frail and/or elderly patient's pain. The major metabolites of morphine are dependant on renal excretion. An elderly, frail patient is more likely to experience side effects such as confusion or drowsiness if the regular dose of morphine is increased too quickly. Reasons for this could include renal impairment, low body weight and multiple drug interactions.

Question

What dose of morphine mixture prn (if any) would you prescribe for Mrs Hakouz's breakthrough pain on the day that you initiate regular morphine mixture ?

Author's answer

Morphine mixture 5 mg orally pm for extra pain

The goal of treatment is to achieve the best possible pain control.

It is therefore necessary to prescribe a breakthrough dose of morphine to supplement the regular 4 hourly dose in case the patient experiences pain between the regular doses of morphine. This breakthrough dose is prescribed prn

and is an important strategy in managing pain. It enables a more rapid attainment of an effective dose of morphine and is important in managing incident pain eg. prior to showering. It is also likely to save you from being telephoned in the middle of the night by a palliative care nurse requesting a prn morphine order.

Some palliative care doctors choose to initiate oral morphine in opioid naive patients using sustained release preparations such as Kapanol or MS Contin.

Question

What dose of sustained release morphine would you prescribe for Mrs Hakouz?

Author's answer

Available sustained release of morphine are:

* kapanol 10, 20, 50, 100 mg capsules daily or bd.

* Ms contin 5, 10, 30, 60, 100, 200 mg tablets bd.

* Ms mono 30, 60, 90, 120 mg capsules daily

The standard starting dose of sustained release morphine for opiod naive patients is generally considered to be 20 mg bd or 40 mg daily.

Question

What dose of morphine mixture prn (if any) would you prescribe for breakthrough pain if you planned to initiate sustained release morphine in the form of Kapanol 20mg bd or 40 mg daily?

Author's answer

Morphine mixture 5 mg orally prn for extra pain.

It is essential to prescribe a top-up dose of morphine mixture to supplement the regular dose of sustained release preparations of morphine. The goal of treatment is to achieve the best possible pain control. It is therefore essential to prescribe a breakthrough dose of morphine mixture to supplement the regular 4 hourly dose in case the patient experiences pain between the regular doses of morphine. This breakthrough dose is prescribed prn and is an important strategy in managing uncontrolled pain.

Continuing history

In the past, Mrs Hakouz has experienced nausea from both pethidine (given during labour) and panadeine forte, prescribed for the pain of impacted wisdom teeth many years ago.

Question

Should a regular anti-emetic be prescribed for Mrs Hakouz when morphine mixture is initiated? Yes or No?

Author's answer

Yes. Given her past history of anusea from two different opiods, it would be appropriate to prescribe a regular prophylactic anti - emetic when morphine was initiated. Example of anti - emitic include: - maxolon (metoclopramide) 10 mg tablets qid - stemetil (prochlorperazine) 5 mg tablets tds or qid - Haloperidol 0.5 mg - 1 tablet tds.

The anti - emetic can be discontinued after 5 to 7 days, as the vomitingg centre is likely to have settled by then.

Question

Would you prescribe a prophylactic laxative for Mrs Hakouz?

Author's answer

The aim of perscribing a laxative with opioids is to prevent the almost universal predictable side affect of constipation. Examples of prophylactic laxative are: -

Coloxyl with senna 1- 2 tablets daily, up to tds, or

Lactulose or sorbitol 20 mls daily up to tds.

(continued)

Continung history

Mrs Hakouz is commenced on 10mg morphine mixture 4 hourly (at 0630, 1030, 1430 and 1830). She is also ordered a double dose at 2230 with the aim of keeping her pain free overnight. She also takes four top up doses of 5mg morphine mixture over 24 hours.

Question

If after 24 hours, Mrs Hakouz's pain had improved by about 50%, how much morphine would you prescribe over the next 24 hours? (include your dose of morphine mixture prn).

Author's answer

15 mg morphine mixture 4 hourly (at 0630, 1030, 1430 & 1830) and 30 mg at 2230, plus morphione mixture 5 mg prn.

Mrs Hakouz took 80 mg morphine over the previous 24 hours (10+10+10+10 +20+5+5+5+5). It is usual to increase the regular 4 hourly dose of morphine by 30 - 50% depending on clinical observation, breakthrough requirements , incident pain and physiological parameters such as renal function.

Recommended dose escalations for regular 4 hourly morphine mixture are as follows:

5mg 10mg

10mg 15mg

15mg 20mg

20mg 30mg

The breakthrough range for morphine mixture 2-4 hourly prn is usually 30-50% of the regular hourly dose.

Some patients who are prescribed regular 4 hourly morphine mixture may not understand the concept of top-up/ breakthrough doses. This means they do not take any top-up doses, and their pain remains poorly controlled.

Question

If Mrs Hakouz was such a patient, what dose of morphine would you order for her over the next 24 hours if the original regular dose was 10mg morphine mixture 4 hourly?

Author's answer

15 mg 4 hourly, that is a 30 - 50% dose increase.

Recommended dose escalations for regular 4 hourly morphine mixture are as follows:

5mg 10mg

10mg 15mg

15mg 20mg

20mg 30mg

Question

If Mrs Hakouz's pain was well controlled on the original total daily dose of 80mg immediate release morphine mixture, what dose of sustained release morphine mixture would you convert her to?

Author's answer

The total daily dose is 80 mg. So give kapanol 80 mg (10 + 20 + 50 capsules) daily or MS contin 40 mgbd (10 + 30 mg tablets).

Do not mix Kapanol and MS Contin as they have different pharmacokinetic profiles.

Do not forget to continue the 5mg top-ups of morphine mixture prn.

Question
Mrs Hakouz is having a total daily morphine dose of 80mg. What would be the equivalent dose of morphine if it was given as a continuous subcutaneous infusion?

Author's answer

Given that Mrs Hakouz's total daily dose of oral morphine is 80 mg and the oral bio-availability of morphine is effectively 30%, devide 80 by 3 = 27 mg per 24 hours in a syringe driver. This dose would then be rounded up to 30 mg per 24 hours. Some palliative care unites devide the total daily dose of oral morphine by 2, rather than 3 when calculating an equivalent continuous subcutaneous infusion dose of morphine.

Continuing history
On the last day of her two-week radiotherapy course, Mrs Hakouz becomes progressively drowsy and is mildly nauseated on Kapanol 80mg daily. She is no longer on an anti-emetic.

Physical examination reveals the following signs:-

Right hip pain virtually gone.

Small pupils.

Decreased respiratory rate

Question
What is the likely explanation for these physical findings?

Author's answer

Mrs Hakouz has symptoms of a morphine overdose, her daily morphine requirement has reduced, because of the palliative radiotheraphy's analgesic effect. The radiation response usualy takes 2 - 3 weeks to occur.

Action: Mrs Hakouz's daily dose of morphine is reduced, and her daily dose of morphine is reduced and her daily dose of morphine stablises on Kapanol 20mg bd.

Lesson: The dose of morphine does not necessarily need to be increased. Regular review of morphine doses is important, especially in patrients who receive palliative radiotherapy.

Further Information

Let us assume Mrs Hakouz's pain is well controlled with morphine. However she subsequently develops intractable nausea, confusion and drowsiness. Her symptoms are assessed as being opioid related, after excluding other causes. (ie. brain metastases, hypercalcaemia and renal failure).

There are three different management options:

• Reduce the dose of morphine

• Change the route of morphine (eg. from oral to continuous subcutaneous infusion

• Change morphine to a different opioid (opioid substitution)

Option one is likely to result in a return of Mrs Hakouz's pain. She is not keen to have a syringe driver at this stage, and you elect to do an opioid substitution. This involves changing a patient with unacceptable, refractory adverse effects of one opioid to a different opioid. The aim of this is to improve any adverse side effect(s) while maintaining an equivalent dose of analgesia.

Reference: *Ashby M.A., Martin P., Jackson K.A. Opioid substitution to reduce adverse effects in cancer pain management. MJA 1999: 70: 68-71.*

(continued)

Question
What analgesic could be used as an alternative to morphine, and in what form should it be administered ?

How do you convert the dose of Kapanol 20mg bd to the new analgesic?

Author's answer:
Oxycodone would be an appropriate alternative to morphine. Oxycodone is available in a sustained release formulation called oxycontin in the form of 10 mg, 20 mg, 40 mg, 80 mg tablets, given bd. The conversion ratio of morphine to oxycodone is 1 : 1. Therefore kapanol 40 mg bd could be changed to oxycontin 40 mg bd.

Each patch provides analgesia for 72 hours. Serum levels rise slowly and do not peak for 12-24 hours. It is therefore important that the previously used opioid is continued for the first twelve hours of introducing fentanyl.

Formulation of morphine	**How to change to fentanyl patch**
Oral: slow release	**Apply first patch at same time as final 12 hourly dose of morphine is taken**
Oral: immediate release	**Continue 4 hourly morphine liquid for next 8 - 12 hours**
Continuous subcutaneous infusion	**Continue subcutaneous morphine infusion for 8 - 12 hours**

Question
If Mrs Green was taking 120mg of slow release morphine per day, what would be the equivalent dose of transdermal fentanyl?

Author's answer
The starting dose of transdermal fentanyl is calculated from the previous 24 hours dose of morphine or oxycodone (refer to product information).

To work out the dose of Fentanyl skin patch, multiply X by 25 ug/hr.

Answer 160/90 = 1.77

Rounded off to the nearest whole number = 2.

X = 2

X x 25ug/hr = 50 ug patch

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