Medical students' experience with dysmetabolic syndrome **X** conditions

S Kumar, RM Saywell, BS O'Hara, TW Zollinger, NR Thakker, JL Burba, DI Allen

Introduction

This study examined patient encounters with dysmetabolic syndrome **X** conditions using data collected by medical students. It was found that students reported a higher level of competency when treating dysmetabolic syndrome **X** conditions and were more involved in the care of patients with dysmetabolic syndrome **X** conditions than patients with other diagnoses. Students were more likely to be involved with education and counselling people with dysmetabolic syndrome **X** conditions, yet the overall low rate represents a missed opportunity for the provider (and the student) to address important patient lifestyle changes. It concludes that the use of a computerised database can identify and address areas in which curricular change is needed.

ARTICLE POINTS

1 This study examines patient encouters with dysmetabolic syndrome X conditions using data collected by medical students.

2 Students reported a higher level of competency when treating dysmetabolic syndrome X conditions than with other diagnoses.

3 Students were more involved in the care of people with dysmetabolic syndrome X than with other diagnoses.

4 Students were more involved with the education of people with dysmetabolic syndrome X conditions, but the overall low rate represents a missed opportunity to address lifestyle changes.

KEY WORDS

● **Dysmetabolic syndrome X**
● **Patient encounters**
● **Computerised database**
● **Students' experience**

Sumit Kumar is a Clinical Assistant Professor of Internal Medicine; Robert M Saywell Jr is a Professor of Family Medicine; Brenda S O'Hara is a Clinical Associate Professor and Director of Pre-Doctoral Education; Terrell W Zollinger is a Professor and Associate Director of the Bowen Research Centre; Nitesh R Thakker is a Research Assistant; Jennifer L Burba is the Family Medicine Clerkship Coordinator; Deborah I Allen is the Otis Bowen Professor and Director of the Bowen Research Centre, Indiana University School of Medicine, Indianapolis, Indiana.

Dysmetabolic syndrome X is characterised by glucose intolerance, obesity, dyslipidaemia, and hypertension (Hansen, 1999). This association of conditions was initially recognised in the 1940s (Reaven, 1988), but has been popularised again in the past decade.

Dysmetabolic syndrome X comprises a group of disorders that tend to cluster in people with three or more of the risk factors required to make the diagnosis. The components continue to evolve over time. Hansen (1999) estimated that by 2010, there will be up to 75 million people in the US and half a billion people worldwide with dysmetabolic syndrome X. The implications of this are serious.

The four components of dysmetabolic syndrome X are major risk factors for atherosclerotic cardiovascular disease, with its attendant morbidity and mortality. Several large epidemiological studies have shown that the presence of even one of these components increases the relative risk of coronary artery disease (Koskinen et al, 1992).

Curriculum content

With the increasing importance of ambulatory care in the medical school curriculum and the increasing prevalence of dysmetabolic syndrome X, it is apparent that curricular questions must include how best to introduce medical students to the various aspects of hypertension, diabetes, obesity and lipid disorders to better train them in the recognition and optimal management of these diseases.

A medical school clerkship is the month that the student spends in the community during his/her third year. It aims to provide supervised experience for medical students as they begin the transition from student to practitioner. Medical education is grounded within a clinical practice base, which varies from one teaching and practice setting to another. Despite the variation, the nature and extent of clinical practice determines the level of knowledge and skills attained by medical students.

Medical students must have adequate practice opportunities to improve their knowledge, skills and judgment capabilities, with broad exposure that best reflects the breadth and depth of a general medical practice. Witzke et al (1990) consider clinical experience to be essential in developing clinical competence. Quantity and diversity are important attributes for a complete education, ensuring that medical students aquire broad and diverse experience.

Ferrell (1991) maintains that there is a need for a monitoring system to tally and assess students' experience and progress during clerkships. From a curricular standpoint, a monitoring system ensures that students receive adequate exposure to various diseases and helps to identify

PAGE POINTS

1 Proficiency in diagnosing, treating and counselling patients with hypertension, diabetes, obesity and dyslipidemia may improve with repeated exposure to these patients in the clinical setting during undergraduate, graduate and postgraduate medical education.

2 This study aimed to determine the level of exposure and perceived competency felt by medical students when caring for patients with hypertension, diabetes, obesity or dyslipidaemia.

3 A detailed patient encounter form was completed by third-year medical students for each patient seen in a 4-week family practice clerkship.

4 Information obtained on the encounter form included: patient age and gender; the top four ICD-9-CM diagnosis codes; degree of student responsibility; and the student's perceived competency level in dealing with his/her patients.

differences between practice sites. A carefully constructed patient encounter database provides such a monitoring system and has been used successfully in the past by Witzke et al (1990) and Snell et al (1998).

Background

During their family medicine clerkship at the Indiana University School of Medicine, third-year students are placed in one of 12 residency locations within the state, under the direction of a community physician educator, where they receive didactic teaching one day a week. Students are also assigned to community-based family physicians who serve as educators to the students during a 4-week period. These educators provide students with practice-based experience for a month; the community physician educator serves as a didactic instructor who provides a core-based curriculum that includes performing procedures and differentiating diagnoses.

Parkerson and Baker (1980) believe that primary care settings are major entry points for people with hypertension, diabetes, obesity and lipid disorders. Thus, primary care physicians often have the best opportunity to recognise these problems, counsel patients in their prevention and treat or refer patients to other physicians as necessary. Proficiency in diagnosing, treating and counselling patients with hypertension, diabetes, obesity and dyslipidaemia may improve with repeated exposure to these patients in the clinical setting during undergraduate, graduate and postgraduate medical education.

This study was designed to determine the level of exposure and perceived competency of medical students when caring for patients diagnosed with hypertension, diabetes, obesity or dyslipidaemia. Previous studies (O'Hara et al, 2001, 2002; Saywell et al, 2002a,b, 2003) using the same clerkship database found significant variation in self-reported competency levels within selected groups of diagnoses. The increase in prevalence of dysmetabolic syndrome X conditions during the past few decades makes this study even more vital for teachers of medical students.

This study examined the volume of encounters as well as clerkship students'

perceived confidence in treating dysmetabolic syndrome X conditions.

Method

A detailed patient encounter form was completed by third-year medical students for each patient seen in a 4-week family practice clerkship. Over the 2-year period (1 June 1997 to 31 May 1999), 56 151 patient encounters were received and entered into the clerkship database. Every student submitted these forms (range 50–200 forms per student). The form was designed to capture the most relevant information,s yet still be completed quickly by students between patient encounters. Information obtained on the encounter form included:

- Patient age
- Patient gender
- The top four ICD-9-CM diagnosis codes
- Degree of student responsibility
- The student's perceived competency level when dealing with his/her patients.

The ICD-9-CM codes were used to maintain consistency in reporting diagnoses. Once in the clerkship, students were asked to bring completed patient encounter forms to their final examination for collection, which were then scanned into the clerkship database. Since encounter forms did not list patient diagnoses other than those that were the reason for the visit, it was not possible to determine the prevalence of dysmetabolic syndrome X in this population. For the purposes of this study, diabetes, hypertension, dyslipidaemia, and obesity diagnoses were categorised as dysmetabolic syndrome X conditions.

Statistical analysis

Differences in patient demographic characteristics and medical students' experiences and perceived competency were tested for significance using the chi-square test and the z-test for proportions. Significant differences are addressed in the text only for those with sufficient frequency and clinical importance to warrant discussion.

Results

There were 78 854 diagnoses within the 56 151 encounters. After classifying the four dysmetabolic syndrome X related conditions in the database, 11.1% were determined to

Table 1: ICD-9-CM diagnostic code categories by student comfort level

	Uncomfortable/ unskilled N (%)	Marginally competent N (%)	OK, could be better N (%)	Competent N (%)	Confident/ skilled N (%)	Total	P-value*
Dysmetabolic syndrome X diagnoses:							
ICD 250: Diabetes	7 (0.3)	120 (4.6)	530 (20.3)	1485 (56.8)	472 (18.1)	2614	0.019
ICD 272: Disorders of lipid metabolism	2 (0.1)	69 (4.6)	301 (20.2)	846 (56.7)	275 (18.4)	1493	0.151
ICD 278: Obesity and other hyperalimentation	4 (0.8)	16 (3.0)	108 (20.4)	281 (53.1)	120 (22.7)	529	0.066
ICD 401: Essential hypertension	17 (0.4)	153 (3.3)	854 (18.3)	2687 (57.6)	956 (20.5)	4667	0.002
Total dysmetabolic syndrome X diagnoses	30 (0.3)	358 (3.8)	1793 (19.3)	5299 (57.0)	1823 (19.6)	9303	< 0.001
Total non-dysmetabolic syndrome X diagnoses	641 (1.0)	3397 (5.4)	13 602 (21.7)	32 997 (52.7)	11 929 (19.1)	62 566	
Total diagnoses	671 (0.9)	3755 (5.2)	15 395 (21.4)	38 296 (53.3)	13 752 (19.1)	71 869	

* Comparing the student responses for the specific diagnosis to the other diagnoses; N = number

be dysmetabolic syndrome X encounters, and 12.9% of the diagnoses were for one of the four dysmetabolic syndrome X conditions.

Patients with a dysmetabolic syndrome X condition had a mean age of 58.7 years, compared with 37.7 years for patients with other conditions. Almost all of the patients with a dysmetabolic syndrome X condition were aged ≥36 years (92.9%) compared with about half of those with other conditions (50.5%). Just over half of the patients with a dysmetabolic syndrome X condition were female (53.8%).

Of the 10 207 diagnoses of dysmetabolic syndrome X conditions, 50.6% were hypertension, 27.9% were diabetes, 15.8% were dyslipidaemia and 5.7% were obesity. Of the dysmetabolic syndrome X conditions encountered by the students, 51.2% were in women aged >36 years, and 42.1% were in men aged >36 years.

The encounter form asked students to record their perceived level of competence when encountering patients with a dysmetabolic syndrome X condition. *Table 1* lists and compares reported competency levels for specific dysmetabolic syndrome X diagnoses. Within these diagnoses there were significant differences in self-reported competency levels. Significantly more students (25.2%) felt less than 'competent' with diabetes, while fewer students (22.0%) felt less than 'competent' with essential hypertension (i.e. more felt 'competent' or 'confident/skilled').

Table 1 also compares student competency levels with a dysmetabolic syndrome X condition overall with their competency levels for non-dysmetabolic syndrome X diagnoses. Few reported feeling 'uncomfortable/ unskilled' with a dysmetabolic syndrome X condition (0.3%). About a fifth felt that they were 'OK, could be better' (19.3%) while most felt that they were 'competent' (57.0%) or 'confident/skilled' (19.6%) when evaluating and managing patients with a dysmetabolic syndrome X condition. Overall, a smaller proportion reported feeling less than 'competent' dealing with dysmetabolic syndrome X diagnoses (23.4%) compared with non-dysmetabolic syndrome X diagnoses (28.1%).

Students were instructed to indicate their clinical responsibilities at each encounter (more than one response was allowed). The type of student involvement for each dysmetabolic syndrome X diagnosis is shown in *Table 2*. In general, students' experience in terms of their level of responsibility among the entire dysmetabolic syndrome X diagnoses did not differ significantly from their experiences with non-dysmetabolic syndrome X diagnoses. Where there were statistically significant differences, these differences were not clinically relevant.

Clinical educators more frequently discussed the conditions of their dysmetabolic syndrome X patients with the medical students (65.6% vs 63.8%), more often allowed the medical students to see their

PAGE POINTS

1 Patients with a dysmetabolic syndrome X condition had a mean age of 58.7 years compared with 37.7 years for patients with other conditions.

2 Of the 10 207 diagnoses for dysmetabolic syndrome X conditions, 50.6% were hypertension, 27.9% were diabetes, 15.8% were dyslipidemia and 5.7% were obesity.

3 Significantly more students (25.2%) felt less than 'competent' with diabetes, while fewer students (22.0%) felt less than 'competent' with essential hypertension.

Table 2. Endo ICD-9-CM diagnostic code categories by degree of responsibility

	Observed N (%)	Saw before educator N (%)	Did history N (%)	Suggested treatment N (%)	Education/ counselling N (%)	Discuss educator N (%)	Did physical examination N (%)
Dysmetabolic syndrome X diagnoses:							
ICD 250: Diabetes	1153 (40.5)	1255 (44.1)	1289 (45.3)	906 (31.8)	204 (7.2)	1836 (64.5)	1368 (48.0)
ICD 272: Disorders of lipid metabolism	619 (38.3)	721 (44.6)	753 (46.6)	536 (33.2)	153 (9.5)*	1046 (64.8)	799 (49.5)
ICD 278: Obesity and other hyperalimentation	223 (38.1)	275 (47.0)	287 (49.1)	215 (36.8)*	57 (9.7)*	406 (69.4)	292 (49.9)
ICD 401: Essential hypertension	1981 (38.4)	2256 (43.7)	2327 (45.1)	1698 (32.9)	335 (6.5)†	3406 (66.0)	2605 (50.5)
Total dysmetabolic syndrome X diagnoses	3976 (39.0)	4507 (44.2)*	4656 (45.6)*	3355 (32.9)	749 (7.3)*	6694 (65.6)*	5064 (49.6)
Total non-dysmetabolic syndrome X diagnoses	26 550 (38.7)	28 221 (41.1)	30 222 (44.0)	22 105 (32.2)	3796 (5.5)	43 811 (63.8)	34 181 (49.8)
Total diagnoses	30 526 (38.7)	32 278 (41.5)	34 878 (44.2)	25 460 (32.3)	4545 (5.8)	50 505 (64.0)	39 245 (49.8)

N = number; ∗ = significantly higher at P<0.05; † = significantly lower at P<0.05

PAGE POINTS

1 Students conducted physical examinations on 49.8% of all patients, suggested a treatment for 32.9% and only observed in 38.7% of patient encounters.

2 Few students reported involvement with patient education and counselling of patients with dysmetabolic syndrome X, despite the fact that these patients stand to benefit tremendously from lifestyle education and counselling.

3 Clerkship medical educators should encourage student participation in lifestyle counselling activities so that these early experiences can be ingrained into students' future practice routines.

dysmetabolic syndrome X condition patients before them (44.2% vs 41.1%), and more often permitted them to take a history (45.6% vs 44.0%). Students conducted physical examinations on 49.8% of all patients, suggested a treatment for 32.9% and only observed in 38.7% of patient encounters.

The students provided slightly more patient education and counselling for patients with dysmetabolic syndrome X diagnoses than for those with non-dysmetabolic syndrome X diagnoses (7.3% vs 5.5%), but generally did not provide education and counselling to many of the patients they encountered. There was also significant variation within the four dysmetabolic syndrome X diagnoses, e.g. they did not educate and counsel hypertensive patients as much (6.5%) but did provide counselling to a larger proportion of patients with dyslipidaemia (9.5%) or with obesity (9.7%).

Discussion

During the 2-year period, just over 10% of the encounters seen by students in the family medicine clerkship involved one or more of the diagnoses associated with a dysmetabolic syndrome X diagnosis. Overall, the students seem more comfortable treating patients with dysmetabolic syndrome X conditions than patients with non-dysmetabolic syndrome X conditions.

Analysis of data on student responsibilities suggests that students gain sufficient experience, see patients before the educator, take patient histories, conduct physical examinations and discuss dysmetabolic syndrome X diagnoses and cases with the educator. This information is important to medical school departments involved with curriculum development, ensuring the adequacy of experience that students receive in these areas.

However, few students reported involvement with patient education and counselling of patients with dysmetabolic syndrome X despite the fact that these patients stand to benefit tremendously from lifestyle education and counselling. Even though student participation in education and counselling is slightly higher in dysmetabolic syndrome X cases than in other diagnoses, these encounters present an important opportunity for students to obtain valuable experience in providing lifestyle and behaviour-change counselling.

It may be that the educators are not giving their students enough time to practise these important skills because they do not provide lifestyle counselling themselves. Alternatively, they may not be confident that the medical students have the ability to provide direct education/ counselling services. In either event, clerkship medical educators should encourage student participation in lifestyle counselling activities so that these early experiences can be ingrained into students' future practice routines.

There are several possible explanations for

the relatively high volume of students' experience with dysmetabolic syndrome X conditions and the higher level of self-reported competency. First, as Donnelly et al (1994) have shown, educators may tend to select experiences for the students that are straightforward and likely to encounter agreement for participation by the patient. Patients with personal issues (mental illness, substance abuse, etc) are more likely to refuse student participation in their care. There is also a higher rate of refusal in patients of both genders presenting for conditions related to the genitourinary system, such as annual Papanicolaou tests, prostate and rectal examinations.

Given the high incidence and overall prevalence of dysmetabolic syndrome X conditions in primary care settings, family practice clerkships and residency programmes must instruct students effectively on the epidemiology of dysmetabolic syndrome X, the importance and significance of primary prevention, early diagnosis, and education (including lifestyle modification and dietary counselling), and an optimal treatment strategy.

Limitations

Although the patient encounter database is valuable and produces important statistics, it does have limitations:

- There may be errors in specifying the diagnosis or other patient information.
- Some students may not completely fill out the encounter forms. The greatest percentages of missing values (3–4%) were for age, location of care and gender. This small proportion of missing entries does not have a significant effect on the interpretation of the data.
- It is estimated that students did not complete forms on 15–20% of the patients they saw. According to Patricoski et al (1998), other studies have shown that no more than 83% of dictated patient encounters are recorded in medical student logbooks. Greer et al (1993) suspect that there are a number of possible factors: one important cause of underreporting was felt to be student fatigue and loss of interest when they were required to collect detailed information. Also, Weissman et al (1999)

found that experience logs were reasonably accurate when used to record procedures, especially dramatic or unusual procedures. It is important to remember this when interpreting the results.

Conclusion

A relatively simple computerised patient encounter database can identify and resolve many curricular development issues. By using computerised databases containing important information about patients, students, and educators, the family practice and other medical school clerkships can improve students' clinical education. ■

Donnelly JF, Boltri JM, Weeks ME (1994) Measuring self-reported comfort with general family practice skills during a required third-year family practice clerkship. *Family Medicine* **26**(1): 21–6

Ferrell BG (1991) Demonstrating the efficacy of the patient logbook as a program evaluation tool. *Academic Medicine* **66** (Suppl 9): S49–S51

Greer T, Schneeweiss R, Baldwin LM (1993) A comparison of student clerkship experiences in community practices and residency-based clinics. *Family Medicine* **25**(5): 322–6

Hansen BC (1999) The dysmetabolic X syndrome. *Annals of the New York Academy of Science* **892**:1–24

Koskinen P, Manttari M, Manninen V et al (1992) Coronary heart disease incidence in NIDDM patients in the Helsinki Heart Study. *Diabetes Care* **15**(7): 820–5

O'Hara BS, Saywell RM Jr, Smidley JA et al (2001) Medical students' experience with psychiatric diagnoses in a family medicine clerkship. *Teaching and Learning in Medicine* **13**(3): 167–75

O'Hara BS, Saywell RM Jr, Zollinger TW et al (2002) Students' experience with women's health care in a family medicine clerkship. *Medical Education* **36**: 1–10

Parkerson GRJ, Baker C (1980) Clinical experience of medical students in North Carolina family medicine preceptorships. *Journal of Medical Education* **55**(1): 42–7

Patricoski CT, Shannon K, Doyle GA (1998) The accuracy of patient encounter logbooks used by family medicine clerkship students. *Family Medicine* **30**(7): 487–9

Reaven GM (1988) Banting lecture 1988: Role of insulin resistance in human disease. *Diabetes* **379**(12): 1595–607

Saywell RM Jr, O'Hara BS, Zollinger TW (2002a) Medical student's experience with musculoskeletal diagnoses in a family medicine clerkship. *Medical Teacher* **24**(2): 186–92

Saywell RM, O'Hara BS, Zollinger TW et al (2002b) Medical students' experience with skin and subcutaneous tissue diagnoses in a family medicine clerkship. *The Educator* **2**(4): 26–32

Saywell RM Jr, O'Hara BS, Zollinger TW et al (2003) Medical students' experience with geriatric patients in a family medicine clerkship. *Gerontology and Geriatrics Education* **23**(3): 19–37

Snell LM, Battles JB, Bedford JA et al (1998) Verifying the curriculum of a family medicine clerkship. *Medical Education* **32**(4): 370–5

Weissman AM, Dawson JD, Fox DL (1999) Variability in the learning experiences of family practice residents during an obstetrics rotation. *Family Medicine* **31**(1): 28–33

Witzke DB, Koff NA, McGeagh AM et al (1990) Developing a computer-based system to document and report students' clinical patient encounters. *Academic Medicine* **65**(7): 440–41

PAGE POINTS

1 There are several possible explanations for the relatively high volume of students' experience with dysmetabolic syndrome X conditions and the higher level of self-reported competency.

2 Educators may tend to select experiences for the students that are straightforward and likely to encounter agreement for participation by the patient.

3 Patients with personal issues (mental illness, substance abuse, etc) are more likely to refuse student participation in their care.

4 There is also a higher rate of refusal in patients of both genders presenting for conditions related to the genitourinary system, such as annual Papanicolaou tests, prostate and rectal examinations.