Prevalence and perceived outcomes of complementary and alternative medicine use in hospitalized British patients

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ABSTRACT

Objectives: This study aimed to investigate the prevalence and perceived outcomes of complementary and alternative medicine (CAM) use in secondary care patients and to find out determinants for CAM utilization and perceived effectiveness and side-effects. **Materials and Methods:** Patients who met the eligibility criteria in this cross-sectional study were interviewed using a semi-structured questionnaire. Patients' medications and relevant details were verified from the medical notes. A logistic regression analysis was performed and the significance level set at $\alpha = 0.05$. **Results:** A total of 240 in-patients were interviewed. The prevalence of CAM use during admission, within 1 month, within 1 year, and at some point in life was 90.4%, 68.8%, 37.9%, and 8.3%, respectively. Diverse reasons for CAM use or non-use were cited. Nearly two-thirds of patients (63.1%) perceived CAM effectiveness and approximately half (57.6%) were aware of its side-effects. The determinants for CAM use at some point in life and perceived effectiveness could be predicted approximately 20% by two models: Logit $P_{use} = 3.404 - 1.044 \times Educ + 1.314 \times Ward - 1.539 \times Consider$ and Logit $P_{eff} = 3.244 - 0.995 \times Gender - 0.025 \times Age - 1.503 \times Consider$. **Conclusion:** Patients decided to use CAM for various reasons and perceived different outcomes. The specific CAM use and its outcomes warrant further studies.

INTRODUCTION

Patients in community or hospital settings tend to use complementary and alternative medicine (CAM) alone or concomitantly with conventional drugs. They mostly utilize CAM to fit into their way of life, maintain good health, or prevent illnesses.[1,2] The widespread use of CAM by patients and the public has an impact on public health policies relating to the

regulatory systems, provision of current evidence and information sources, and practitioner's competency.[3] With respect to CAM utilization and multiculturalism, Lim *et al*.[4] pointed out that complementary therapies fit well with patients' social values, beliefs, and philosophical orientations toward health and life in the multiracial society like Singapore. Apart from that, Furnham and his team[5,6] confirmed that CAM use is pertinent to patient's enchantment with CAM or discontentment with mainstream medicines. These findings thus signify the multifaceted nature of CAM.

The reported prevalence of CAM varies with different studies in terms of study design, CAM definition chosen for the study, selected CAM therapies, studies population, and settings. According to a systematic review in the UK[7] the estimated life-time use of

CAM ranges from 35% to 69% in dermatological patients. Moreover, the prevalence of CAM use at some point in life ranges from 6% in the population[8] to 71% in ambulatory patients.[9] Reasons for patients' CAM use depend on patients' illnesses, demography, environment, and personal experiences.[1,10] Furnham and Forey[6] concluded that most patients who use CAM are more critical and skeptical about the efficacy of modern medicine. However, in case of hospitalized patients the prevalence rate and reasons for CAM use in the UK remained unclear and warranted an investigation.

In regard to CAM effectiveness, rigorous evidence is scarce to prove its effectiveness owing to difficulties in conducting clinical trials and data collection.[11] However, there are at present more evidence-based reports of CAM effectiveness and safety profiles. Potential adverse effects of CAM that may affect patients' condition and treatment are also an important issue addressed by numerous patients.[12,13] As part of CAM, herbal remedies and dietary supplements are likely to cause mild-to-serious side-effects.[14] The adverse CAM effects thus need to be further explored in hospitalized patients to ensure patient safety during the CAM therapies.

CAM studies have mostly focused on out-patients in primary care or clinics.[9,15,16] A couple of studies[2,17] have looked into in-patients' use of CAM. This study was therefore intended to investigate the prevalence and perceived outcomes of CAM utilization in hospitalized patients and to find out determinants for CAM use and perceived outcomes. This study may enable healthcare professionals to monitor patients' use of CAM and assess its relevant outcomes in order to provide optimum care and medicines management for hospitalized patients.

MATERIALS AND METHODS

This cross-sectional study was carried out in patients admitted to a district general hospital in the North East England during November 2008-November 2009. It was approved by the National Research Ethics Service committee (NRES) and the University's ethics committee. Additionally, other permissions were granted from the Caldicott custodian panel, NHS Research and Development and Audit Quality Improvement of Northumbria NHS Healthcare Trust. A qualitative interview was initially planned according to the good practice proposed by Broom[18], i.e., starting from developing a research question with study parameters, through designing an interview schedule

and doing a qualitative interview, to analyzing the interview data with appropriate coding.

In this study, in order to facilitate the data analysis and interpretation CAM was here classified into two types, i.e., herbal remedies and dietary supplements (HS) and other forms of CAM (non-HS)[19] such as homeopathy, aromatherapy, and acupuncture. The prevalence of CAM was investigated in four time frames, i.e., during hospital stay, within 1 month or 1 year prior to the interview and at some point in life. Patients' perceived outcomes included CAM effectiveness and adverse effects (so-called 'CAM side-effects') directly experienced or viewed by patients. Regarding patients' reports of CAM side-effects, they could not be clearly assessed for the association of an adverse event and CAM applications by Naranjo's Algorithm[20] owing to the incomplete data, for example, responses to 'dechallenge' and other details. A simple causality assessment using temporal sequence, i.e., the CAM being used before the adverse effect taking place, and documented evidence was performed instead.

Patients and eligibility criteria

Patients would be included in the study if they were aged 16 or over, able to give written or oral consent, and admitted to one of 11 wards of five specialties, i.e., Orthopedics and Trauma, General Surgery, General Medicine, Elderly Medicine, and Gynecology, during the study period. These wards were selected in order to provide results of diverse patient groups, which were different from other studies that emphasized only a specific cohort. Few wards, such as Children or Oncology, were excluded, as it was not appropriate to obtain patients' data. Exclusion criteria were: Patients who were mentally or terminally ill, refused to give consent or could not communicate with the researcher (NB) in English. Medical or nursing staff could also exclude patients who were not appropriate to get interviewed.

The sample size was estimated according to the prevalence of in-patients' CAM use and the formula stated by Eng[21]-the required sample (N) $=4(Z_{crit})^2 P(1-p)/d^2$. The prevalence rate of 68.0% found in hospitalized patients who ever used CAM by Shakeel *et al.*[2] was chosen, since it was the only one of few studies in in-patients, of which data were reliable. The sample size of 84-334 was determined according to a 95% confidence interval with the expected width of 10-20%. When the incomplete data and patients' responses were taken into account, at least 200 patients

were needed to detect a prevalence rate of CAM use in this study.

Study tools

A semi-structured questionnaire with closed and open-ended questions was specially constructed based on the literature evidence. The questionnaire consisted of three sections. Section 1 embraced patient's characteristics, whereas Section 2 embraced questions about the use of CAM and perceptions of CAM effectiveness and side-effects. Some questions of Section 2 are demonstrated in Figure 1. Section 3 was used to cross-check patients' information against the medical notes, i.e., medical conditions, conventional drug use, records of CAM use, adverse effects, length of hospital stay, and outcomes on discharge. The questionnaire was checked for content validity by three experts in the areas of complementary therapies, clinical pharmacy, and statistics. It was subsequently piloted in 82 patients attending health shops and a healthcare setting, and finally reviewed by the ethics committee. A consent form and a participant information sheet were developed to clarify the study. The information sheet included information about the purpose of the study, definition and examples of CAM, study activity and risk and benefit of participation, confidentiality and voluntary withdrawal at any time.

Data collection

Adult in-patients who met the eligibility criteria were informed of the consent form and details of the study. They were then given identification codes, e.g., R5, R150, or R230, and interviewed face-to-face by the researcher (NB) using the questionnaire for approximately 25-60 minutes. After that, relevant data in patients' medical notes were verified and recorded in Section 3 of the questionnaire. All completed questionnaires were collated and analyzed.

Data analysis

Quantitative data regarding patients' characteristics, CAM use, and perceived outcomes were analyzed using descriptive statistics in PASW Statistics version 18 (SPSS-IBM Co., Chicago, IL). The determinants for CAM use at some point in time and outcome perceptions were calculated in 90% of patient cases, which were randomly selected by the software, by a binary logistic regression analysis.[22] The rest 10% were used to test the logistic regression models. A significance level (a) was set at 0.05. Furthermore, qualitative data, i.e., patients' opinions on CAM use and relevant outcomes, were entered into NVivo 8.0 (QSR International (UK) Ltd., Southport, UK). For a content analysis, the categorization using a line-by-line analysis of the data was performed by the researcher (NB) applying. Examples of themes identified for reasons of CAM use and non-use are as follows:

- Use of CAM – Media, friends and words of mouth; effective in some conditions; self-experience, belief and expectation, etc.
- Non-use of CAM – Did not need or think about CAM;

Q1. Have you used any form of CAM before?
Q2. Can you describe briefly what your general views and opinions on CAM?
Q3. Why did you choose to use or not to use CAM?
Q4. Would you consider using CAM in the future?
Q5. Based on your opinion, do you think CAM can have side-effects, unwanted effects or discomfort?
Q6. Do you think CAM is effective?
Q7. When was the last time you had used any form of CAM? – Currently on, within 1 month, within 1 year or at some point in life
Q8. Who advised you to use CAM?

For specific types of CAM, please answer Q9–Q14

▫ Herbal medicine	▫ Dietary supplements
▫ Homeopathy	▫ Aromatherapy
▫ Massage	▫ Acupuncture
▫ Osteopathy	▫ Chiropractic
▫ Reflexology	▫ Other (please specify)….

Q9. Have you used the form of CAM?
Q10. When was it used?
Q11. For how long and how was it used?
Q12. What were your reasons for use and medical conditions?
Q13. Did you experience any discomfort during or soon after use? If yes, what were they?
Q14. Did this stop when you discontinued using CAM?

Figure 1: Some questions of the questionnaire

chose to stick to conventional medicine; satisfaction or confidence with conventional medicine, etc.

RESULTS

At the beginning, 300 hospitalized patients were recruited into the study. Of these, 44 refused to participate, 9 declined to give consent for reviewing medical notes, and 7 withdrew from the study during the interview. A total of 240 patients could thus be interviewed and their medical notes were verified. The characteristics of 240 patients are shown in Table 1. Female patients were nearly equal to males, i.e., 54.6% vs. 45.4%. Patients' age ranged from 17 to 94 years with the median age of 61 years (interquartile range: 48-72), or the mean age of 59.3 years (SD = 17.3). As shown in Table 1, the majority were mostly older patients. Almost all were White British (98.8%) and more than half were educated at the college level (56.7%), i.e., A-levels or vocational equivalent. Additionally, most patients stayed in three major specialty wards, i.e., Orthopedics and Trauma (33.3%), General Surgery (30.0%), and General Medicine (29.2%). By the time of the interview, they were staying on the wards with the median length of 8 days (interquartile range: 4-14).

Use of complementary and alternative medicine and reasons for use

In Table 1, the prevalence rates of CAM use during admission, within 1 month, within 1 year, and at some point in life were 8.3%, 37.9%, 68.8%, and 90.4%, respectively. Main reasons for use or non-use of CAM are summarized in Table 2. Patients were likely to use CAM owing to the influence of external sources (i.e., media, friends, and word of mouth), effectiveness in some non-medical conditions, self-experience with CAM use, and lack of hope for the treatment. In contrast, they would not try CAM if they did not need or think about it, or decided to stick to the conventional medicine.

A long list of specific CAM types, i.e., 68 HS and 25 non-HS, was cited by patients using CAM at some time in life. The list was partly confirmed by patients' perceptions of CAM effectiveness [Table 3]. Top 5 HS embraced nutritional oil (e.g., cod liver oil and omega-3), vitamins and mineral, glucosamine, evening primrose, and valerian products. Top 5 non-HS reported were massage, aromatherapy, chiropractic, acupuncture, and reflexology. Regarding CAM indications, they mostly utilize it for musculoskeletal diseases (e.g., arthritis or slipped disc), neuropsychological disorders (e.g., depression, phobia, stress, tiredness, or insomnia), respiratory

Table 1: Patients' characteristics and use of complementary and alternative medicine (*N*=240)		
Variable	**Attribute**	**Number of patients (%)**
Characteristics		
Gender	Male	109 (45.4)
	Female	131 (54.6)
Age group (years)	16-39	32 (13.3)
	40-64	111 (46.3)
	65-74	50 (20.8)
	>75	47 (19.6)
	Median (interquartile range)	61 (4872)
Ethnic background	White	237 (98.8)
	Asian	3 (1.2)
Education	None and primary	68 (28.3)
	College: A-levels or equivalent	136 (56.7)
	Higher degrees	36 (15.0)
Specialty ward	Orthopedics and Trauma	80 (33.3)
	General Surgery	72 (30.0)
	General medicine	70 (29.2)
	Elderly medicine	10 (4.2)
	Gynecology	8 (3.3)
Length of hospital stay (days)	Median (interquartile range)	8 (4-14)
Use of CAM		
CAM application	Current use (admission)	20 (8.3)
	Within 1 month	91 (37.9)
	Within 1 year	165 (68.8)
	At some point in life	217 (90.4)
Consideration for future use	Yes	171 (71.3)
Perceived effectiveness (*N*=236)	Yes	149 (63.1)
Evaluation of effectiveness (*N*=104)	Undecided	28 (26.9)
	Ineffective	1 (0.9)
	Slightly effective	8 (7.7)
	Moderately effective	22 (21.2)
	Effective	31 (29.8)
	Very effective	14 (13.5)
Experience with effectiveness (*N*=217)	Yes	180 (82.9)
Perceived side-effects (*N*=236)	Yes	136 (57.6)
Evaluation of safety (*N*=102)	Undecided	37 (36.3)
	Unsafe	0 (0.0)
	Slightly safe	3 (2.9)
	Moderately safe	17 (16.7)
	Safe	33 (32.3)
	Very safe	12 (11.8)
Experience with side-effects (*N*=217)	Yes	82 (37.8)

diseases (e.g., cold, flu, sore throat, or asthma), dermatological disorders (e.g., burns, rash, or skin infection), and general health. When asked about the future use of CAM, most of them (71.3%) would consider using it after discharge for various reasons, for instance, previous experience with CAM

Table 2: Reasons for use or nonuse of complementary and alternative medicine given by in-patients	
Reason	Number of reports
Use of CAM	
Media, friends and word of mouth	96
Effective in some conditions	91
Self-experience, belief or expectation	77
Personal decisions	29
Desperation due to prolonged unresolved conditions	23
Harmless or less harmful than conventional medicine	16
Health maintenance, enhancement or preventions	15
Natural, man-made, nonchemical or toxic	12
Treatment of disease	11
Substitute to conventional medicine	8
Long waiting time to get appointments or prescriptions	6
Reduce taking medications	5
No need for prescription or others	5
Experienced with medicine side-effects	5
Concerned about adverse effects of conventional medicine	5
Dislike doctors or medications	4
Free, affordable or not expensive	2
Related to age and occupation	2
Unable to use conventional medicine (pregnancy)	1
Non-use of CAM	
Did not need or think about CAM	41
Chose to stick to conventional medicine	27
Satisfaction or confidence with conventional medicine	21
Felt healthy	19
Experienced with ineffective CAM	13
Did not want to mix with conventional medicine	12
Lack of knowledge	11
Concerned about adverse effects	10
Skeptical or fear of CAM	6
Expensive	5

Table 3: Complementary and alternative medicine effectiveness reported by in-patients (*N*=180)	
CAM type[a]	Number of patients
Herbal remedies and dietary supplements (HS)	
Nutritional oil	37
Vitamins and mineral	33
Glucosamine	29
Evening primrose	27
Valerian products	26
Aloe vera	22
Garlic	21
Echinacea	13
St John's wort	9
Herbal teas	7
Chinese herbal medicine	4
Devils claw	4
Dandelion	3
Feverfew	3
Linseed	2
Adios slimming pills	1
Aniseed	1
Aqua balm	1
Black cohosh	1
Brewer's yeast	1
Cannabis	1
Capsain	1
Clove oil	1
Creatine and protein shake	1
Herbal laxative (Carlifig)	1
Herbal mixture	1
Liver 52	1
Manuka honey	1
Milk thistle	1
Oleobas	1
Rhubarb pills	1
Other forms of CAM (non-HS)	
Massage	77
Aromatherapy	43
Chiropractic	32
Acupuncture	28
Reflexology	25
Osteopathy	25
Homeopathy	23
Hypnotherapy	1

[a]One or more forms of CAM utilized by the patients

effectiveness and less side-effects, and its availability or accessibility.

Complementary and alternative medicine effectiveness

A total of 236 patients expressed their views on CAM effectiveness. Of these, 149 patients (63.1%) conceded CAM was effective, but the rest said 'no effectiveness' or were undecided. After they were requested to rate it on the scale of 1 to 6, i.e., 1 = undecided to 6 = very effective, nearly half of 104 patients (51.0%) agreed it was 'effective or moderately effective'. Nevertheless, many (26.9%) could not decide upon its effectiveness. When the effectiveness was further explored in patients who had ever used CAM, 180 of 217 patients (82.9%) revealed some favorable effects of HS or non-HS, as listed in Table 3. The list was similar to that of CAM used by patients within a year. Examples of patients' opinions on the CAM effectiveness are as follows:

"It is effective and improves quality of life." (R2)
"…believe in its effectiveness." (R38)
"Though the effect is not measurable, I can see the benefit of it." (R114)

Complementary and alternative medicine side-effects

As for CAM effectiveness, only 236 patients responded to the question relating to CAM safety or side-effects [Table 1]. Approximately half of

them (57.6%) perceived CAM possessed some adverse effects, but the remainder answered 'no side-effect' or were undecided. Similar to the perceived CAM effectiveness, on the scale of 1 to 6, i.e., 1 = undecided to 6 = very safe, nearly half (49.0%) rated CAM as 'safe or moderately safe', but a large number of patients (36.3%) were undecided. Opinions on CAM adverse effects embraced:

"Safety of alternative medicine is not clear compared to conventional medicine." (R11)
"…lack of knowledge of alternative medicine itself." (R118)
"Using it is like a 'trial and error'. There might be some bad effects." (R207)

Regarding direct experience with CAM side-effects, 82 patients (37.8%) maintained they once suffered from its adverse effects that tended to resolve or relieve after discontinuation [Table 1]. CAM side-effects reported by the patients are elaborated in Table 4. Patients primarily experienced adverse effects relating to the gastrointestinal system (e.g. constipation, darkened stool, and diarrhea), central nervous system (e.g., nausea, vomiting, and bitter taste), and musculoskeletal system (e.g., pain, burning muscles, and muscular stiffness). Based on the simple causality assessment, the association between the attributed CAM and side-effects could be regarded as 'possible'.

Table 4: Complementary and alternative medicine side-effects reported by in-patients (*N*=82)

Attributed CAM	Side-effect
Herbal remedies and dietary supplements (HS)	
Adios slimming pills	Dizziness or light headedness
Agnus castus	Headache, exploding head, nausea
Aloe vera	Tingling, dry, hash, rash, vomiting, sick
Angus containing vitamin B	Dizziness or light headedness
Aqua balm	Thirst
Black cohosh	Nightmares, increased night sweats
Califig herbal laxative	Diarrhea
Chinese herbs	Bitter, bad taste, tingling, dry, hash, rash, bad breath, stomach discomfort, upset,
Cod liver oil	Constipation, feel ill, flu like, flatulence, bloating, indigestion, regurgitation, rifting, vomiting, sick
Creatine and protein shake	Increased defecation, not diarrhea
Dandelion	Flatulence, bloating, indigestion, not feel right, made feel worse
Devil's claw	Stomach discomfort, upset
Evening primrose	Constipation, dizziness, light headedness, vomiting, sick
Garlic	Heart burn, regurgitation, belching, rifting, vomiting, sick, mouth felt funny, bad breath
Glucosamine	Swollen tongue, wheeze, stomach discomfort, upset
Herbal tea	Allergy, plaster allergy, diarrhea, vomiting, sick
Mixture liquid from herbalist	Syncope, faint
Multivitamin (iron)	Darkened stool, diarrhea, stomach discomfort, upset
Powder for arthritis	Constipation
Seaweed (kelp)	Discomfort, uncomfortable, not feel right, made feel worse, flatulence, bloating, indigestion
St John's wort	Feel ill, flu like, increased period
Supplements for hormone	Headache, exploding head
Valerian products	Dizziness, light headedness, flatulence, bloating, indigestion, pain, soreness, aches, burning muscles, stiffness, restless, tingling, dry, hash, rash, stomach discomfort, upset
Vitamin B	Thrush
Other forms of CAM (non-HS)	
Acupuncture	Seizures
Alexander technique	Syncope, faint
Aromatherapy	Tingling, dry, hash, rash, vomiting, sick
Chiropractic	Discomfort, uncomfortable, not feel right, dizziness, light headedness, pain, soreness, aches, burning muscles, stiffness, aggravated condition
Homeopathy	Increased blood sugar, nausea, tingling, dry, hash, rash, tiredness
Massage	Aggressive, vigorous procedure, bruises, discomfort, not feel right, felt beaten up, hemoptysis, pulmonary embolism, increased urination, pain, soreness, burning muscles, stiffness, dazed, aggressive procedure
Osteopathy	Affected breathing, plaster allergy, discomfort, not feel right, pain, soreness, aches, burning muscles, stiffness
Reflexology	Feel ill, flu like, pain, soreness, aches, stiffness

Determinants for complementary and alternative medicine use and perceived outcomes

The factors affecting CAM applications and perceived outcomes were determined using a binary logistic regression analysis as demonstrated in Table 5. The data obtained from 218 of 240 patients (90.8%) were utilized to analyze the logistic regression model of CAM use, and those from 214 of 236 patients (90.7%) for that of the perceived outcomes. Patients' education, type of hospital wards, and consideration for future use were significantly associated with the use of CAM at some point in life (P = 0.034, 0.007, and 0.002, respectively). The natural logarithm for the odds of CAM use [ln (odds P_u)], or Logit P_u, can be presented as the equation:

$$\text{Logit } P_{use} = 3.404 - 1.044 \times \text{Educ} + 1.314 \times \text{Ward} - 1.539 \times \text{Consider}$$

According to the Nagelkerke R² values in Table 5, this equation could predict only 22.1% for the probability of CAM use at some time in life.

For perceived CAM effectiveness, there were three significant factors, i.e., patients' gender (P = 0.003), age (P = 0.024), and consideration for future use (P = 0.001). The prediction equation for perceived CAM effectiveness was expressed as:

$$\text{Logit } P_{eff} = 3.244 - 0.995 \times \text{Gender} - 0.025 \times \text{Age} - 1.503 \times \text{Consider}$$

This equation could forecast the probability of patients' perceived CAM effectiveness up to 27.8%. However, the determinant for perceived CAM side-effects was not found, as evidenced by all statistically insignificant variables [Table 5].

DISCUSSION

This is one of few CAM studies in the UK that reflected the perceptions of hospitalized patients who were predominantly White, older British, educated at the college level (i.e., A-levels or vocational equivalent) and admitted to Orthopedics and Surgery wards. As the majority of people living in the North East of England are White British (92.4%)[23] the results from the hospitalized patients who were mostly White British partly mirrored the views on CAM use in this region. The prevalence of patients' use of CAM within 1 month and during admission, that is, 37.9% and 8.3%, was fairly unique, as it has never been documented before. Compared with the study of Shakeel and his co-workers[2] in Scotland, the prevalence rates of CAM used by hospitalized patients at some point in life and within 1 year were higher in this study, that is, 90.4% vs. 68.0% and 68.8% vs. 46.0%, respectively. One possible explanation for this discrepancy is the different methods of data collection and patient groups, as indicated by Adusumilli *et al.*[10] The lower rates of CAM use may be related to structured interview methods[2,7] whereas higher CAM usage is found in less structured interviews.[17,24] The results of this study are consistent with Shorofi's work[17] that revealed the prevalence of life-time use of CAM among Australian surgical patients was 90.4%. It is also comparable to

Table 5: Determinants for complementary and alternative medicine use at some point in life, perceived CAM effectiveness and perceived CAM side-effects based on a binary logistic regression model

Factor	Detail (code)	CAM use at some point in life (*N*=218)		Perceived CAM effectiveness (*N*=214)		Perceived CAM side-effects (*N*=214)	
		B	***P* value**	**B**	***P* value**	**B**	***P* value**
Constant	-	3.404	0.003*	3.244	0.001*	-0.179	0.767
Gender	Female (1) Male (0)	-0.566	0.243	-0.995	0.003*	0.099	0.725
Age (years)	Actual age	-0.008	0.611	-0.025	0.024*	0.007	0.403
Ethnic background	White (1) Other (0)	19.382	0.999	-2.410	0.068	-21.341	0.999
Education (Educ)	College (1) Other (0)	-1.044	0.034*	0.055	0.868	0.109	0.702
Specialty ward (Ward)	Orthopedics and Trauma (1) Other (0)	1.314	0.007*	-0.074	0.829	0.000	1.000
Consideration for future use (Consider)	Yes (1) No (0)	-1.539	0.002*	-1.503	0.001*	-0.154	0.642
CAM use at some point	Yes (1) No (0)	-	-	-0.911	0.092	-0.148	0.757
Nagelkerke R²	-	0.221		0.278		0.000	

* *P* value<0.05 (statistically significant)

the findings of Barraco and his team[24] who found 63% of American patients with acute coronary syndrome use CAM in one preceding year.

Patients made their decisions on CAM use based on many internal and external factors. Singh *et al.*[25] stipulated that patients' motivation dictates the CAM use at different levels. This possibly explained why a number of patients who never utilized CAM or were unsure about its effectiveness considered using it in the future; their motivation might gradually change over time. According to the logistic regression model, the tendency of CAM use at some point in life could be predicted approximately 22% with positive and negative factors, that is, education levels, ward types, and consideration for future use. Patients who had higher education, stayed on wards other than Orthopedics and Trauma, and did not need CAM in the future tended to use less CAM or none. This was possibly linked to their self-experience, attitudes, and beliefs about CAM applications, as reasoned by some patients for CAM use. Other crucial factors, which were found neither significant nor part of the determinants in this study, were patients' gender, age group and ethnicity. Female patients are likely to have more doctor visits and co-morbidities[25] and tend to use specific CAM types, for example, evening primrose and black cohosh, compared with their counterpart. Additionally, CAM applications tend to decline with advancing age[2,9] probably because of changes in perceptions of CAM effectiveness over the long period of time. Older patients in this study, however, utilized some specific types of CAM relating to their conditions, that is, valerian products for stress and difficulties in sleeping, and massage for anxiety due to their morbidities or hospital admission. The impact of media, relatives, friends, and word of mouth on CAM usage should not be overlooked, since they can influence patients' judgments as specified by many patients. The public should be therefore informed of current CAM evidence in order to help them maximize benefits and minimize risks of CAM use.

In regard to CAM effectiveness, most patients perceived the positive effects of CAM on musculoskeletal, psychological, and other acute symptoms. This result was congruent with the Scottish study.[2] The probability of perceived CAM effectiveness could be predicted roughly as 28% using the logistic regression equation. In other words, the perceptions of CAM benefits decreased with male patients, increasing age, and consideration for not using CAM in the future. Interestingly, no association was found with education levels and CAM use at some

point in life, although patients' perceptions of CAM effects tended to increase with higher education. The issue of education and CAM use merits further study, as it has an implication for healthcare professionals. Nearly half of the patients (57.6%) were aware of CAM adverse effects, but the determinants for perceived CAM side-effects could not be identified. This is possibly because most patients were not certain about its adverse effects, that is, whether it could really cause a problem. They were also likely to focus on the CAM effectiveness more than the safety issues.[24,25]

Limitations of the study

A major limitation was patients' recall bias, as the patients were asked to elaborate the use of CAM in the questionnaire. Some patients were unable to memorize the CAM use within different periods of time or elaborate the particular CAM applications. As a result, this bias affected the CAM documentation and data analysis. Another barrier is ambiguous responses given by individual patients: few patients somehow answered 'yes' to a query with the explanation of 'no', or vice versa. These vague responses made it very challenging to perform the content analysis. The ethnic background is also an issue that should be taken into consideration. As almost all patients in this study were white British, it was not feasible to fully investigate the use of CAM in ethnic minorities who make use CAM in their daily life.

CONCLUSION

This study explored CAM applications and perceived outcomes among British in-patients. The results affirmed the prevalent use of CAM by patients prior to admission and decreased usage during hospital stay for various reasons. There are many internal and external factors that influence CAM use. According to the logistic regression model, the utilization of CAM depends on the ward type, especially Orthopedics and Surgery. Patients who stayed on these wards tended to exploit CAM and they should be regularly monitored for CAM adverse effects and interactions by healthcare professionals in order to ensure the safe use of CAM during hospital stay. Since patients or CAM users are not clearly questioned about their use of CAM, they should be encouraged by healthcare professionals to disclose the CAM use and its outcomes in terms of effectiveness and adverse effects. Healthcare practitioners should pay more attention to patients with gastrointestinal, neuropsychological, and musculoskeletal problems, as many patients in this study encountered the CAM adverse effects

resembling the medical problems. Further studies are required to evaluate the outcomes of the specific CAM usage in patients and the public so as to provide more rigorous evidence for CAM effectiveness and safety.

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