

Original Article

Do registered dietitians search for evidence-based information? A nationwide survey of regional hospitals in Taiwan

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Dietitians can obtain nutrition-related information from a variety of sources. The current study was to investigate how registered dietitians look for nutritional information and perceive evidence-based nutrition (EBN). A postal questionnaire survey was conducted, with 67 valid returns collected. The most common informational sources were Web portals, followed by continuing education, colleague consultation, textbooks, online databases, electronic journals, printed journals, and electronic textbooks. Among the 11 commonly used online databases, dietitians preferred to access MEDLINE and three databases in Chinese. Sixty-two dietitians (92.5%) were aware of EBN. Although they had a favorable impression of EBN, their knowledge of and skills in EBN were relatively lacking. The most common barrier to the implementation of EBN was a lack of library resources in Chinese (58.1%), followed by deficient skill in critical appraisal (54.8%), insufficient convenient kits (53.2%), and time constraints (50.0%). In conclusion, most registered dietitians search for information through non-EBN resources. Language is an important element relevant to the implementation of EBN. These findings may help the refining of strategies to promote the accessing of evidence-based information.

Key Words: evidence-based nutrition, registered dietitian, information, online, database

INTRODUCTION

Dietitians have to deal with a broad range of nutritional problems in clinical practice. Timely acquisition of relevant information is thus an important issue. The information may come from a variety of sources, such as textbooks, colleagues, journal articles, and the Internet. To date, the information-searching behavior of dietitians has not been fully explored.

The information that dietitians accessed may be out of date or wrong.¹ Evidence-based nutrition (EBN), a clinical practice consistent with the current best evidence, has recently been extended attention.² Although most dietitians hold positive attitudes toward EBN, their knowledge and skills pertaining to the implementation of EBN are relatively insufficient.^{3,4} For example, Byham-Gray *et al.* reported a questionnaire survey showing high scores of perceptions and attitudes but low scores of knowledge and database awareness from 258 registered dietitians of American Dietetic Association.⁴ Clinical practice based on scientific evidence has been identified as a core competence to improve healthcare quality.^{5,6} Therefore, how current evidence-based knowledge is obtained is a critical

skill. Nevertheless, few studies have surveyed the behavior and motivation of dietitians in searching for evidence-based information.⁷

This national study aims to evaluate the information-searching behavior of registered dietitians. Their experience in EBN is also examined. The results will shed some light on the dissemination of EBN.

MATERIALS AND METHODS

Design

A structured questionnaire was developed by the National Health Research Institutes (NHRI). It was designed using questions based on our previous reported questionnaires.^{8,9} The study was conducted in a four-month period,

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from January through April 2011.

Subjects

The targets in this study were registered dietitians working in Taiwan's regional hospitals. A regional hospital is defined as a secondary care hospital, as appraised by Taiwan's Joint Commission of Hospital Accreditation. For the present study we randomly enrolled 11 of the 65 regional hospitals in Taiwan, including 3 located in northern Taiwan, 4 in western Taiwan, and 2 each in eastern and southern Taiwan. The postal questionnaires were distributed to all dietitians at the enrolled hospitals.

Questionnaire

The survey included items for measuring behavior on searching for information. In addition, perceptions toward EBN, including the awareness of, belief in, attitude toward, knowledge of, skill in, and barriers to EBN were further explored. Background characteristics, including gender, age, faculty position, administrative position, working experience, and academic degree were also examined.

The usage patterns of 8 informational resources were measured: Web portals (e.g., Google, Yahoo), electronic textbooks, online databases, electronic journals, printed journals, colleague consultations, textbooks, and continuing education (such as conferences). The frequency was

classified by Likert's 5-point scale (always, often, sometimes, seldom, and never).

In addition, the questionnaire explored the usage of access to 11 online databases: 3 databases in Chinese and 8 databases in English (Table 1). The Chinese databases included the Index to Chinese Periodical Literature (ICPL), the National Digital Library of Theses and Dissertations in Taiwan (NDLTD), and the Chinese Electronic Periodical Service (CEPS). The English databases included the Cumulative Index to Nursing & Allied Health Literature (CINAHL), the Cochrane Library, MD Consult, MEDLINE, ProQuest, UpToDate, Micromedex, and DynaMed. These 11 databases were selected because of their popularity. The ICPL and MEDLINE are freely accessible, while the other databases require payment from individuals or their organizations.

Questions regarding the belief in, attitude toward, knowledge of, skill in, and barriers to EBN were rated by Likert's 5-point scale (strongly agree, agree, neutral, disagree, and strongly disagree).

Validity and reliability

Content validity was examined by 10 experts with more than 15 years of clinical experience each. The internal consistency of all indexes was estimated by using Cronbach's coefficient alpha. In this survey, the content validity index of 0.96 and Cronbach's coefficient alpha of 0.88 indicated sufficient validity and reliability of

Table 1. Summary of 11 commonly used online databases.[†]

Database	Commercial	Web site	Details
In Chinese			
ICPL	no	www.ncl.edu.tw	Over 2,600 titles of Chinese and Western language periodicals published in Taiwan, Hong Kong, and Macau from 1991.
CEPS	yes	www.ceps.com.tw	More than 2,000 periodicals for medicine, life science, and nature science published in Hong Kong, mainland China, and Taiwan
NDLTD	no	ndltd.ncl.edu.tw	Over 320,000 bibliographic records of theses and dissertations of academic degrees in Taiwan from 1956
In English			
Cochrane Library	yes	www.thecochranelibrary.com	preeminent online database of systematic reviews containing regularly updated evidence-based healthcare information
MD Consult	yes	www.mdconsult.com	full-text articles from over 50 leading medical references across a wide range of specialties
MEDLINE	no	www.ncbi.nlm.nih.gov	16 million references in the fields of medicine, nursing, pharmacy, dentistry, veterinary medicine, health care, biology, and biochemistry
CINAHL	yes	www.ebscohost.com/cinahl	Over 10,000 articles in nursing and related professions
ProQuest	yes	www.proquest.com	1500 magazines and newspapers, covering a wide range of topics for researchers
Micromedex	yes	www.micromedex.com	Information about drugs, toxicology, diseases, acute care, and alternative medicine
DynaMed	yes	dynamed.ebscohost.com	clinically-organized summaries for more than 3,200 topics
UpToDate	yes	www.uptodate.com	a clinical reference designed to provide physicians access to current clinical information (specific recommendations for diagnosis, management, and therapy)

[†]ICPL=Index to Chinese Periodical Literature; CEPS=Chinese Electronic Periodical Services; NDLTD=National Digital Library of Theses and Dissertations in Taiwan; CINAHL=Cumulative Index to Nursing & Allied Health Literature

Table 2. Demographic information and questionnaire returns of 11 enrolled hospitals.

	Location in Taiwan	Hospital information					beds/dietitian	Number of valid returns
		doctor	pharmacist	nurse	bed	dietitian		
A	Northern	175	37	610	694	9	77.1	9
B	Northern	136	25	592	613	8	76.6	8
C	Northern	111	26	642	778	7	111	5
D	Western	276	71	929	1339	10	134	7
E	Western	220	44	655	730	12	60.8	10
F	Western	191	57	822	708	7	101	5
G	Western	116	36	461	578	5	116	0
H	Southern	335	69	1216	1264	13	97.2	12
I	Southern	177	37	622	625	5	125	4
J	Eastern	95	26	465	599	6	99.8	5
K	Eastern	54	18	168	384	3	128	2
total		1886	446	7182	8312	85	102	67

parameters in the questionnaire.

Ethical considerations

The Ethical Review Board of the National Health Research Institutes approved the study protocol. The questionnaire was accompanied by an introductory letter stating the purpose of this study and promising confidentiality. Return of the completed questionnaire was considered a consent of participating the study.

Statistical analyses

Likert's 5-point scale for the use of information resources was dichotomized for further analyses. A self-rating report of either "always" or "often" was regarded as a favorable answer and the other three ("sometimes", "seldom" and "never") were viewed as unfavorable answers. Similarly, a self-rating report of either "strongly agree" or "agree" was regarded as a favorable answer and the other three ("neutral", "disagree" and "strongly disagree") were viewed as unfavorable answers. The statistical analyses were conducted using SPSS 12.0 for Windows (SPSS Inc., Illinois, USA). Pearson's chi-square test was used to compare the differences. Significance was defined as $p < 0.05$.

RESULTS

Demographic data

The demographic information of enrolled hospitals is summarized in Table 2. There were a total of 85 dietitians, including 24 in the northern hospitals, 34 in the western hospitals, 18 in the southern hospitals, and 9 in the eastern hospitals. There was no significant difference in the number of bed/dietitian among these four regions. Of the 85 enrolled dietitians, 67 returned questionnaires were valid with complete answers for analysis (78.8%). The demographic data of dietitians are summarized in Table 3. Females were more common (89.6%). The average age and working period were 35.6 ± 7.6 years old and 7.4 ± 6.5 years, respectively. Twenty-six dietitians had a master's degree (38.8%), 31 had a bachelor's degree (46.3%), and the rest had a junior college's degree (14.9%). Furthermore, 19 dietitians were faculty members (28.4%) and 10 were directors (14.9%).

Patterns of information-searching

Preferences for obtaining nutritional information are

Table 3. Demographic characteristics of 67 respondents.

	n	%
Gender		
Male	7	10.4
Female	60	89.6
Age, y		
20-30	17	25.4
31-40	37	55.2
41-50	9	13.4
> 50	4	6.0
Working experience, y		
<5	28	41.8
5-10	22	32.8
>10	17	25.4
Academic degree		
Junior college's	10	14.9
Bachelor's	31	46.3
Master's	26	38.8
Faculty, %		
Yes	19	28.4
No	48	71.6
Director, %		
Yes	10	14.9
No	57	85.1

illustrated in Table 4. The most common informational resource was a Web portal, followed by continuing education, colleague consultations, textbooks, online databases, electronic journals, printed journals, and electronic textbooks. The majority of dietitians used a Web portal as a source to obtain nutritional information (61.2%). There was no significant difference in the preference of information resources among dietitians from the northern, western, southern, and eastern hospitals (data not shown).

The frequency of access to online databases is shown in Table 5. Usage of at least once per month was defined as commonly used. The most commonly used database was MEDLINE, followed by CEPS, ICPL, NDLTDT, UpToDate, the Cochrane Library, MD Consult, ProQuest, CINAHL, Micromedex, and DynaMed. Motivations for use of online databases are listed in Table 6. The most common motivation for accessing an online database was self-learning (82.1%), followed by clinical practice (67.2%), instruction preparation (29.9%), class assign-

Table 4. Preferred resources for obtaining nutritional information.

rank	Resource	Frequency, n (%)				
		Always	Often	Sometimes	Seldom	Never
1	Web portal	41 (61.2)	15 (22.4)	9 (13.4)	2 (3.0)	0 (0)
2	Continuing education	26 (38.8)	34 (50.7)	7 (10.4)	0 (0)	0 (0)
3	Colleague consultation	20 (29.9)	34 (50.7)	13 (19.4)	0 (0)	0 (0)
4	Textbook	13 (19.4)	25 (37.3)	24 (35.8)	4 (6.0)	1 (1.5)
5	Online database	10 (14.9)	24 (35.8)	20 (29.9)	10 (14.9)	3 (4.5)
6	Electronic journal	4 (6.0)	23 (34.3)	23 (34.3)	10 (14.9)	7 (10.4)
7	Printed journal	4 (6.0)	13 (19.4)	24 (35.8)	21 (31.3)	5 (7.5)
8	Electronic textbook	1 (1.5)	9 (13.4)	24 (35.8)	17 (25.4)	16 (23.9)

Table 5. Preference of access to 13 commonly used online databases, ranked by use at least once monthly.

rank	Database	Frequency, n (%)					
		Daily	Weekly	Monthly	Quarterly	Yearly	Never
1	MEDLINE	0 (0)	5 (7.4)	19 (28.4)	18 (26.9)	8 (11.9)	17 (25.4)
2	CEPS [†]	0 (0)	6 (9.0)	11 (16.4)	11 (16.4)	9 (13.5)	30 (44.8)
3	ICPL [†]	0 (0)	1 (1.5)	13 (19.3)	16 (23.9)	18 (26.9)	19 (18.4)
4	NDLTDT [†]	0 (0)	3 (4.5)	9 (13.4)	9 (13.4)	20 (29.9)	26 (38.8)
5	UpToDate	0 (0)	2 (3.0)	8 (11.9)	14 (20.9)	19 (28.4)	24 (35.8)
6	Cochrane Library	0 (0)	2 (3.0)	8 (11.9)	5 (7.5)	14 (20.9)	38 (56.7)
7	MD Consult	0 (0)	1 (1.5)	7 (10.4)	7 (10.4)	10 (15.0)	42 (62.7)
8	ProQuest	0 (0)	0 (0)	6 (9.0)	10 (14.9)	9 (13.4)	42 (62.7)
9	CINAHL	0 (0)	0 (0)	2 (3.0)	6 (9.0)	9 (13.4)	50 (74.6)
10	Micromedex	0 (0)	0 (0)	2 (3.0)	6 (9.0)	7 (10.4)	52 (77.6)
11	DynaMed	0 (0)	0 (0)	1 (1.5)	5 (7.5)	10 (15.0)	51 (76.0)

[†] in Chinese. ICPL = Index to Chinese Periodical Literature, NDLTDT = National Digital Library of Theses and Dissertations in Taiwan, CEPS = Chinese Electronic Periodical Service.

ment (28.4%), research (26.9%), medical accreditation (23.9%), positional promotion (9.0%), contest for evidence-based practice (4.5%), and insurance issue (1.5%). There was no significant difference in the usage of the 11 online databases among dietitians from the northern, western, southern, and eastern hospitals.

Awareness of, belief in, attitude toward, knowledge of, and skill in EBN

Sixty-two dietitians were aware of EBN (92.5%), including 21 in the northern hospitals (100%), 21 in the western hospitals (91.3%), 13 in the southern hospitals (81.3%), and 7 in the eastern hospitals (100%). Their belief in, attitude toward, knowledge of, and skill in EBN are shown in Figure 1. Fifty-one dietitians believed that EBN is important for the improvement of patient care quality (82.3%). In addition, 45 dietitians stated that they were willing to support the implementation of EBN (72.6%). However, their knowledge of (29.0%) and skill in (4.8%) implementing EBN principles were relatively insufficient. In specific, capability of critical appraisal and literature searching was reported in 8 (12.9%) and 14 (22.6%) dietitians, respectively. Furthermore, 17 had taken an educational course covering EBN (27.4%). There was no significant difference in the belief, attitude, knowledge, and skill among dietitians from the northern, western, southern, and eastern hospitals.

Barriers to implementing EBN

The barriers to implementing EBN are illustrated in Figure 2. The most common barrier was lack of library resources in Chinese (58.1%), followed by deficient skill in critical appraisal (54.8%), insufficient convenient kits (53.2%), time constraints (50.0%), deficient skill in

Table 6. Motivation for accessing online databases.

rank	Reason	Number	%
1	Self-learning	55	82.1
2	Clinical practice	45	67.2
3	Instruction preparation	20	29.9
4	Class assignment	19	28.4
5	Research	18	26.9
6	Medical accreditation	16	23.9
7	Positional promotion	6	9.0
8	Contest for evidence-based practice	3	4.5
9	Insurance issue	1	1.5

literature searching (43.5%), insufficient library resources (43.5%), deficient knowledge (40.3%), deficient capable designated personnel (38.7%), lack of clinical incorporation (32.3%), deficient space for use (32.3%), lack of organizational climate (22.6%), and lack of support from superiors (17.7%). There was no significant difference in the barriers among dietitians from the northern, western, southern, and eastern hospitals.

DISCUSSION

This cross-sectional study provides baseline data about the resources of information searching and the perceptions of EBN among registered dietitians of regional hospitals in Taiwan. The dietitians used a wide variety of approaches to look for nutrition-related information. To our knowledge, this is the first study to identify the patterns of dietitians' preferences in informational searching. Our findings showed that Web portals are the most popular sources for information. An increasing number of studies show that Web portals have changed information-searching behavior.¹⁰⁻¹² Although

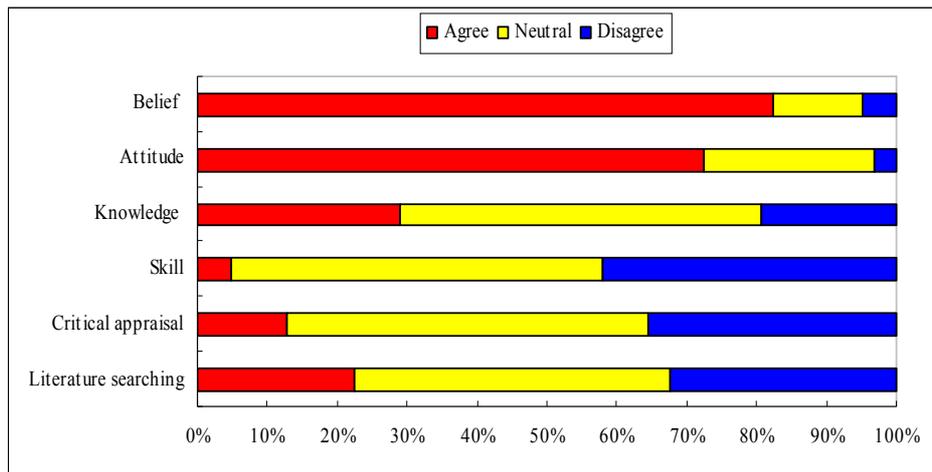


Figure 1. Belief in, attitude toward, knowledge of, and skill in evidence-based nutrition (EBN) among 62 dietitians in the regional hospitals of Taiwan. Belief – EBN is important for the improvement of patient care quality. Attitude – I am willing to support the implementation of EBN. Knowledge – I have sufficient knowledge to implement EBN principles. Skill – I possess enough skill to implement EBN principles. Critical appraisal – I am capable of appraising relevant literature critically. Literature searching – I am capable of searching relevant literature for clinical decision making.

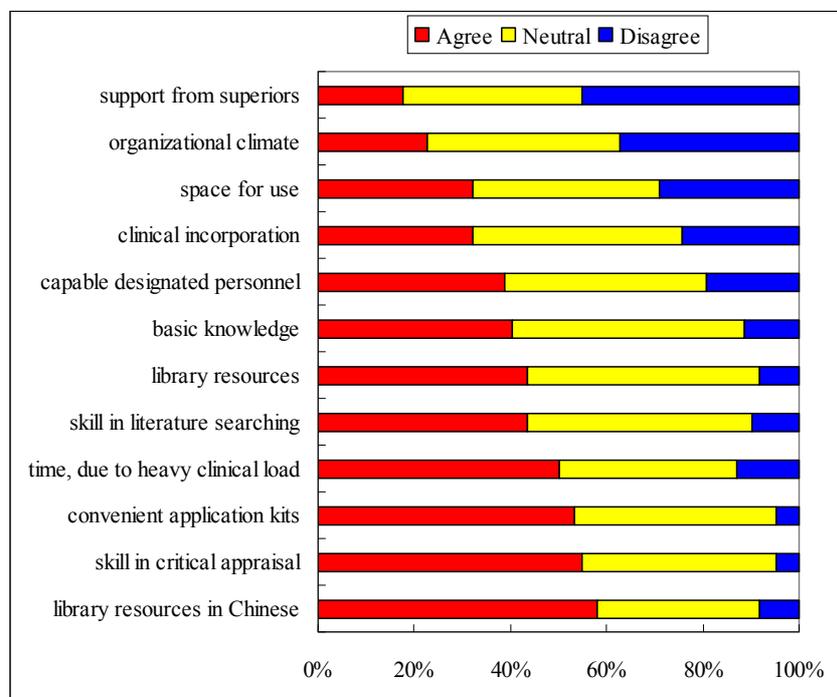


Figure 2. Insufficient factors for the implementation of EBN among 62 dietitians in the regional hospitals of Taiwan.

access to Web portals is instant and effective, the information they link to is not always accurate. Furthermore, the amount of information Web portals provide is always greater than needed. How one is able to easily find quality information from what is often an overwhelmingly large number of Web search results has been a challenge.^{10–12} In addition to using Web portals, dietitians preferred face-to-face contact rather than printed sources for clinical answers. Although colleagues' opinions are not always evidence-based, it has been an important resource for dietitians who wish to obtain information.^{13,14} These data indicate that EBN has not become widespread among the registered dietitians in Taiwan's regional hospitals.

In general, the barriers to the use of evidence for dietitians were similar to those for physicians and nurses in the regional hospitals of Taiwan.¹⁵ This probably is a

common phenomenon in regional hospitals. Convenient access to instant knowledge is also an important issue to facilitating such access.^{6,7} Of importance, registered dietitians demanded access resources in Chinese, indicating that language is a critical element in the implementation of EBN.

Unlike other professionals who serve as the first-line health personnel for patient care in regional hospitals, dietitians work on a special consultant basis. In most circumstances, dietitians provide clinical service after they are consulted. Their perceptions toward EBN were therefore explored apart from those of others in the same hospitals.^{3,16} Our study correlates with previous surveys' examinations of dietitians' opinions on EBN.^{4,17} The results indicate that the majority of dietitians hold favorable attitudes towards EBN. In addition, our study indicates that dietitians lack methodological competence in EBN. The

low level of knowledge and skill in EBN was consistent with a previous report.⁴ Integrating EBN into the dietetic curriculum may be necessary to accelerate EBN's implementation.

Expediting their efforts to access emerging medical informatics is imperative to disseminate EBN into the dietitians.¹⁸ The online database has been increasingly used as a key resource in the search for information with a summary of individual research evidence. This study looked at the ways in which registered dietitians make use of online databases. In this study, dietitians were less apt to rely on online databases for information than on Web portals, colleagues and continuing education. Furthermore, the majority of information accessed from online databases was used for professional purposes. MEDLINE was accessed more than any other database. These findings are in accordance with previous surveys.^{7,13,19} In addition to MEDLINE, CEPS, ICPL, and NDLTDT, all three of which are in Chinese, were popular with registered dietitians. Although language was not a significant barrier to access for physicians in the regional hospitals of Taiwan, it was one for the registered dietitians.⁹

In addition to the online databases, there are some websites with summarized evidence-based information.²⁰ With the advent of Web portals, such as the use of Google Scholar, these websites have been increasingly utilized.^{21,22} However, challenges regarding to their credibility still exist. Furthermore, the effectiveness of such resources on the improvement of healthcare quality is not clear yet.²³

Two methodological issues should be cautiously interpreted in this study. First, our study is a self-rated survey, not an audit of actual practice. Second, our study did not further explore the EBN websites derived from the Web portals. Further study may be necessary to investigate how registered dietitians search for nutritional information from such resources. In spite of the limitations, our survey presents several potentially useful findings. It represents a nationwide sample of regional hospitals in Taiwan and, therefore, can be generalized to dietitians working in similar settings. In addition, our results shed some lights on dietitians' preferences for access to nutritional information.

Conclusions and implications

Overall, this study represents a nationwide profile of information-searching preferences of dietitians at regional hospitals in Taiwan. The findings have important implications for educational and clinical issues. Firstly, when they wish to find specific information, dietitians feel much more confident asking peers and searching Web portals than they do using bibliographic databases. Secondly, although dietitians recognize the value of EBN, few have acquired the ability to implement its principles. Third, a large percentage of dietitians access online databases for professional purposes. Mastery of access to such databases is a core skill for applying EBN. In conclusion, dietitians in Taiwan are not ready for EBN because of the gaps in their information literacy and computer searching skills.

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AUTHOR DISCLOSURES

The authors have no conflicts of interest to declare.

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Original Article

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營養師是否經由實證營養之管道來搜尋訊息？台灣區域醫院之全國性調查

營養師可以從許多不同的管道來獲取營養相關之訊息。本研究評估營養師如何取得營養方面之訊息及其對於實證營養之看法。採用郵寄問卷進行調查，共回收 67 份有效問卷。營養師最常從入口網站以搜尋營養相關之資訊，其次為繼續教育，再依次為詢問同事、教科書、網路資料庫、電子期刊、紙本期刊，最後為電子教科書。在 11 個經常使用的網路資料庫當中，營養師較常使用 MEDLINE 及三個中文的網路資料庫。有 62 位營養師(92.5%)知曉何謂實證營養。雖然營養師一致認同且支持實證營養，但是他們對應用實證營養的知識及技巧是相對不足的。在進行實證營養之應用時，最常見的障礙為缺乏中文化之圖書來源(58.1%)，其次為對文獻評讀之技巧不足(54.8%)、缺乏便利之相關工具(53.2%)及沒有時間(50.0%)。總結為，多數有執照的營養師經由非實證營養之管道以搜尋訊息，其中語言為應用實證營養時一個很重要的相關因素。本研究之發現將有助於規劃策略來推廣實證資訊之使用。

關鍵字：實證營養、營養師、資訊、網路、資料庫