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ABSTRACT

This study investigates patterns of on-line communication between physicians and patients on the consulting board of the KingNet WebHospital in Taiwan. The dermatology, urology, gynecology and pediatrics departments, which all have frequent physician-patient interaction on KingNet, were selected as samples. After conducting content analysis of total 600 on-line messages between physicians and patients from these four departments, we classified patients' questions into four categories: "Symptoms and Diseases," "Medications or Treatments," "Tests or Diagnostic Procedures," and "Prevention." We also analyzed physicians' responses and classified them into three types: ignore, partially-fulfil and fulfil. While questions involving "Symptoms and Diseases" were the ones most commonly raised by patients in all four departments, they were also the ones that most physicians ignored or answered only vaguely. To understand the possible causes of this gap, interviews were conducted with the physicians. The results show that, for physicians it is difficult to answer such questions on-line due to uncertainty of medical treatments, restrictions imposed by medical regulations, the possibility of medical disputes, and the perception gap between patients and physicians. Consequently, physicians tend to either offer "partial" suggestions or ask patients to go to hospital for further examination.

Keywords

Physician-Patient Relationship, Online Systems, Communication Barriers, Content Analysis, Qualitative Research

INTRODUCTION

A recent development in healthcare has been the growing interaction between physicians and patients on the Internet or via e-mail (Anderson, Rainey and Eysenbach 2003; Hussain, Agyeman and Das Carlo 2004; Liedermanand Morefield 2003; Sciamanna, Clark, Diaz and Newton 2003). This new communicative model offers a number of advantages. It provides an alternative way for physicians to deal with problems, offering constant health care and medical information to patients and encouraging those with chronic diseases to manage their own health. It also allows physicians to observe and record changes in a disease (Carand Sheikh 2004; Cocosila, Coursaris and Yuan 2004; Kassirer 2000). On the Internet, patients can deal privately with potentially embarrassing medical problems and avoid possible awkwardness between physicians and patients arising from differences in ages, or class, etc. during physical examination. Further, on-line communication help to get around restrictions caused by transportation, distance, privacy and time (Rainieand Packel 2001). It provides patients with an unofficial way to consult a physician and protects privacy, especially for those who are unwilling to reveal their identities in public (Carand Sheikh 2004; Wenand Tan 2005).

According to Pew Internet and American Life Project, about 55% of sixty million American adults questioned had used the Internet to search for medical information related to illnesses or medical treatments (Rainieand Packel 2001). Anderson et al. (2003) point out that over seventy million American consumers use the Internet to obtain health information. A recent trend has been the growth in the number of on-line medical websites - such as NIH (http://www.nih.gov), webMD (http://my.webmd.com), and Medem (http://www.medem.com) – providing patients with an interface for on-line consultation. Medem, for example, encourages physicians to keep in Internet contact with their patients after diagnosis. All the on-line communication is kept on record and privacy is protected. In addition, patients are asked to give their consent before submitting to on-line consultation. Over 100,000 physicians utilize Medem, and 10,000 physicians communicate with patients using this method. In Taiwan, Che (2001) has checked Taiwan Yahoo, Yam, and Chunghwa Telecom websites and

found 1366 websites dedicated to medical care. Chuech (2001) found that 84.1% people have searched for health information from such websites. Clearly, medical websites have become significant tools for patients.

The Internet has changed physician-patient communicative patterns and relationships. Researchers have begun to examine the influence of this on-line interaction (Anderson, Rainey and Eysenbach 2003; Gerberand Eiser 2001; Lasker, Sogolow and Sharim 2005), physician and patient attitudes toward on-line communication (Hassol et al. 2004; Hussain, Agyeman and Das Carlo 2004; Katz, Moyer, Cox and Stern 2003; Kleiner, Akers, Burke and Werner 2002), and the obstacles to, and influences on, such communication (Brooksand Menachemi 2006; Huang, Hsu, Ko and Kuo 2007). However, few surveys have analyzed the content of physician-patient on-line communication (Anand, Feldman, Geller, Bisbee and Bauchner 2005; Street 1991; White, Moyer, Stern and Katz 2004). White et al. (2004) analyzed 3007 messages between physician and patient, dividing them into nine categories as follows: information updates to physicians, prescription renewals, health questions, questions about test results, referrals, others (such as gratitude or apologies), appointments, requests for non-health-related information, and billing queries. They found that all of these messages were brief, formal, insensitive and not urgent. Anand et al. (2005) analysed the content of e-mail communication between parents and pediatricians and used questionnaires to investigate the parents' attitudes toward the service provided by the pediatricians. They recognized four categories of physician-patient interaction as follows: medical questions, medical updates, subspecialty evaluation, and administrative issues. The results of the analysis showed that 39% of pediatricians responded to e-mails immediately and that 98% of patients felt satisfied with their on-line interaction. Sitting (2003) showed that most patient e-mails were concerned with information on medication or treatments, specific symptoms or diseases, or requests for action regarding medication or treatments. Physicians responded to most of the questions but their responses were brief.

The surveys mentioned above have generally focused on the analysis of physician-patient e-mails. Few have studied the messages posted on consulting boards. Moreover, most have examined the situation as it exists in Western countries. Few have investigated physician-patient interaction in Asia. In order to better understand physician-patient on-line communication in Taiwan, this study examines three aspects of messages posted on the consulting boards of KingNet WebHospital: (1) categories of patient question; (2) physician responses; (3) obstacles to physician-patient on-line communication. We also interview physicians to confirm the findings of content analysis, and to understand the barriers preventing better physician-patient interaction.

METHODS

This study uses content analysis to analyze and categorize patients' questions and physicians' responses. Content analysis, which is also referred to as "Quasi-Statistics", aims to manifest content in communication objectively, systematically and quantitatively. It allows the content of conversations to be clearly exposed (Holsti 1969). Code books are made in advance according to the topic and purpose of the research. The contents of all interviews are then classified systematically into these code books. Finally, interview word frequency and sentence usage are analyzed. To understand physician-patient on-line communication, this study used content analysis to examine their conversations in KingNet WebHospital. Patients' questions, physicians' responses, and physician-patient communicative patterns were categorized on the basis of the classifications used by Kravitz, Bell, & Franz (1999) and Sitting (2003) and then tested.

KingNet WebHospital consists of 76 departments, each with its own physician-patient consulting board. Four departments with high levels of physician-patient communication were selected as samples. These were the general gynecology department, the dermatology department, the urology department, and the pediatrics department. To test the reliability of the categorization, three researchers were asked to categorize questions independently. One hundred and fifty messages were randomly selected from the dermatology department covering the period December 1998 to May 2007. The researchers categorized the messages according to content and then compared their results to examine "inter-researcher reliability." On the first classification, reliability was just 78%, below the acceptance level. Therefore, the researchers checked their classifying criteria together, and embarked upon a second classification. This resulted in the level of reliability rising to 91%, above the acceptance level. After this procedure, the researchers categorized the messages in the other three departments using the new categories. Finally, the researchers discussed those messages where there were still differences, until agreement was reached.

Following content analysis, open-ended interviews were conducted with four physicians, one from each of the four departments concerned, to confirm the results. The physicians had all served on the KingNet WebHospital for over two years and spent over two hours a day on the website. The interviews were recorded, with their permission, and later transcribed by the researchers in preparation for analysis. To ensure that the physicians' viewpoints were interpreted accurately, the transcripts were coded and analyzed by three independent researchers.

RESULTS

KingNet WebHospital

KingNet WebHospital (http://hospital.kingnet.com.tw/) was set up by Jing-ming International Corporation. It is a public-service medical website where physicians and patients can communicate with each other. This study examined physician-patient on-line communicative patterns using only messages posted on the free "medical consulting board". The consulting boards on KingNet WebHospital allow patients to obtain second opinions. Patients first select a department related to their problem and then post their questions on the relevant consulting board. Physicians answer patients' questions and show their responses on the consulting board. As of May 2007, 552 physicians had registered to give general medical consultation on KingNet WebHospital.

KingNet WebHospital has three types of medical consultation: general medical consultation consisting of 31 departments, special medical consultation consisting of 39 departments, and Chinese medical consultation consisting of 6 departments. Of these, general medical consultation receives the most questions.

In general medical consultation, the four departments with the most frequent physician-patient interaction were dermatology, urology, gynecology, and pediatrics. The number of messages they each received on the consulting board are shown in Table 1 below.

DEPARTMENT	PERIOD BEGINS	PERIOD ENDS	NUMBER OF MESSAGES
Dermatology	1999/2/11	2007/05/28	8955
Urology	1998/12/1	2007/05/29	8182
Gynecology	1999/4/23	2007/05/30	7837
Pediatrics	1998/12/17	2007/05/30	5017

Table 1: The Four Departments with the Highest Physician-Patient Interaction

Messages Analyses on the Consulting Boards

To better understand physician-patient interaction on KingNet WebHospital, this study analyzed messages from the four most used consulting boards. Patients' questions, physicians' responses, and physician-patient communicative patterns were classified.

1)、 KingNet WebHospital Consulting Board

Physician-patient communication on KingNet WebHospital takes place through the consulting boards. Patients' questions are shown on the board, but personal information is never revealed. Only physicians have access to this personal information. Messages are listed by time and responses are displayed after the questions. Patients can search for relevant information on the boards using keywords.

2)、 The Format of Patients' Questions and Physicians' Responses

In order to help patients clearly describe their problems, KingNet WebHospital provides instructions, including symptoms, duration, and complements, etc. The Format is presented in Figure 1 below.

SYMPTOMS:

Dear doctor,

When should I use facial gelatin, before or after applying cosmetics?

If I have to use facial gelatin first, can I apply cosmetics afterwards?

Thanks!

DURATION:

COMPLEMENTS:

RESPONSES:

Hi,

I suggest you apply the facial gelatin before the cosmetics.

You can apply cosmetics, but remember to wash off the facial gelatin before doing so.

Chuang-Yue Dermatology Department

Mei-hui, Li, M.D.

Figure 1: The Format of Questions and Responses

3)、 Categorization of Physician-Patient Questions

This study adopted the coding schema of Kravitz et al. (1999) and Sitting (2003) to categorize questions and responses. Kravitz et al. (1999) classified the conversations between patients and physicians and validated these classifications by observing physician-patient interaction in clinics. Sitting (2003) also adopted Kravitz et al. classification to analyze physician-patient interaction through e-mails. Patients' questions can be divided into 11 categories, and physicians' responses into 3 categories (Table 2, Table3).

For patient's questions, categories were created on the basis of their content. "Symptoms and Diseases" is self-explanatory. "Psychosocial Problems" refers to questions about psychological states. "Physical Examination" is concerned with physician-patient conversations during physical examination. "Tests or Diagnostic Procedures" refers to questions about the procedures involved in physical examination. "Medication or Treatments" refers to questions on medicines usage or medical treatments. "Prevention" covers questions of health care. "Patient-Provider Relationship" is self-explanatory. "Other Physicians" relates to questions about other doctors. "3rd Party Payer or Managed Care Issue" refers to medical management. "Other Administrative Issues" refer to questions about administration. "Other Requests for Information" includes all questions which cannot be placed into other categories.

Physicians' responses were divided into three categories: ignore, fulfil, and partially fulfil. "Ignore" means that physicians do not answer a patient's question directly, but instead suggest they go to hospital. "Fulfill" indicates that physicians are able to deal with the question. "Partially fulfill" means that physicians only partially answer questions. Physicians make assumptions about a patient's condition and propose a possible solution. For reassurance, physicians also suggest they go to hospital. Words such as "maybe" or "perhaps" are often used in such responses.

CATEGORY	EXAMPLE
Symptoms and Diseases	Doctor, what's wrong with me?
Psychosocial Problems	Do you think too much pressure would cause chest pains?
Physical Examination	What are you poking me there for?
Tests/Diagnostic Procedures	When do I need another X ray?
Medication/ Treatments	Should I keep taking the antibiotics?
Prevention	How can I keep from getting osteoporosis like my mother?
Patient-Provider Relationship	Are you still going to be my physician?
Other Physicians	Is Smith an excellent physician in the department of cardiology?
3rd Party Payer or Managed Care Issue	Does Medicaid cover that medication?
Other Administrative Issues	Do you validate parking?
Other Requests for Information	Where is the reckoning counter?

Table 2: Patients' Questions by Category (Revised by Kravitz et al., 1999)

CATEGORY	EXAMPLE
Ignore	What you depict may happen in many situations; it is difficult for me to make a diagnosis based on your description. Please go to hospital for a precise diagnosis
Fulfil	Measure your basal body temperature. There will be a high temperature period after ovulating, and this is normal
Partially Fulfil	Maybe, it is a sign of a miscarriage, so you had better return to the hospital for a further check.

Table 3: Physicians' Responses by Category (Revised by Kravitz et al., 1999)

4)、 Messages Analyses on Consulting Boards in Four Departments

After reaching agreement categorization, 150 messages from urology, general gynecology, and pediatrics were randomly selected and analyzed by three researchers. The total analyzed messages are 600. Tables 4 and 5 show the results.

Dept. / Response Category	Dermatology	Urology	Gynecology	Pediatrics
Ignore	10.9%	15.8%	5.4%	38.5%
Fulfil	53.7%	60.3%	68.2%	37.8%
Partially Fulfil	35.4%	24%	26.4%	23.8%

Table 4: Physician Responses by Percentage

Dept \ Category	Dermatology	Urology	Gynecology	Pediatrics
Symptoms and Diseases	58%	60.7%	70.7%	64%
Medication/ Treatments	26%	18.7%	16.7%	10.7%
Prevention	8.7%	6%	6.7%	16.7%
Tests/ Diagnostic Procedures	5.3%	12%	4.7%	4%
Other Physicians	1%	1.7%	1.2%	2.7%
Other Requests for Information	0%	1%	0%	2%
Psychosocial Problems	1%	0%	0%	0%
The Physical Examination	0%	0%	0%	0%
Patient-Provider Relationship	0%	0%	0%	0%
3rd Party Payer or Managed Care Issue	0%	0%	0%	0%
Other Administrative Issues	0%	0%	0%	0%
Total	100%	100%	100%	100%

Table 5: Patient Questions by Percentage

Detailed results for each of the four departments are shown below in Tables 6-9.

Physician Response \ Patient Questions	Ignore	Fulfill	Partially Fulfill
Symptoms and Diseases	15(17.2%)	39(44.8%)	33(37.9%)
Medications/ Treatments	0(0%)	24(61.5%)	15(38.5%)
Prevention	1(7.7%)	10(76.9%)	2(15.4%)
Tests/Diagnostic Procedures	0(0%)	6(75%)	2(25%)
Total Response Category	16(10.9%)	79(53.7%)	52(35.4%)

Table 6: Questions and Responses in Dermatology Department

Physician Response / Patient Questions	Ignore	Fulfill	Partial Fulfill
Symptoms and Diseases	21(23.1%)	36(39.6%)	34(37.4%)
Medications/ Treatments	2(7.1%)	25(89.3%)	1(3.6%)
Prevention	0(0%)	18(100%)	0(0%)
Tests/Diagnostic Procedures	0(0%)	9(100%)	0(0%)
Total Response Category	23(15.8%)	88(60.3%)	35(24%)

Table 7: Questions and Responses in Urology Department

Physician Response / Patient Questions	Ignore	Fulfill	Partially Fulfill
Symptoms and Diseases	8(7.55%)	60(56.6%)	38(35.85%)
Medications/ Treatments	0(0%)	13(100%)	0(0%)
Prevention	0(0%)	9(90%)	1(10%)
Tests/ Diagnostic Procedures	0(0%)	7(100%)	0(0%)
Total Response Category	8(5.4%)	101(68.2%)	39(26.4%)

Table 8: Questions and Responses in General Gynecology Department

Physician Response / Patient Questions	Ignore	Fulfill	Partial Fulfill
Symptoms and Diseases	51(53.1%)	14(14.6%)	31(32.3%)
Medications/ Treatments	1(4%)	23(92%)	1(4%)
Prevention	2(12.5%)	12(75%)	2(12.5%)
Tests/ Diagnostic Procedures	1(16.7%)	5(83.3%)	0(0%)
Total Response Category	55(38.5%)	54(37.8%)	34(23.8%)

Table 9: Questions and Responses in Pediatrics Department

Interviews with physicians on KingNet Website

Content analysis of the on-line communication between physicians and patients revealed a gap between what patients ask and the replies offered by physicians, particularly in the category, "Symptoms and Diseases". Many patients ask questions about their symptoms, but these are mostly ignored by the physicians or answered only vaguely. To confirm these findings and gain some insight into the barriers preventing better physician-patient interaction on such problems, we interviewed four KingNet WebHospital physicians, one each from the dermatology, urology, general gynecology, and pediatrics departments.

The physicians all expressed their concern about the obstacles facing them when answering patient questions about symptoms and diseases. The anonymity and convenience of the WebHospital encourages patients to ask questions related to

their symptoms. However, to answer such questions on-line is problematical for physicians. Not only does the lack of face-to-face contact make it difficult to give an accurate diagnosis, but medical law also states that physicians can't make such a diagnosis unless they have personally examined the patient. As a result, physicians always reply ambiguously using wording such as "possible" and "maybe" and ask patients to go to hospital for face-to-face diagnosis.

DISCUSSION

Based on the content analysis of web dialogs between patients and physicians and the interviews with physicians, the findings could be discussed as following:

Overview of patients' questions

Most questions from patients using the boards of the four departments studied fall into one of four categories, namely "Symptoms and Diseases," "Medications or Treatments," "Tests or Diagnostic Procedures," and "Prevention." In each of the departments, questions about "Symptoms and Diseases" were the most numerous. Questions about "Prevention" were more common in the pediatrics department than in other departments. In the urology and general gynecology departments, questions about "Symptoms and Diseases" often involved descriptions of genital organs, sex life and pregnancy. In the dermatology and urology departments, many questions came with depictions of the inflected areas. Questions to the general gynecology department were often presented with dates of events.

Comparison of patients' questions and physicians' responses in four departments

This study indicates that physicians are unable to dominate physician-patient communication on the consulting boards. Without interruption from physicians, patients are free to describe their symptoms based on their own understanding. Typically, physicians tend to respond briefly without asking patients to clarify or answer questions. Patients tend not to ask further questions and the on-line communication simply comes to an end.

Results show that physicians fully answer a much higher percentage of questions about "Symptoms and Diseases in the general gynecology department than in other departments. In the dermatology and urology departments the proportion of such questions "Fulfilled" or "Partially Fulfilled" is similar. The pediatrics department has the highest percentage of "Symptoms and Diseases" questions "Ignored" by physicians. The uncertainty of medical treatment makes it difficult for physicians to give positive answers to every question. Instead, they tend to put forward a number of suggestions followed by a request for the patients to go to hospital for reassurance. If physicians, especially pediatricians, don't recognize the symptoms depicted, they tend to ignore the question and ask patients to go to see a doctor directly. Questions about "Medications or Treatments", "Tests or Diagnostic Procedures", and "Prevention" were easily answered by physicians in all four departments. Overall, the patterns of patient-physician interaction are as follows:

1)、 "Symptoms and Diseases": patients describe symptoms, events or appearance of infected areas according to their understanding. However, physicians cannot make judgments based merely on patients' written descriptions. Consequently, they respond with frequent use of words such as "should" or "may". Responses typically fall into the "Partially Fulfill" category.

2)、 "Medications or Treatments" and "Prevention": patients ask about the advantages and disadvantages of particular medicines, medical treatments or health care. Physicians deal with these kinds of questions capably and provide standard answers. They sometimes pass on medical knowledge to patients. There is plenty of interaction between physicians and patients in these two categories.

3)、 "Tests or Diagnostic Procedures": on the consulting boards of KingNet WebHospital there are few of these types of questions. Patients occasionally ask about the procedure involved in a particular physical examination, and its cost, etc. The nature of these questions means that physicians are able to give complete answers.

Factors presenting barriers to better interaction on "Symptoms and Diseases"

From our interviews with physicians at WebHospital, it is clear that many doctors join in order to serve a greater number of people. However, the nature of the on-line system involved means that there is insufficient timely interaction between patient and physician and an uncertainty over appropriate medication. This results in patients failing to provide proper and sufficient information and physicians being unable to give complete replies. Physicians also worry about possible medical disputes arising from on-line consultation. As a result, they tend to answer only simple, clear questions and with brief replies.

Questions which are unclear are answered either vaguely or not at all. This leads to complaints from patients about the ineffectiveness of the physicians' responses. For their part, physicians feel angry and misunderstood by patients. Eventually, interaction between physicians and patients is hindered. Further discussion follows below.

1)、 Lack of physical examination
For physicians to fully understand patients' symptoms requires timely interaction. Face-to-face questioning enables physicians to revise and make further diagnoses. However, these conditions are hard to achieve through either email or on-line discussion.

Physicians need as much information as possible to make a correct judgment. Examinations allow the physician to view, listen to, and ask about symptoms while physically inspecting the patient's body. Obviously, this cannot be done adequately through text messages and thus most physicians find that they can not gain a full understanding of a patient's problem on-line. Things are made worse when patients fail to describe their symptoms fully or, for personal reasons, hold important information back.

2)、 Increasing number of medical disputes
Medical disputes impede interaction between patients and physicians. The increasing number of such disputes makes physicians more conservative and cautious when treating patients. They tend toward vagueness when answering patients' questions. This is especially true of on-line communication. Physicians believe that medical disputes often happen as a result of patients trying to compare and question opinions from different doctors. One informant points out that many doctors are concerned that some patients only ask questions in order to criticize the opinions of their previous physicians.

The potential for conflict increases on-line due to the lack of direct physical contact between physician and patient and the subsequent unwillingness of physicians to respond in too much detail.

Although physicians who join WebHospital know that on-line consultations are mainly for the purpose of offering second opinions to patients, they are concerned for the doctors who will actually carry out the treatments. Consequently, they are extremely careful and cautious about their replies.

3)、 Medical treatment is an art
Uncertainty is one of the characteristics of medical treatment. Different diseases can produce similar symptoms and a simple symptom may have many possible explanations. In this way, it is difficult for physicians to make diagnoses or suggestions based simply on patients' descriptions. Moreover, based on a patient's particular condition, different physicians may arrive at different treatments and prescriptions for the same diseases. This adds another layer of uncertainty. When patients go on-line to seek second opinions or confirm the treatments that they have already received, it is difficult for the 'web' doctors to fully understand the thinking of the other physician.

4)、 Cognitive gap between physicians and patients
Physicians believe that it is difficult to communicate with patients because of the gap in medical knowledge. This knowledge gap can be seen in the way patients ask questions. Past studies have made a similar point. Mishler (1984) stated that patients use the voice of life to communicate while physicians use the voice of medicine. Patel, Arocha, & Kushniruk (2002) pointed out that there is difference between patients' and physicians' perceptions of communication. Physicians use a disease model and patients use an illness model to interact with each other, creating an obstacle to full understanding. Patients always focus on external symptoms and ignore related signs, while physicians don't know how to respond as they lack full information.

5)、 Lack of mutual trust between physicians and patients
On the Internet, patients may wear a mask to hide their real selves. They may lie about their age and gender and even ask questions in other people's names. They sometimes fail to disclose diagnoses made by other physicians or hide information about their symptoms in order to test the professionalism of the on-line physician.

When patients try to disguise themselves in this way, physicians are unable to answer question well as they don't know the true condition of the patients' disease. Furthermore, dealing with such patients makes physicians more cautious and realize that they need to protect their own. They reconfirm information, request results from related tests, and always ask patients to go to hospital for further examination.

CONCLUSION

On-line communication provides a convenient way for patients to interact with physicians comfortably and anonymously. However, as patients come to rely on such on-line communication for medical advice and raise more and more questions, physicians find that it is difficult to provide adequate responses on-line. The uncertainty of medical treatment, the medical

regulations, the threat of possible medical disputes, and the perception gap between patients and physicians all present obstacles to a satisfactory interaction. As a result, while on-line consultation deals well with questions about "Prevention", "Medications or Treatments", and "Tests or Diagnostic Procedures", patients are dissatisfied with the physicians' responses to questions about "Symptoms and Diseases", leaving doctors feeling misunderstood. Clearly, there is plenty of room for improvement. In order to improve patients' skills in raising questions on board, patients could be educated for more medical knowledge. Meanwhile, for a more effective physician-patient communication, interfaces should be designed to simplify patients' questions or instruct patients to delineate their problems clearly. Moreover, different medical departments should have different interfaces invented and specific instruction included for physician-patient communication.

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