Doctor-Patient Knowledge Transfer: Innovative Technologies and Policy Implications

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Abstract

The aim of this study was to empirically investigate the barriers in doctor-patient communication and knowledge transfer and the role of innovative technologies in overcoming these barriers. We applied qualitative research methods.

Our results show that patients extensively use information sources, primarily the Internet before the visits. Patients regularly apply a self-diagnosis regarding their diseases. This implies several risks as many of them are not able to properly interpret the found information and at the same time the information might not be reliable. To overcome these risks efforts are required within the fields of technology developments for making web sites more reliable and improvement of the health culture of patients, as well.

Our research identified the most significant barriers of doctor-patient communication including limited time, the patients' distress, inadequate health culture and prior knowledge, as well as poor communication skills of some clinicians. Technology might help clinicians to use their limited time more effectively.

In the long term, innovative technology solutions might take over some tasks of the health care personnel if they provide reliable health information adapted to the patient's health, emotional and psychosocial status. Barriers of access to the new technology should be identified and addressed otherwise it would increase the already existing knowledge gap between patients and doctors.

Keywords: doctor-patient communication, knowledge transfer, innovative technologies, patient education, policy implications

1. Introduction

1.1 Doctor-patient knowledge transfer

Although there are many easily accessible sources of medical information like websites and discussion forums, there is still strong information asymmetry between doctors and patients (Pilnick et al., 2011). In addition, the quality of information found e.g. via an Internet search might be poor (Adams, 2010). Even if the information is not incorrect or outdated, the commercial web sites might predominate the search results (Woodard, 2004). Therefore doctor-patient knowledge transfer plays an important role: doctors are still the most reliable information source about the patients' health status, disease, treatment options or necessary lifestyle changes. Patient education is a structured form of knowledge transfer. Research shows that patient education can decrease the length of hospitalization and consequently decrease costs (Siggeirsdottir et al., 2005).

1.2 Barriers in the knowledge transfer

Patients often report difficulty in communication with physicians, and up to one-third leave with unanswered questions (Barnabei et al., 2008). There are various factors causing this ineffectiveness of communication and knowledge transfer.

First, patients, especially those newly diagnosed are usually distressed about their health status. This distress may impede their capacity to 'take up' new information and it may also impede their decision-making processes. Furthermore, new knowledge about their disease might even increase the level of distress (Hovey et al., 2012).

Health information is frequently provided during stressful situations like hospitalization which reduces the patients' ability to understand and remember it (Balmer, 2005). Recall of spoken health information provided during clinical encounters is rather poor, regardless of health literacy level (McCarthy et al., 2012).

In addition diverse cultural background, low general and health literacy and poor language skills are also important barriers of effective communication and knowledge transfer, especially in minority and new immigrant groups (Poureslami et al., 2011). Similar issues arise in the case of foreign patients (Türkeli et al., 2009). Health literacy is not solely related to general literacy or educational level: according to a US survey, one-third or the population has limited health literacy level (Kutner M, 2006).

1.3 Policy implications

Information asymmetry does not mean that patients should be passive receivers of knowledge. On the contrary, according to the patient-centred model of care, patients should actively participate in the care process. They express their knowledge, interests and preferences during the encounter, which should be taken into consideration in the communication and decision-making (Breen et al., 2009). This approach is included in the most recent guidelines, for example in the American College of Cardiology Foundation's (ACCF) 2012 Health Policy Statement on Patient-Centred Care in Cardiovascular Medicine (Walsh et al., 2012). This policy statement emphasizes the role of patient education as it contains among others the following recommendations:

- *"Clinicians should be familiar with the sources of knowledge appropriate for their patient populations, and have access to a variety of educational materials to provide their patients. Pamphlets, online programs, community events, or group education sessions enable clinicians to accommodate patients with different learning styles, cultural realities, and socioeconomic status."*
- *"Patient education materials provided by clinicians should be individually relevant and culturally appropriate, incorporate actionable goals, and acknowledge patients as respected partners in their care."*

Education is a critical element of other chronic conditions, among others diabetes care as well: a separate policy standard was issued in the field of diabetes self-management education and support (Haas et al., 2012). This guideline recognizes the importance of the individualized education and it recommends various factors that should be considered when developing the personal education plan, including "medical history, age, cultural influences, health beliefs and attitudes, diabetes knowledge, diabetes self-management skills and behaviours, emotional response to diabetes, readiness to learn, literacy level (including health literacy and numeracy), physical limitations, family support, and financial status". It also highlights the importance of the documentation of the education plan as it can guide the educational process, facilitate communication between team members, prevent duplication of services and demonstrate adherence to the guidelines.

1.4 Technologies to overcome the barriers

Advanced technologies, particularly information and communication technology (ICT) might help to overcome the identified barriers and implement the guidelines.

The first step towards effective patient education is the identification of educational needs, possible barriers and previous education received. These establish a personal education plan which facilitates the communication between health care team members, prevents duplication of topics and supports the identification of topics requiring review and reinforcement (Kanak et al., 2008). However education is often not documented, mainly because it is provided in an informal manner which is not considered as education (Cook et al., 2008).

Patient education can be delivered via various methods that affect the knowledge and satisfaction of the patients at different rates. Structured teaching has been shown to be much more effective than unstructured ad hoc teaching. Verbal teaching and discussion were found to be the least effective strategies. Computer technology, audio and videotapes, written materials, and demonstrations were more effective (Friedman et al., 2011). This finding might be associated with the fact that education provided in a stressful sitatuation – i.e. during an encounter or hospitalization – is less effective. If the patient has access to the information at home in a more comfortable environment, it can be easier to understand and it can be reviwed as many times as necessary (Atack et al., 2008). Visual cues (i.e. photographs or drawings) added to the text improved the patients' satisfaction with the comprehesibility of educational materials. The effect was stronger in case of more complex text and older patients (Friedman et al., 2011).

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Various study results suggest that tailoring the health education, i.e. uniquely individualizing communication to each patient may improve the results (Albada et al., 2009; Lustria, Cortese et al., 2009; Noar et al., 2007). It can be applied to many health issues including tobacco and alcohol use, healthier diet, increasing physical activity or promoting screening and vaccination. However, evidence is not always clear, e.g. a recent review found that tailoring was an effective method in nutrition interventions while the results for physical activity were mixed (Enwald et al., 2010).

2. Research methodology

We applied qualitative research methods. We have undertaken participative research methods, analysed documents related to doctor-patient knowledge transfer, and applied semi-structured, in-depth interviews with ICT and health care professionals, as well as patients.

Each semi-structured interview session typically lasted from 60 to 90 minutes. We interviewed 10 ICT professionals, 10 doctors and 10 patients.

Afterwards, the data was analysed, and results have been further evaluated during critical discussions with academic staff, as well as health care experts.

3. Research findings

3.1 The use of online information sources

All the interviewees agreed that the spread of information technology, especially the Internet could be both beneficial and harmful. Clinicians stated that in their practice 65 per cent of the patients arrive with a self-diagnosis, and in the younger population this ratio can be as high as 80 per cent. Some of the patients are able to find relevant and reliable information and they might be able to understand their findings. These patients and their doctors can benefit from the use of technology, for example the patients might have focused questions about their disease, and the clinicians could help in the right interpretation of the information. This requires also certain trust towards the health care professional.

But the majority of the patients become misinformed while searching for information on the Internet. This issue is two-fold: on one hand, patients use chat rooms or discussion forums where only laymen's opinions can be learnt. They cannot recognize that something true for one patient might not be true for another one. There might be also malicious users who provide false or misleading information e.g. because of commercial interest.

On the other hand, patients may find scientific information but they are not able to interpret it as they do not have the necessary qualifications and skills, for example they do not understand the statistical methods. In addition to the missing professional knowledge, many patients lack even the fundamental health culture.

We cannot avoid the fact that patients would like to discuss their health problems with other people, as well. This is reflected in the aforementioned popularity of discussion forums. The Internet made it much easier to find other patients with the same diseases and get in touch with them. The social media is the most recent trend for the communication between patients.

3.2 Opportunities for the improvement the reliability of online sources

The long-term solution to the problem described in the previous section might be the proper health culture development, already from early childhood. But as long as it becomes the standard of education and a new generation with proper culture grows up, short-term solutions should be applied to improve the situation. It is not possible to prohibit the use of discussion forums, but efforts could be made in order to make them more reliable.

First, patients' attention should be drawn if a webpage contains only personal opinions and experience that might not be applied to other patients, and not scientific evidence. Moreover, some kind of rating system could be used where the users can evaluate the responses of others and the community can identify the best quality information. This method is in line with the most recent trend of involving the consumers of online information (i.e. the Web 2.0). The interviewed ICT professionals reminded that the Health on the Net (HON) foundation promotes the deployment of reliable health information on the Internet and issues a certificate (the HONcode) to websites fulfilling certain quality criteria.

In sum, it might be possible to improve the reliability of web resources, but it is difficult to achieve at a global level. It is more a human than a technological issue.

3.3 Communication with health care providers

Today's health care systems build heavily on team-work: the patient is treated not only by a single physician, but other specialists, nurses and health professionals are involved as well. Much information comes from these actors, so they play an important role in the communication.

The interviewed clinicians preferred the personal communication, but they also recognized the role of technology (telephone, email, and videoconferencing). They admitted that they did not prefer e-mail because of the lack of time and the higher liability of the written communication. Several interviewees mentioned that the guidance of patients is an important issue, i.e. they should be directed to the most appropriate health care provider and/or information source. They suggested focusing on the Swedish model where a multi-level telephone service helps patients to find assistance. On the first level they can talk to trained nurses who are able to guide patients with less severe problems, and only those who have more serious problems are directed to the appropriate specialist. Clinicians suggested that this could be partially automated where patients can fill in a short questionnaire, and the computer provides guidance based on the answers, e.g. it redirects the patient to a website with controlled information about the specific disease or risk factor, or it advices to visit a certain specialist.

The interviewed physicians agreed that the most important barrier of effective communication is the lack of time. They have sometimes only five to ten minutes to explain the therapy and answer the patient's questions. In addition a visit is a stressful situation: one of the clinicians compared it to an exam. A gynecologist noted that in some specialties including his one it is even more noticeable as they affect very sensitive aspects of the patients' life. Many patients are not prepared for such a situation, as a result they cannot understand or remember the information they have received. The effectiveness of the communication is even worse if the patient is undereducated.

The identified barriers are summarized in Figure 1. The solution to this issue might be complex. The stress could be lowered if the patient gets positive experiences before the visit in the waiting room, e.g. a relaxing environment is provided. Patients might be educated before the visit by the involvement of other medical personnel or information technology. Computerized questionnaires were also suggested for preliminary assessment of the patients' status and preferences (e.g. the preferred form of invocation). It might be helpful if the patient is interested and asks questions about his or her disease. The questionnaires can be used for the collection of questions, problems as well. These can be filled in before the visit at home in calm conditions, or by the assistance of the clinical personnel just before entering the examination room.

Patients expect answers to their questions primarily from the physicians. One of the interviewees argued that health professionals should strive to leave no open questions after the visit. It is difficult to achieve, however, and it depends very much on the personality of the physician. Another clinician revealed that despite his patients usually come from other doctors, many of them does not have the basic information about their disease. The physicians should provide only such kind of information, which can be digested by the patient, i.e. it is aligned with his/her mental and emotional status. One of the interviewees argued that physicians should focus on the most important information and refer patients to trusted sources for additional information.

It might be also necessary to educate physicians about how to communicate with patients in such a way that they understand. Courses or professional forums, workshops should be organized in order to promote the best practices, share experiences and improve the communication skills of the physicians. These could be part of the regular, obligatory training of health practitioners.

3.4 The potentials of innovation and innovative technologies

Our research findings show that health care professionals put more emphasis on human factors like communication skills, empathy, and people skills. They consider information technology only as a valuable tool, which might facilitate the personal contacts.

In contrast, ICT professionals believe that more advanced and innovative knowledge management solutions for patients would enable more effective information and knowledge transfer. These could provide also adaptive channels, i.e. where the knowledge is adapted to the particular patient, for examples based on prior knowledge, emotional status, digital literacy and the preferred learning method.

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Personalization is an approved approach for improving the quality of knowledge transfer, but it requires much effort from the health care providers. Innovative solutions might facilitate the practical implementation of this principle. In the long term, knowledge transfer applications could even use artificial intelligence methods in order to provide more personalized solutions. In the short term, properly designed online information sources using some basic methods e.g. questionnaires for the assessment of the patients' status might also be useful tools for the improvement of the patients' knowledge.

These solutions provide an opportunity for personalized information supply and might reduce the need for human resources, but they have risks as well. Although the majority of the population has access to the Internet and related technology, there are still people (especially older and low-income people) who cannot benefit from these technologies. Access to the technology might be an important barrier, which should be addressed, otherwise the informational asymmetry between patients will grow.

Technology development, like smart televisions could provide new opportunities for involving patients. In addition, no matter how carefully are these services planned there is a certain risk that they incorrectly assess the patient's status, and they did not recognize issues, which would be identified by an experienced clinician. It must be noted that the development of alternative contents – e.g. videos, pictures and animations in addition to text – would increase the costs as well.

Figure 2 illustrates the various solutions for the improvement of doctor-patient communication.

3.5   Policy implications

Along with previous research evidence, significant regulation is needed within the field of doctor-patient knowledge transfer. Such regulation would assure that the overall health care system would be more efficient because of the optimisation of information flow. Moreover, misuse of technologies and other knowledge transfer tools would be also prevented.

Data protection and security concerns were raised by most of the patients interviewed. There is a high expectation towards policy-makers in order to find adequate policy solutions to these concerns.

4. Conclusions

Patients require an increased amount of information about their diseases, its impact on their everyday life and their treatment. Traditionally physicians were the source of this information, but the development of technology, and other information sources, including web sites and social media communication channels significantly changed these habits.

Information technologies have benefits that patients can more easily access knowledge about their health, but risks also emerged. The information on the Internet cannot be controlled, and without proper health culture and literacy the patients cannot evaluate the reliability of them. Efforts should be made both for the education of the patients and for making the information sources more reliable, but this is not only technological issue.

Patients still expect much information from the health care providers, but the knowledge transfer is often dissatisfactory. The most important barriers include limited time, the patients' distress, inadequate health culture and prior knowledge as well as the poor communication skills of some clinicians. Technology might help to overcome some of these barriers, for example health questionnaires could help to assess the patients' status, collect their problems and question. In this way, clinicians could use their limited time for effectively, focusing on the most important issues. It would be also important to put more effort on the clinicians training in order to improve their communication skills both at the university and during their practice.

More advanced technology solutions might take over some roles of the health care personnel by providing reliable, personalized information to the patient. If the content and communication channel is adapted to the patient's health, emotional and psychosocial status, it could be more easily understood and remembered. This approach is approved by the most recent treatment policies, but it is not part of the standard practice. This is mainly because of the fact that the implementation of personalized education by traditional methods requires many resources. Innovative technologies might help disseminating new ways of patient education. It must be also noted that barriers of access to the new technology should be identified and addressed, otherwise it would increase the knowledge gap between patients.

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The suggested systems would be useful only if they become an integral part of standard clinical practice. It could be realized if both patients and health care professionals can be convinced that technology will not deteriorate the personal doctor-patient relationship, but on the contrary, it improves the communication between the actors involved in the care of the patient.

In finding the right solutions and turning them into reliable tools of doctor-patient knowledge transfer, policy-makers have an increased role. A complex policy environment should support the use of innovative technologies within doctor-patient knowledge transfer.
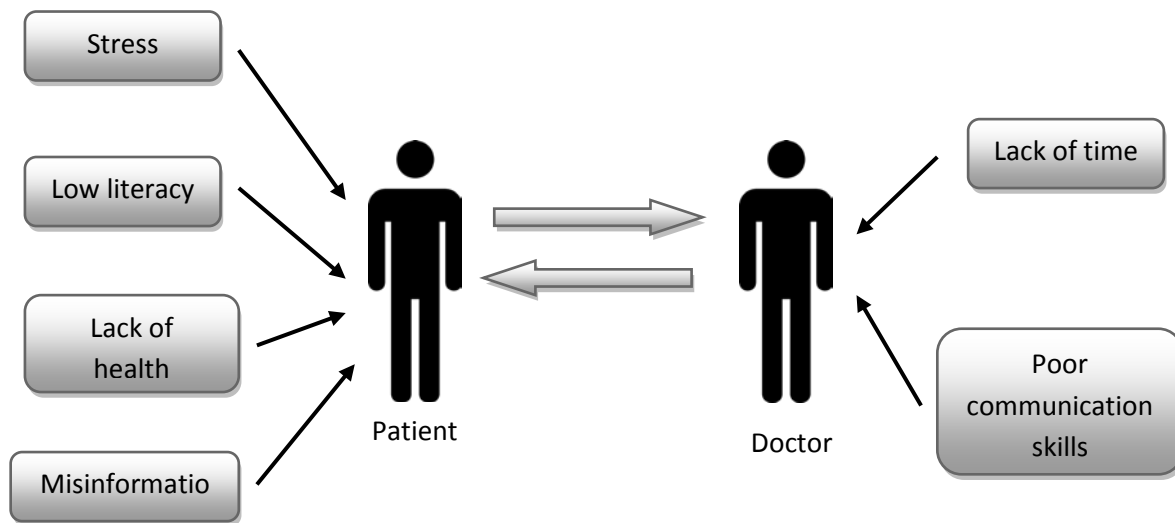
Figures

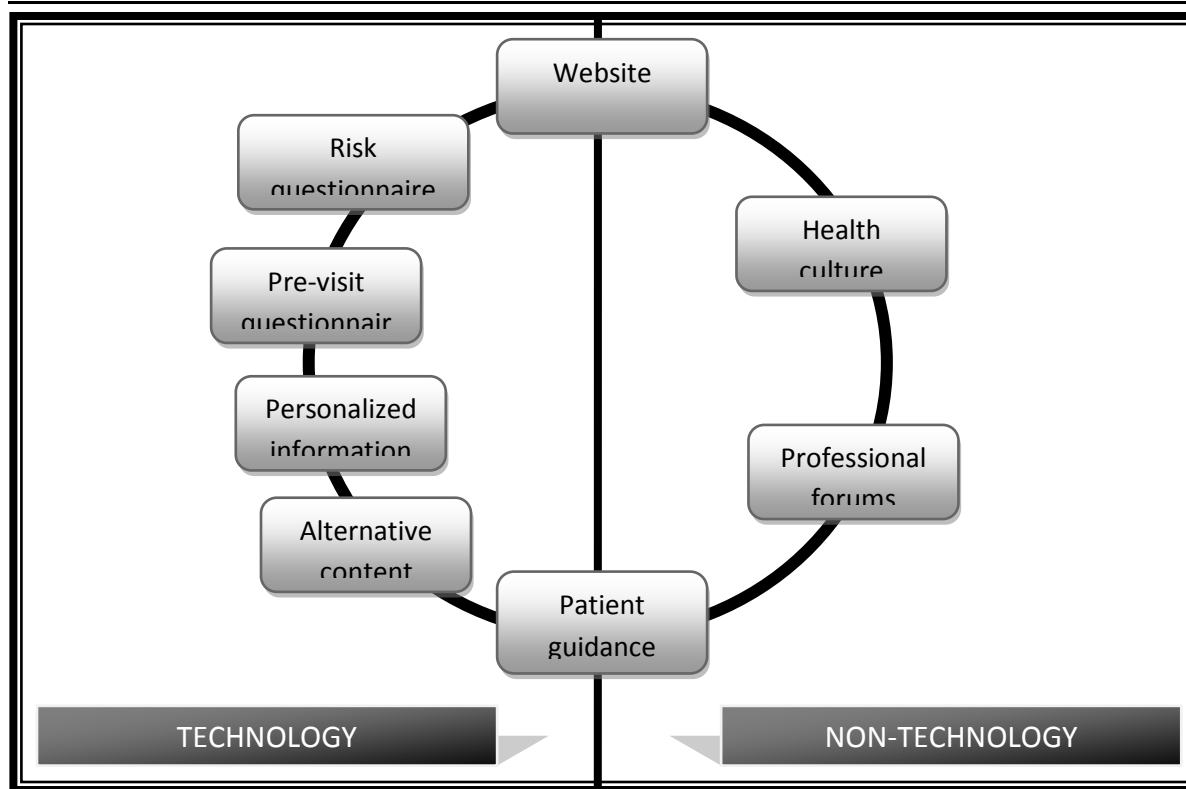Figure 1: The most important barriers of effective doctor-patient communication

Figure 2: Technology and non-technology solutions for improving knowledge transfer

References

Adams, S. A. (2010). Revisiting the online health information reliability debate in the wake of "web 2.0": an inter-disciplinary literature and website review. *Int J Med Inform, 79*(6), 391-400. doi: 10.1016/j.ijmedinf.2010.01.006

Albada, Akke, Ausems, Margreet G. E. M., Bensing, Jozien M., & van Dulmen, Sandra. (2009). Tailored information about cancer risk and screening: A systematic review. *Patient Education and Counseling, 77*(2), 155-171. doi: 10.1016/j.pec.2009.03.005

Atack, L., Luke, R., & Chien, E. (2008). Evaluation of patient satisfaction with tailored online patient education information. *Comput Inform Nurs, 26*(5), 258-264. doi: 10.1097/01.ncn.0000304838.52207.90

Balmer, C. (2005). The information requirements of people with cancer: where to go after the "patient information leaflet"? *Cancer Nurs, 28*(1), 36-44, quiz 45-36.

Barnabei, V. M., O'Connor, J. J., Nimphius, N. M., Vierkant, R. A., & Eaker, E. D. (2008). The effects of a web-based tool on patient-provider communication and satisfaction with hormone therapy: a randomized evaluation. *J Womens Health (Larchmt), 17*(1), 147-158. doi: 10.1089/jwh.2007.0369

Breen, G. M., Wan, T. T., Zhang, N. J., Marathe, S. S., Seblega, B. K., & Paek, S. C. (2009). Improving doctor-patient communication: examining innovative modalities vis-a-vis effective patient-centric care management technology. *J Med Syst, 33*(2), 155-162.

Cook, Linda, Castrogiovanni, Andrea, David, Diane, Stephenson, D. W., Dickson, Michele, Smith, Delores, & Bonney, Anna. (2008). Patient Education Documentation: Is it Being Done? *Medsurg Nursing, 17*(5), 306-310.

Enwald, H. P., & Huotari, M. L. (2010). Preventing the obesity epidemic by second generation tailored health communication: an interdisciplinary review. *J Med Internet Res, 12*(2), e24. doi: 10.2196/jmir.1409

Friedman, AudreyJusko, Cosby, Roxanne, Boyko, Susan, Hatton-Bauer, Jane, & Turnbull, Gale. (2011). Effective Teaching Strategies and Methods of Delivery for Patient Education: A Systematic Review and Practice Guideline Recommendations. *Journal of Cancer Education, 26*(1), 12-21. doi: 10.1007/s13187-010-0183-x

Haas, L., Maryniuk, M., Beck, J., Cox, C. E., Duker, P., Edwards, L., . . . Youssef, G. (2012). National standards for diabetes self-management education and support. *Diabetes Care, 35*(11), 2393-2401. doi: 10.2337/dc12-1707

Hovey, R. B., Cuthbertson, K. E. S., Birnie, K. A., Robinson, J. W., Thomas, B. C., Massfeller, H. F., . . . Scott, C. (2012). The influence of distress on knowledge transfer for men newly diagnosed with prostate cancer. *Journal Of Cancer Education: The Official Journal Of The American Association For Cancer Education, 27*(3), 540-545. doi: 10.1007/s13187-012-0343-2

Kanak, Mary F., Titler, Marita, Shever, Leah, Fei, Qiang, Dochterman, Joanne, & Picone, Debra M. (2008). The effects of hospitalization on multiple units. *Applied Nursing Research, 21*(1), 15-22. doi: http://dx.doi.org/10.1016/j.apnr.2006.07.001

Kutner M, Greenberg E, Jin Y, Paulsen C. (2006). *The Health Literacy of America's Adults: Results from the 2003 National Assessment of Adult Literacy*

Lustria, M. L., Cortese, J., Noar, S. M., & Glueckauf, R. L. (2009). Computer-tailored health interventions delivered over the Web: review and analysis of key components. *Patient Educ Couns, 74*(2), 156-173. doi: 10.1016/j.pec.2008.08.023

McCarthy, Danielle M., Waite, Katherine R., Curtis, Laura M., Engel, Kirsten G., Baker, David W., & Wolf, Michael S. (2012). What Did the Doctor Say? Health Literacy and Recall of Medical Instructions. *Medical Care, 50*(4), 277-282 210.1097/MLR.1090b1013e318241e318248e318241.

Noar, S. M., Benac, C. N., & Harris, M. S. (2007). Does tailoring matter? Meta-analytic review of tailored print health behavior change interventions. *Psychol Bull, 133*(4), 673-693. doi: 10.1037/0033-2909.133.4.673

Norine Walsh, Mary, Bove, Alfred A., Cross, Russell R., Ferdinand, Keith C., Forman, Daniel E., Freeman, Andrew M., Doermann Byrd, Katherine. (2012). ACCF 2012 Health Policy Statement on Patient-Centered Care in Cardiovascular MedicineA Report of the American College of Cardiology Foundation Clinical Quality Committee. *Journal of the American College of Cardiology, 59*(23), 2125-2143. doi: 10.1016/j.jacc.2012.03.016

Pilnick, Alison, & Dingwall, Robert. (2011). On the remarkable persistence of asymmetry in doctor/patient interaction: A critical review. *Social Science & Medicine, 72*(8), 1374-1382. doi: http://dx.doi.org/10.1016/j.socscimed.2011.02.033

Poureslami, I., Rootman, I., Doyle-Waters, M. M., Nimmon, L., & Fitzgerald, J. M. (2011). Health literacy, language, and ethnicity-related factors in newcomer asthma patients to Canada: a qualitative study. *J Immigr Minor Health, 13*(2), 315-322. doi: 10.1007/s10903-010-9405-x

Serkan Türkeli, Hatice Gahin. (2009). *How can we improve the communication quality between doctor and foreign patient?* Paper presented at the EFMI Special Topic Conference.

Siggeirsdottir, K., Olafsson, O., Jonsson, H., Iwarsson, S., Gudnason, V., & Jonsson, B. Y. (2005). Short hospital stay augmented with education and home-based rehabilitation improves function and quality of life after hip replacement: randomized study of 50 patients with 6 months of follow-up. *Acta Orthop, 76*(4), 555-562. doi: 10.1080/17453670510041565

Woodard, Cheryl. (2004). Search Engines: Clogged with Commerce and Begging for an Upgrade. http://www.askquestions.org/articles/searches/searchengines.pdf

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