The influence of online health information on health decisions – methodological aspects

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Internet as the basis of medical decisions

- Along with the advance of internet technology, searching online for health information is becoming more and more popular among patients and the general population.

- Nevertheless, the credibility, accuracy and reliability of health information on the internet are of great concern

- Navigating the social media information environment might be confusing, frustrating, and overwhelming, due to the fast speed and uncontrolled manner of social media information accumulation.

- Such negative users' experience could generate further concerns, fatigue, or, in some cases, anxiety and depression, withdrawal from fact-checking, obstructing the effectiveness of social media to promote health and well-being and – impacting the decisions (Jang, 2022).

- It should be monitored how retrieved information induce the individual's decision.

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OHI- online health information

- Online health information may potentially influence health information seekers' attitude toward a disease, a medical treatment or a procedure

- Literature suggests that Internet use may increase patient engagement and empowerment, reduce unnecessary medical visits, and foster a more patient-centered relationship.

- Alternatively, studies also indicate that online health searches can increase patient anxiety, increase consultation length, and erode clinician authority.

- Social media activities, such as sharing and conversing, are likely to result in a decline in reflective thinking and instead promote rapid and superficial thoughts which might lead to cognitive and moral triviality (Baccarella et al., 2018)

- Some analysis show the syndrom of bias-seeking (Suzuki &Yamamoto 2021). Web search users with poor health literacy and negative prior beliefs about the health search topic did not spend time examining the list of web search results, and these users demonstrated bias in webpage selection. In contrast, web search users with high health literacy and negative prior beliefs about the search topic spent more time examining the list of web search results and checking sites with different opinions.

- The patients' seeking plans/strategies should be recognised

- The topic how OHI seeking influence the medical decisions – is still under-researched.

What kind of decision may be induced by OHI?

- Start/quit life style changes
- Adhere/no adhere medical recommendations or treatments
- Start/quit conventional treatment (eg. surgery, vaccination)
- Start/quit unconventional treatment (choosing CAM – complementary or alternative treatment)
- Start additional therapy or supplementation
- Increase/decrease number of doctor's visiting
- Frequency/place of medical services (for screening or treatment purposes)
- The choice of specific doctor/ institution (based on found opinions)
- How to talk to medical staff (doctor-patient relationship and communication)
- Purchasing supplements / medications via unproper providers

- The question: Are the patients' decisions evidence-made? Should they be?

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How many patients make decision on the basis of OHI?

- According to studies, the proportion of participants reporting that OHI influenced their decision making varied from 11.2% to 80.7% , with the majority reporting the proportion between 30 and 60% (Thappa 2020).

- Statistically significant associations were established between OHI use and its perceived role in decision making (5/14), number of visits to health professionals (1/14), question-asking behavior during consultations (1/14), treatment compliance (3/14), healthy physical activity (2/14), changing lifestyle (2/14) and drug adherence (1/14).

- Although many studies reported OHI affecting health and medical decisions, for most studies the major influencer was face-to-face contact with a health professional with the Internet used only as a supplementary source of knowledge leading to decision.

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The impact is visible/confirmed in areas:

- **DECISION TYPE**: Internet health information was more often searched for surgery decisions (35.9%) than screening purposes. Medical decisions related to surgery were positively associated with OHI use, while screening related decisions were negatively associated in the multivariate model (Couper, 2010)

- **PATIENT-DOCTOR COMMUNICATION:** OHI induced asking more questions in communication with physicians (66%), greater adherence to physician advice (54%), making self-directed dietary changes (54%), increased physician visits (37%) and increased use of herbal products or dietary supplements (27%). (Iverson, 2008,)

- **SELF-TREATMENT :** 53% of male cancer patients reported OHI contributed to maintain the chosen therapy. 31.1% of female cancer patients undertook additional therapy based on the Internet information. 18.4% of participants started therapy in which their doctor had been sceptical or stopped their therapy (Kirchning and von Kardoff, 2008)

- **HEALTH BEHAVIOR**: OHI users reported change in health behaviour such as healthier diet and regular exercise (16.7%), smoking cessation (6.5%), reduction in body weight (2.8%) and reducing the frequency of professional visit (1.9%) (Ohlow, 2013)

- **SELF-CARE**: Fewer OHI users reported the information influenced changing their medication without consulting a doctor (8.7%), discontinuation of planned tests or medicines (6.8%) and cancellation of a doctor's appointment (21.9%). Higher frequency of Internet use for health purposes was significantly associated with health decisions for physical activity (p = .009), making (p = .006) or cancelling (p < .001) the appointment, and resignation from planned tests or medicines used (p = .005) (Bujnowska-Fedak, 2020) .

Surgery decisions

Asking questions during visits

Taking additional therapy

Quiting planned therapy or tests

Cancelation of appointments

Increasing physical activity

Start healthier diet

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How to measure the impact of OHI on medical decisions?

Measuring Online Health Information Use

The Problem Solving in Medicine questionnaire [below],

the Internet Health Information Quality questionnaire

the Trust in Online Health Information Questionnaire.

Firstly, many studies used standard scales for *Measuring Online Health Information Use*

- We can measure impact of OHI on decisions among specific disease patients (eg. cancer patients) or in general population. It is also possible to categorize Internet use for health information into three groups of users: direct (consumers), indirect (friends or family), and none.

- OHI seeking refer to any aspects of disease symptoms, choice of treatment, diagnoses, medication, or other aspects of health care before or after visiting their medical service provider.

- How the users cope with lack of information, low quality information or unreliable content?

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How to measure the impact of OHI on medical decisions?

Measuring Health Decision Making

different types of subsequent health decision making as a result of the OHI searches, decisions about where to be treated, treatment adherence, and medical consultations; the number of visits or telephone contacts; behavior changes; and self-care activities.

the consumers' self-perceived impact on decision making

and/or the association between OHI search behavior and health decisions

Secondly, the harder problem is in *Measuring Health Decision Making*

- There have been used somewhat objective measures of consumer-reported decision making, such as patient task behavior (patients were asked to assess the perceived level of participation with physician , question asking behavior), choices to modify their lifestyles, treatment adherence, decisions concerning prenatal screening and type of birth , and number of visits in the past 12 months.

- Some studies used (or adopted) standard scales for health decision making assessment like the 'Changing decisions' dimension of the Online Health Information Utilization questionnaire [below], the Morisky Medication Adherence Scale , a modified, 12-item version of the Performance-Based Measure, the Medication Adherence Report Scale, Patient Compliance, Well-being Health Changes and the Decision Making Preference Scale of the Health Information Wants Questionnaire

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7 Responses by 196 patients who regularly searched the internet for health-related information to questions related to the Internet Search effect on Medical Interaction Index (ISMII) or compliance with medical advice

Internet Search effect on Medical Interaction Index questions	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	No response
I receive more attention to my questions from health providers as a result of gathering information from the internet	6 (3%)	30 (16%)	77 (40%)	72 (37%)	9 (5%)	2
I receive more information from health providers as a result of gathering information from the internet	8 (4%)	27 (14%)	80 (42%)	67 (35%)	10 (5.2%)	4
Interactions with health providers have become more respectful as a result of gathering information from the internet	10 (5.2%)	39 (23%)	80 (42%)	53 (28%)	10 (5.2%)	4
Interactions with health providers have become strained as a result of bringing up health and medical information from the internet in my consultation (reverse scored in ISMII)	17 (8.9%)	64 (34%)	69 (36%)	36 (19%)	5 (3%)	5
Information on the internet helps me to communicate more effectively with doctors	1 (0.5%)	18 (9.3%)	42 (22%)	108 (56%)	24 (12%)	3
Information on the internet helps me to ask more informed questions to doctors	1 (0.5%)	5 (3%)	31 (16%)	115 (60%)	40 (21%)	4
Information on the internet helps me to better understand what my doctor is telling me during my consultation	1 (0.5%)	9 (5%)	29 (15%)	121 (62%)	34 (18%)	2
Gathering information from the internet about my health makes me feel empowered	4 (2%)	28 (15%)	60 (31%)	81 (42%)	18 (9.4%)	5
Gathering information from the internet about my health makes me worried and/or anxious (reverse scored in ISMII)	10 (5.2%)	50 (26%)	55 (29%)	61 (32%)	15 (7.9%)	5

Cocco, A. M., Zordan, R., Taylor, D. M., Weiland, T. J., Dilley, S. J., Kant, J., … Hutton, J. (2018). *Dr Google in the ED: searching for online health information by adult emergency department patients. The Medical Journal of Australia,*
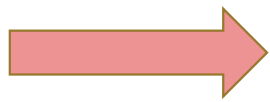
Treatment compliance questions	Never	Rarely	Sometimes	Often	Always	
Do you change your willingness to accept treatment from your doctor after reading information from the internet?	72 (37%)	43 (22%)	63 (33%)	12 (6.2%)	3 (2%)	3
Do you doubt your diagnosis or treatment of a doctor if it conflicts with information on the internet?	110 (57%)	43 (22%)	31 (16%)	8 (4%)	2 (1%)	2
Have you ever changed a treatment given to you by a doctor due to information obtained on the internet?	135 (71%)	39 (20%)	14 (7.3%)	2 (1%)	1 (0.5%)	5
Have you ever experienced a health problem as a result of using internet information?	164 (86%)	17 (8.9%)	10 (5.2%)	0	0	5

Appendix 1. The Problem-solving in Medicine questionnaire (PSM).

		Items
NHIS 1	1	When I have a medical problem, I will search for relevant knowledge from professional medical books.
NHIS 2	2	When I have a medical problem, I will search for relevant knowledge from medical magazines.
NHIS 3	3	When I have a medical problem, I will search for relevant knowledge from news reporting.
NHIS 4	4	When I have a medical problem, I will search for relevant knowledge from TV or radio programs.
OHIS 1	5	When I have a medical problem, I will search for solutions using internet search engines (e.g., Google, Yahoo).
OHIS 2	6	When I have a medical problem, I will search for solutions from online discussion forums (e.g., medical-related online forum, bulletin board system (BBS)).
OHIS 3	7	When I have a medical problem, I will search for solutions from the websites of the social media platforms and social networking services (e.g., Facebook, Twitter).
OHIS 4	8	When I have a medical problem, I will search for solutions from medical websites (hospital websites, hospital e-newspapers).
OHIS 5	9	When I have a medical problem, I will search for solutions from doctors' websites.
NFMH 1	10	When I don't know how to solve a medical problem, I will call a doctor, a medical expert, or other health care professionals for helps.
NFMH 2	11	When I have a medical problem, I will seek helps from doctors or other health care professionals who are known by my friends or relatives.
NFMH 3	12	When I have a medical problem, I will seek helps from doctors or health care professionals who are working in health care institutions.
NFMH 4	13	When I have a medical problem, I will inquire the pharmacist of a nearby pharmacy store.
OFMH 1	14	When I can't solve a medical problem, I will e-mail a doctor, medical expert or health care professional to seek medical help.
OFMH 2	15	When I have a medical problem that I don't understand, I will post a request on internet medical forums for help from doctors, other health care professionals, or medical experts.
OFMH 3	16	When I have a medical problem, I will seek help from doctors or other health care professionals using Instant Messages (e.g.,

		Facebook, Line, WeChat, WhatsApp).
OFMH 4	17	When I have a medical problem, I will try to seek help from websites or online blogs maintained by doctors or health care institutions.
NIMH 1	18	When I have a medical problem, I will seek helps from a drugstore.
NIMH 2	19	When I have a medical problem, I will ask for advice or opinions from my family members.
NIMH 3	20	When I have a medical problem, I will go to the temple praying to god for advice.
NIMH 4	21	When I have a medical problem, I will seek help from experienced persons.
NIMH 5	22	When I have a medical problem, I will seek help from friends or relatives.
OIMH 1	23	When I have a medical problem, I will post a message on relevant web forums requesting help from other forum users.
OIMH 2	24	When I can't solve a medical problem, I will seek help from others using my microblog (e.g., Facebook or Twitter).
OIMH 3	25	When I have a medical problem, I will seek help from friends, colleagues or netizens using Instant Messages (e.g., Facebook, Line, WeChat, WhatsApp).
OIMH 4	26	When I have a medical problem, I will post the problem on relevant websites of knowledge communities (e.g., Facebook) and try to find a solution.
OIMH 5	27	When I have a medical problem, I will post the problem on a proper website, medical-related online forums or bulletin board system (BBS).

Abbreviation List: NHIS = non-online health information search; OHIS = online health information search; NFMH = non-online formal medical help-seeking; OFMH = online formal medical help-seeking; NIMH = non-online informal medical help-seeking; OIMH = online informal medical help-seeking.

Appendix 2. The Online Health Information Utilization questionnaire (OHIU).

		Items
CD 1	1	After searching for online health information, I will change my views to align with the information I obtained.
CD 2	2	After searching for online health information, I will change my decision, aligning with the information I obtained, about whether to see a doctor.
CD 3	3	After searching for online health information, I will change my judgments, aligning with the information I obtained, on personal medical issues.
CD 4	4	After searching for online health information, I will change my decision, aligning with the information I obtained, about whether to consult an expert.
CO 1	5	Online health information is an important reference for me when making medical decisions.
CO 2	6	I will discuss relevant issues with a doctor based on the health information on the Internet.
CO 3	7	I will discuss relevant issues with my family or friends based on the health information on the Internet.
CO 4	8	I will discuss relevant issues with experts based on the health information on the Internet.
PS 1	9	I am confident that I can evaluate the accuracy of online health information for making medical decisions.
PS 2	10	I am confident that I can make good use of online medical information.
PS 3	11	I am confident that I can find useful online health information.
PS 4	12	I am confident that I can make correct medical judgments on personal medical issues based on online medical information.

Abbreviation List: CD = changing decisions; CO = consulting others; PS = promoting self-efficacy.

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The role of seeking strategies

- Chen (2018) confirmed that patients who engaged in online health information search (OHIS) for solving medical problems were significantly and positively associated with changing their medical decisions.

- **Therefore, the more online health information patients searched for solving their medical problems, the more likely their medical decision was changed based on the online health information they had gathered**.

- Patients using the strategy of non-online formal medical help-seeking (NFMH) when encountering medical problems were significantly associated with consultation with others about the online health information they obtained.

- Furthermore, **those using the strategy of nononline informal medical help-seeking (NIMH) were significantly associated with changing medical decisions based on the online health information.**

- In comparison, patients with the strategy of nononline health information searches (NHIS) , for example, searching medical textbooks, medical magazines, and newspapers/TV news, were significantly and negatively associated with consulting others based on the online health information they had gathered. They don' change decsions facing the online information.

- Only 38% of the total variance for change decision was accounted in Chen's model , leaving 62% unexplained.

What kind of difficulties OHI seekers report?

Online health information can empower consumers to become an active partner in decision making and self-care, but can also have adverse effects including self-rated poor health and psychological distress including anxiety, and making changes to medical therapy without informing service providers.

- Lack of relevant information

- Information in professional jargon, hard to understand (Online information was somewhat hard to understand for 32% but 91% found it useful. (Chang i in., 2020).

- Hardships in evaluating the reliability and credibility of information

- Sometimes the seeker are involved in virtual therapeutic groups, provided by non-medical administrators, highlighting the issue of malpractices in medical treatment

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Impact of OHI on medical decisions – summary

Cognitive	Emotional	Behavioral
• Increasing interest in health topics • Information role: Complementary information (better understanding of the disease and diagnosis) • Validation role: verify the health information already given by health care professionals • Education or self-education role	• encourage to start health behavior • Motivating to maintain the behavior (eg. treatment) • Inducing/increasing patient's self-efficacy and self-confidence • Inducing the sense of overwhelming of information, confusion, anxiety (negative)	• Increasing/decreasing number of visits • The choice of specific doctor/ institution • recommendations' adherence/compliance • Improves self-care, self-diagnostic, self-medication • Danger of Cyberhondria

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Conclusions

- It seems that impact of OHI on medical decisions is not so strong as we assume and its rather positive. But it may be result of a methodology. We need more experiments, qualitative studies or AI technologies.

- Present health care professionals have a responsibility to acknowledge that patients' medical decision making may be changed based on additional online health information.

- Online health information providers (governments, professional organizations, educational institutions) may benefit evidence-based medical decision making by providing online health information seekers with valid, accurate, and credible health information.

- Health care professionals should assist patients' medical decision making by initiating as much dialogue with patients as possible, providing credible and convincing health information to patients, and guiding patients where to look for accurate, comprehensive, and understandable online health information. The seeking strategies should be part of patients' education.

- By doing so, patients will avoid becoming overwhelmed with extraneous and often conflicting health information. Educational interventions to promote health information seekers' ability to identify, locate, obtain, read, understand, evaluate, and effectively use online health information are highly encouraged.

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References

- Baccarella, C. V., Wagner, T. F., Kietzmann, J. H., & McCarthy, I. P. (2018). Social media? It's serious! Understanding the dark side of social media. *European Management Journal*, *36*(4), 431–438. https://doi.org/10.1016/j.emj.2018.07.002

- Bujnowska-Fedak, M. M., & Węgierek, P. (2020). The Impact of Online Health Information on Patient Health Behaviours and Making Decisions Concerning Health. *International Journal of Environmental Research and Public Health*, *17*(3), E880. https://doi.org/10.3390/ijerph17030880

- Chang, K., Berthelet, E., Grubbs, E., Hamilton, S., Karvat, A., Tran, E., Wu, J., & Ingledew, P.-A. (2020). Websites, Websites Everywhere: How Thyroid Cancer Patients Use the Internet. *Journal of Cancer Education: The Official Journal of the American Association for Cancer Education*, *35*(6), 1177–1183. https://doi.org/10.1007/s13187-019-01576-5

- Couper, M. P., Singer, E., Levin, C. A., Fowler, F. J., Fagerlin, A., & Zikmund-Fisher, B. J. (2010). Use of the Internet and ratings of information sources for medical decisions: Results from the DECISIONS survey. *Medical Decision Making: An International Journal of the Society for Medical Decision Making*, *30*(5 Suppl), 106S-114S. https://doi.org/10.1177/0272989X10377661

- Iverson, S. A., Howard, K. B., & Penney, B. K. (2008). Impact of internet use on health-related behaviors and the patient-physician relationship: A survey-based study and review. *The Journal of the American Osteopathic Association*, *108*(12), 699–711.

- Jiang, S. (2022). The Roles of Worry, Social Media Information Overload, and Social Media Fatigue in Hindering Health Fact-Checking. *Social Media + Society*, *8*(3), 205630512211130. https://doi.org/10.1177/20563051221113070

- Kirschning, S., & von Kardorff, E. (2008). The use of the internet by women with breast cancer and men with prostate cancer-results of online research. Journal of Public Health, 16(2), 133-143.

- Ohlow, M.-A., Brunelli, M., & Lauer, B. (2013). Internet use in patients with cardiovascular diseases: Bad Berka Cross-Sectional Study (BABSY). *International Journal of Clinical Practice*, *67*(10), 990–995. https://doi.org/10.1111/ijcp.12162

- Suzuki, M., & Yamamoto, Y. (2021). Characterizing the Influence of Confirmation Bias on Web Search Behavior. *Frontiers in Psychology*, *12*, 771948. https://doi.org/10.3389/fpsyg.2021.771948

- Thapa, D. K., Visentin, D. C., Kornhaber, R., West, S., & Cleary, M. (2021). The influence of online health information on health decisions: A systematic review. *Patient Education and Counseling*, *104*(4), 770–784. https://doi.org/10.1016/j.pec.2020.11.016

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