

SECOND MEDICAL OPINION: UTILIZATION RATE AND CHARACTERISTICS OF SEEKERS IN A GENERAL POPULATION

Liora Shmueli, MBA¹, Erez Shmueli, PhD² Joseph S. Pliskin, PhD^{1,3}, Ran D. Balicer, MD, PhD⁴,
Nadav Davidovitch, MD, PhD¹, Igal Hekselman, MD⁵, Geva Greenfield, PhD^{1,6}

¹ Department of Health Systems Management, Ben-Gurion University of the Negev, P.O. Box 653, Beer-Sheva 84105, Israel

² Department of Industrial Engineering, Tel-Aviv University, Ramat Aviv, Tel Aviv 69978, Israel

³ Department of Industrial Engineering and Management, Ben-Gurion University of the Negev, Beer-Sheva 84105, Israel

⁴ Clalit Research Institute, Clalit Health Services, Arlozorov 115, Tel-Aviv 62098, Israel

⁵ Clalit Mushlam Health Insurance, Clalit Health Services, 1 Ben-Gurion Street, Bnei Brak 51201, Israel

⁶ Department of Primary Care and Public Health, School of Public Health, Imperial College London, Reynolds Building, St. Dunstan's Road, London W6 8RP, UK

Corresponding author: Liora Shmueli, MBA, Department of Health Systems Management, Ben-Gurion University of the Negev, P.O. Box 653, Beer-Sheva 84105, Israel

Email: liora.jana@gmail.com

ABSTRACT

Background: Second opinion is common in medical practice and can reduce unnecessary risks and costs. To date, there is no population-based estimation of how many people seek second opinions and what the characteristics of second-opinion seekers are.

Objectives: To estimate how many people seek second opinions, and what the characteristics of second-opinion seekers are.

Methods: We conducted both a medical records analysis (n=1,392,907) and a cross-sectional national telephone survey with a representative sample of the general Israeli population (n=848, response rate=62%). In the medical records analysis we linked consultations with specialists at community secondary care and private consultations using claims data. We developed a time-sensitive algorithm that identified potential second opinion instances. In both methods, we predicted the characteristics of second-opinion seekers using multivariate logistic regressions.

Results: The medical records analysis and the survey findings were highly consistent, and showed that about sixth (14.9% in the medical records? vs. 17.2% in the survey?) of a general population sought a second opinion, mostly from orthopedic surgeons. Women, native-born and established immigrants, people living in in central urban areas or close to central urban areas, people with chronic conditions, and those who perceived their health status as not very good, were more likely to seek second opinions than others.

Conclusions: A considerable amount of people sought a second opinion. Certain patient profiles tended to seek second opinions more than others. Such utilization patterns are important to devise policy regarding second opinions, due to their implications on expenditure, policy, clinical outcomes, and patient satisfaction.

Keywords: Second opinion, utilization, health policy

INTRODUCTION

Seeking a second opinion (SO) reflects a patient's desire to obtain the best medical treatment. The rationale behind seeking a SO is that clinical judgment inevitably varies among clinicians with different medical education, clinical philosophies, or expertise. The vast evidence on diagnostic discrepancies between independent first and SOs¹⁻⁶ highlights the clinical importance of obtaining SOs, to challenge a diagnosis, a treatment, or a prognosis given by another physician.

Patients mostly seek SOs when they want to be sure that the best diagnosis, treatment, or prognosis is in place, to obtain additional information or reassurance for that purpose,¹¹⁻¹³ or to ascertain whether the treatment is appropriate for them.¹⁴⁻¹⁶ In many cases, patients seek a SO simply because they hope that the diagnosis would turn out to be wrong,^{4,17} are anxious about their condition,^{4,18} or find it difficult to emotionally deal with the diagnosis.^{11,12} Patients also seek a SO when they are dissatisfied with an impersonal communication or feel that their physician had not spent enough time with them, feel they did not get the information they need, or lack trust in the physician.^{4,11,13-15,17-22}

Despite the importance of the SO tool, only a few studies evaluated how many patients seek SOs,²³ and they are limited to self-report surveys in particular patient groups (e.g., cancer patients). We were aware of only one survey that estimated SO utilization in a general population, conducted in the US in 1994, where 18.8% of the respondents received a SO.²² A survey from 2006 of 1,984 US breast cancer patients found that about 20% of them sought a SO.²⁵ Much higher rates were found in Hong Kong (41.9%),¹⁶ Japan (40.6%),¹⁸ and Israel (45%),²⁶ but only 6.5% in Australia.¹³

Moreover, to the best of our knowledge, all studies that evaluated SO utilization were based on patient self-reported surveys which inherently rely on the patient's subjective interpretation of what is a SO. Lack of objective data and reproducible measurements of SO utilization make it difficult to compare utilization rates among different studies and different countries, hence the comparison should be taken with caution.

Consequently, it is important to be able to estimate SO utilization not only by self-reported surveys, but also using objectively collected data on a large population such as electronic medical records. Unfortunately this is not an easy task as patients may seek SOs from providers in different services or settings (e.g., by approaching a private orthopedic surgeon after a public hospital surgeon made a diagnosis or recommended surgery). The challenge in this case is to build an integrated indicator of SO utilization based on the fusion of multiple datasets.

Second opinions in the Israeli healthcare system

A detailed description of the access to SOs in Israel can be found elsewhere.²⁸ In short, the Israeli healthcare system consists of four health funds, providing universal access to primary, secondary, and tertiary care. Patients in Israel can obtain SOs either through the secondary care provided by the health funds in the community or by private physicians. **Patients in Israel do not need a referral from their GP in order to get a SO.** More than 75% of the population is covered by voluntary, supplementary health insurance provided by the health funds. These insurance policies allow partial reimbursement for out-of-pocket SO consultations. In addition, there are private insurance plans that provide a SO with co-payments or by paying the private physician directly. Hence, people can get a SO in both the public and private systems.

Goal

To estimate how many people seek SOs in Israel, and what the characteristics of SO seekers are, using a population-based data analysis and a national representative survey regarding the use of SOs in the general Israeli population. Such an assessment is required in order to know whether this important tool is utilized in a sensible manner while making efficient use of health resources.

METHODS

In this study, we applied two research methodologies: a medical records analysis and a nationally representative telephone survey.

Medical records analysis

We developed a time-sensitive algorithm that identified potential SO instances from providers in different services in order to estimate SO utilization. Estimating whether a patient accessed different providers can be done by matching consultations of the same patient in different services in which patients can obtain a SO. Visits recorded in electronic medical records are useful for this purpose and can enable a large scale study of SO utilization.

Data sources

Clalit Health Services is the largest Israeli health fund (and the second largest in the world after Kaiser Permanente), providing primary, secondary, and tertiary care for 52% of the Israeli population. The widespread use of electronic medical records in this health fund enables access to visits data. We collected two datasets that were linked by a unique national ID number: (1) consultations with specialists in the community secondary care, and (2) bills of out-of-pocket costs of private consultations, claimed from the health fund's supplemental insurance. We also collected patient and provider demographics. All data were extracted by

authorized personnel in the health fund. The extracted data were anonymized by removal of patient and physician identifying data. The study was approved by the Ethics and Research Committees of the health fund. The data files were transferred to the researchers, who conducted rigorous data quality checks, removing duplicates and outliers.

Study population

The inclusion criteria were: (1) active member of the health fund (active from 1.9.2009 until 30.4.2011); (2) age 21 and above; (3) visited at least one specialist between 1.9.2009 and 30.4.2011, either in the secondary care in the community, or a private consultation claimed from the supplemental insurance, in one of the following specialties: orthopedics, ophthalmology, dermatology, ear, nose and throat (ENT), cardiology, general surgery, urology, gastroenterology, and neurology. We chose these specialties following a preliminary descriptive analysis, showing that these domains account for the vast majority of consultations. The exclusion criteria were: (1) patients who only visited a family physician; (2) patients who did not consult with a specialist in the above list,; (3) treatment or medical procedure visits (i.e., non-clinical consultations); and (4) patients who died during the study period.

An algorithm for identification of second opinion consultations

As we were unaware of any previous methodology for identification of second medical opinion consultations, we developed one. The closest algorithms we are aware of, were used to the identification of “doctor shoppers”, and adopting these algorithms to the SO case is non-trivial.^{38,39}

We define a *second medical opinion* as “consulting with another specialist, in the same specialty, within 3 months of the first consultation in order to obtain a SO on the same medical problem”. **Given time series of consultations of the same patient, the following algorithm was applied to identify pairs of first and second consultations (Figure 1): (1)**

for each patient, we created a unified list with all of her visits in the two datasets; (2) each list was sorted according to the visit time field; (3) each sorted list was split into multiple sub-lists where each sub-list contained visits in the same medical specialty; (4) each sub-list was divided into sequences of consecutive visits where: (a) the time difference between consecutive visits in the sequence was lower than 90 days; and (b) the time difference between the last visit of a given sequence and the first visit of the consecutive sequence was greater than 90 days; and (5) for each chain, we found the first visit to a physician that is not the same as the physician in the first visit of the chain. The identified visit was marked as the secondary consultation visit, and the visit just beforehand was defined as the index visit.

<Please insert Figure 1 about here>

Variables and measurements

In order to assess the factors that affected SO utilization, we defined the following variables. The dependent binary variable was obtaining an SO: “yes” if received a SO or “no” otherwise. The covariates included patient demographics: (1) age; (2) gender; (3) being an immigrant (defined as immigration to Israel after 1989, years of mass immigration mainly from the former USSR); (4) socio-economic level (according to the Israel Central Bureau of Statistics) is based on the characterization and ranking of local authorities in Israel. It reflects a combination of basic features of the population in each unit such as: financial resources of the residents, education, and employment. Units were clustered into 10 groups: cluster 1 represents the lowest socio-economic level, and cluster 10 represents the highest socio-economic level. The clusters were grouped into 3 groups: low, middle, and high; (5) Charlson score (without age)²⁹; (6) “periphery” level. The periphery level is based on a peripheral

index that combines two components: potential accessibility index of the local authority (**this is based on the gravity approach that is used worldwide which takes into account the geographic proximity of the local authority to all other local authorities and their population size**) and proximity of the local authority to the boundary of the Tel Aviv district (**this reflects the unique structure of Israel, where Tel Aviv District serves as an economic and business center, and is also geographically located close to the center of Israel**) (cbs.gov.il). The peripheral index included local authorities that were ranked by increasing order of centrality, and are classified into 10 clusters. We grouped those clusters based on their distribution into 3 groups: peripheral, intermediate, and central.

A national telephone survey

Design

We conducted a cross-sectional national telephone survey asking people about their SO seeking behavior. The survey was conducted in collaboration with the B.I. and Lucile Cohen Institute for Public Opinion Research, an academic survey institute at Tel-Aviv University, during November 2011. The interviewers followed a predefined closed-end protocol (Appendix 1). Respondents were interviewed in their native language (Hebrew, Russian or Arabic). We followed the STROBE guidelines for reporting cross-sectional studies.¹⁸

Participants and Sampling

We sampled a representative random sample of the general Israeli adult population (n=609). In addition we performed a disproportionate stratified sampling to increase the number of respondents who obtained a SO (n=239). For the inferential statistics we used both the random sample and the stratified sample (n=848). A detailed description of the participants and sampling is described in Appendix 2.

Variables and measurements

In order to assess the factors that affected SO utilization, we defined the following variables. The dependent binary variable was self-reported SO utilization. A ‘SO’ was defined and explained to the respondents as ‘*consulting with another specialist, in the same specialty, in order to obtain a SO on the same medical concern during the past 12 months (excluding consultations with family physicians)*’. For the sake of comparison, we chose only covariates that were already chosen in the medical records analysis: age, gender, being an immigrant, socio-economic level and “periphery” level. In addition, we chose the “perceived health status” variable in the survey which was similar in concept to the “Charlson score” variable.

Statistical analyses

We produced descriptive statistics to describe the “SO utilization” variable. We checked correlations between the covariates. We compared the characteristics of patients who obtained SOs to those who did not, using univariate χ^2 tests. We then predicted the binary dependent variable (SO utilization) by the covariates using a multivariate logistic regression model. **Since our analysis included multiple explanatory variables, we have applied the backward stepwise elimination method using the Wald test for variable selection.** The threshold for elimination was 0.05.

FINDINGS

How many people sought a SO?

Medical records analysis

The entire sample included 1,392,907 people. Most were female, were native-born Israelis or established immigrants, classified as middle socio-economic status, and were living in central residential areas. Age distribution was rather uniform. Most of them did not have any chronic disease according to the Charlson score (Table 1).

At least one SO was obtained by 208,022 (14.9%) of the sample during the study period. These 208,022 people had 255,086 SO consultations (i.e., some patients obtained more than one SO, 1.2 on average).

Survey

We approached 984 households, out of which 609 questionnaires were completed in full (response rate 62%). 105 respondents from the representative sample (17.2% of 609) visited a physician for a SO during the study period. Sixteen of these 105 respondents (15.2%) obtained more than one SO (i.e., third opinion and more). With the disproportionate stratified sampling, a total of 344 respondents obtained a SO (an addition of 239 to the 105 respondents from the representative sample). Most of the respondents were female, 40-59 years old, were native-born Israelis or established immigrants. They perceived their health status to be very good, they were objectively classified as middle socioeconomic status and were living in the center of the country (Table 1).

Specialties approached for a SO

The highest rates of SOs in both medical records analysis and survey were to orthopedic surgeons (36.7% vs 45.7% respectively) (Table 2). Other specialties with high SO utilization were ophthalmology (26.6% vs 12.8%) and ENT (9.8% vs 8.6%). To rule out the option that the high proportions of SOs in these specialties were simply due to a large number of consultations in these specialties, we further examined the proportion of SO consultations for each specialty out of the total number of consultations in that specialty (Appendix 3); the results were consistent with those shown in Table 2.

<Please insert Table 1 about here>

<Please insert Table 2 about here>

Who sought a second opinion?

Medical records analysis

The covariates from the univariate analyses that were found to have a statistically significant effect ($p < 0.05$) on seeking a SO included: age group, gender, immigration, socio-economic level, periphery level, and the Charlson Score (Table 3). The significant covariates from the univariate analyses remained significant in the multivariate logistic regression (Table 4). More specifically, women tended to obtain more SOs than men (OR=1.02, 95% CI 1.01–1.03). Native-born and established immigrants tended to obtain SOs more than recent immigrants (OR=1.36, 95% CI 1.33–1.38). Older people sought more SOs than younger people (OR= 2.03, 95% CI 2.00–2.06). People in high and middle socio-economic levels sought more SOs than people with a low income level (OR= 1.05, 95% CI 1.03–1.06). People living in intermediate localities according to the “periphery” level and central areas sought more SOs than people living in peripheral areas (OR=1.25, 95% CI 1.23–1.27). People with chronic conditions (categories 1-2 in the Charlson score) sought more SOs (OR=1.18, 95% CI 1.17–1.19) than people with no chronic conditions (category 0 in the Charlson score).

Survey

The univariate analyses showed significant ($p < 0.05$) differences between respondents who sought a SO and those who did not seek one, with respect to gender and perceived health status (Table 3). There were no significant differences between the groups in age, immigration, periphery level and socioeconomic level.

According to the multivariate logistic regression (Table 4) women tended to obtain more SOs than men (OR=1.4, 95% CI 1.05–1.88). Native-born Israelis and established immigrants obtained more SOs than recent immigrants (OR=1.85, 95% CI 1.15–2.99). Respondents who live in intermediate localities according to the “periphery” level obtained more SOs than those who live in the periphery of (OR=1.7, 95% CI 1.08–2.69). Respondents who perceived

their health as good or very good sought fewer SOs than those who perceived their health as not so good (OR=0.44, 95% CI 0.29–0.69 and OR=0.27, 95% CI 0.17–0.41, respectively).

<Please insert Table 3 about here>

<Please insert Table 4 about here>

DISCUSSION

Our findings show a high level of consistency between the medical records analysis and the survey. About a sixth (14.9% in the medical records vs. 17.2% in the survey) of the general population sought a SO, mostly from orthopedic surgeons. Women, native-born and established immigrants, people living in intermediate localities and central areas, and people with chronic conditions or those who perceived their health status to be ‘not so good’ were more likely to seek SOs.

The utilization rate of SOs found in our study is fairly close to the rate found in a survey of the American general population (18.8%).²² More than a third of the SO consultations were in the orthopedic surgery specialty. It is reasonable that SOs were particularly requested from orthopedic surgeons, as previously shown in the literature.^{7,17,32} Surgery is a stressful decision for the patient and is frequently avoidable.³³ Patients tended to adhere to a SO recommending non-invasive therapy rather than surgery.³⁴

Our findings also raise questions about health disparities and fair healthcare resource allocation. For example, native-born people and established immigrants sought more SOs than recent immigrants. A previous study showed that immigrants use fewer health care services, although they enjoy the same coverage as non-immigrants.³⁵ In the same study, economic factors, cultural factors, and language barriers were shown to influence healthcare

utilization. Those living in central areas sought more SOs than those living in peripheral areas and as found in our medical records analysis method, wealthier people sought more SOs than poorer people. It was shown that people with a higher socio-economic status consult with more specialists.³⁶ Specialists tend to reside in central urban areas where people with stronger socio-economic levels reside. **Hence higher availability of expertise in these areas may increase SO utilization, at the expense of rural areas.** These may introduce inequality in access.

According to the medical records analysis method, older people were more likely to seek SOs than others. Older people and those with more chronic conditions sought more SOs, probably due to the complexity of the age-related morbidities, such as drug interactions. In previous studies, people who described their disease as more severe were more likely to seek a SO.^{12,16,37}

Having up-to-date data on SO utilization is important to policy makers in order to identify whether SOs are utilized appropriately. Health policy regarding SOs is a matter of balancing benefits and costs. On the one hand, some patient profiles could have benefited from a SO, but do not get one because of cost, lack of awareness, or unavailability of specialists in their residential area. On the other hand, other patient profiles are more prone to seek a SO. This potential overuse of SOs can hint at potential failures, such as dissatisfaction from the providers.

Another related question is whether the subsidized access to SOs, **which is possible through the partial reimbursement being paid by the supplementary health insurance**, creates superfluous SO consultations with limited value, that are a mere result of unsatisfying communication with the first physician, long waiting times in the public system, or strong gatekeeping on access to specialists working in public services? If so, many SO consultations

could have been spared by improved communication skills, hence saving money for the patient and the insurer.

Hence, it is important to identify specific patients with that tendency and devise appropriate mechanisms to encourage or limit access to SOs, bearing in mind system failures that may either hinder patients from getting an SO, or otherwise enable too many SOs with questionable value.

Strengths and limitations

This study presents four contributions: First, it uses two methodological population-based approaches (data analysis and a survey) which strengthen the validity of the findings. Second, to the best of our knowledge, all previous studies that evaluated SO utilization used self-reported surveys with relatively small samples. Third, this study is based on an innovative linkage between rarely linked datasets: universal insurance data and supplementary insurance, containing data on private consultations. Fourth, the study proposes a novel algorithm to identify incidences of SO.

There are several limitations to this study. First, the definition of a SO in the medical records analysis as “consulting with another specialist, in the same specialty” relies on the assumption that consequent consultations to different physicians in the same specialty (e.g., two neurologists) in a relatively short period of time, may hint that the second consultation was for obtaining a SO. But patients may approach two physicians in the same domain for other reasons such as a different medical problem, or may approach physicians in different domains for the same clinical problem (e.g., an orthopedic surgeon and a neurologist for back pain). The consistency of the results that we obtained using the survey method proves the validity of our choices. Another limitation is the lack of data on consultations with private physicians that are not claimed from the insurance.

Future research

As mentioned, our operative SO definition in the medical records analysis method assumes that consequent consultations within the same specialty may hint at the same medical problem. Future research may try to address this limitation by considering data that contain such explicit information. **In the same context, we propose to explore the options for better documenting the medical information systems with information on SO usage, whether the first consultant has recommended or directed a SO, the recommendations of the first and second opinions and their outcomes.** Another research direction is examining the cost-benefit aspects of obtaining SOs in order to assist informed policy decisions and balance patient benefit and efficient use of health resources.

Conclusions

This study used two methodological population-based approaches (data analysis and a survey) to estimate SO utilization and the characteristics of SO seekers. Consistently across the two methods, we found that about a sixth of the general population covered by a health fund sought a SO. Particular patient groups (women, native-born and established immigrants, those living in central areas, and those with chronic conditions) sought more SOs than others. SO consultation rates were found to be higher in surgical cases. Having consistent results across the two methods reinforces the validity of our algorithm for identifying potential SO instances. Such an assessment is important when evaluating whether SOs are utilized in an efficient and accessible way for the benefit of patients, physicians, and healthcare organizations.

REFERENCES

1. Althabe F, Belizan JM, Villar J, Alexander S, Bergel E, Ramos S, et al. Mandatory second opinion to reduce rates of unnecessary caesarean sections in Latin America: a cluster randomised controlled trial. *Lancet*. 2004 Jun 12;363(9425):1934–40.
2. Briggs GM, Flynn PA, Worthington M, Rennie I, McKinstry CS. The role of specialist neuroradiology second opinion reporting: is there added value? *Clin Radiol*. 2008 Jul;63(7):791–5.
3. Kronz JD, Westra WH. The role of second opinion pathology in the management of lesions of the head and neck. *Curr Opin Otolaryngol Head Neck Surg*. 2005 Apr;13(2):81–4.
4. Mellink WA, Dulmen AM, Wiggers T, Spreeuwenberg PM, Eggermont AM, Bensing JM. Cancer patients seeking a second surgical opinion: results of a study on motives, needs, and expectations. *J Clin Oncol*. 2003 Apr 15;21(8):1492–7.
5. Wieske L, Wijers D, Richard E, Vergouwen MDI, Stam J. Second opinions and tertiary referrals in neurology: a prospective observational study. *J Neurol*. 2008 Nov;255(11):1743–9.
6. Zan E, Yousem DM, Carone M, Lewin JS. Second-opinion consultations in neuroradiology. *Radiology*. 2010 Apr;255(1):135–41.
7. McCarthy EG, Finkel ML. Second consultant opinion for elective orthopedic surgery. *Am J Public Health*. 1981 Nov;71(11):1233–6.
8. Rosenberg SN, Allen DR, Handte JS, Jackson TC, Leto L, Rodstein BM, et al. Effect of utilization review in a fee-for-service health insurance plan. *N Engl J Med*. 1995 Nov 16;333(20):1326–30.
9. Ruchlin HS, Finkel ML, McCarthy EG. The efficacy of second-opinion consultation programs: a cost-benefit perspective. *Med Care*. 1982 Jan;20(1):3–20.

10. McCarthy EG, Finkel ML, Ruchlin HS. Second opinions on elective surgery. The Cornell/New York Hospital study. *Lancet*. 1981 Jun 20;1(8234):1352–4.
11. Philip J, Gold M, Schwarz M, Komesaroff P. Second medical opinions: the views of oncology patients and their physicians. *Support Care Cancer*. 2010 Sep;18(9):1199–205.
12. Sutherland LR, Verhoef MJ. Patients who seek a second opinion: are they different from the typical referral? *J Clin Gastroenterol*. 1989 Jun;11(3):308–13.
13. Tattersall MHN, Dear RF, Jansen J, Shepherd HL, Devine RJ, Horvath LG, et al. Second opinions in oncology: the experiences of patients attending the Sydney Cancer Centre. *Med J Aust*. 2009 Aug 17;191(4):209–12.
14. Moumjid N, Gafni A, Bremond A, Carrere MO. Seeking a second opinion: do patients need a second opinion when practice guidelines exist? *Health policy (Amsterdam, Netherlands)*. 2007 Jan;80(1):43–50.
15. Oskay-Ozcelik G, Lehmacher W, Konsgen D, Christ H, Kaufmann M, Lichtenegger W, et al. Breast cancer patients' expectations in respect of the physician-patient relationship and treatment management results of a survey of 617 patients. *Ann Oncol*. 2007 Mar;18(3):479–84.
16. Tam KF, Cheng DK, Ng TY, Ngan HY. The behaviors of seeking a second opinion from other health-care professionals and the utilization of complementary and alternative medicine in gynecologic cancer patients. *Support Care Cancer*. 2005 Sep;13(9):679–84.
17. Van Dalen I, Groothoff J, Stewart R, Spreeuwenberg P, Groenewegen P, van Horn J. Motives for seeking a second opinion in orthopaedic surgery. *J Health Serv Res Policy*. 2001 Oct;6(4):195–201.
18. Sato T, Takeichi M, Hara T, Koizumi S. Second opinion behaviour among Japanese primary care patients. *Br J Gen Pract*. 1999 Jul;49(444):546–50.

19. Clauson J, Hsieh YC, Acharya S, Rademaker AW, Morrow M. Results of the Lynn Sage Second-Opinion Program for local therapy in patients with breast carcinoma. Changes in management and determinants of where care is delivered. *Cancer*. 2002 Feb 15;94(4):889–94.
20. Goldman RE, Sullivan A, Back AL, Alexander SC, Matsuyama RK, Lee SJ. Patients' reflections on communication in the second-opinion hematology-oncology consultation. *Patient education and counseling*. 2009 Jul;76(1):44–50.
21. Greenfield G, Pliskin JS, Feder-Bubis P, Wientroub S, Davidovitch N. Patient-physician relationships in second opinion encounters - the physicians' perspective. *Soc Sci Med*. 2012 Oct;75(7):1202–12.
22. Wagner T, Wagner L. Who gets second opinions? *Health Aff (Millwood)*. 1999 Oct;18(5):137–45.
23. Vashitz G, Davidovitch N, Pliskin JS. [Second medical opinions]. *Harefuah*. 2011 Feb;150(2):105–10, 207.
24. Hewitt M, Breen N, Devesa S. Cancer prevalence and survivorship issues: analyses of the 1992 National Health Interview Survey. *J Natl Cancer Inst*. 1999 Sep 1;91(17):1480–6.
25. Morrow M, Jagsi R, Alderman AK, Griggs JJ, Hawley ST, Hamilton AS, et al. Surgeon recommendations and receipt of mastectomy for treatment of breast cancer. *JAMA*. 2009 Oct 14;302(14):1551–6.
26. Sapir R, Catane R, Kaufman B, Isacson R, Segal A, Wein S, et al. Cancer patient expectations of and communication with oncologists and oncology nurses: the experience of an integrated oncology and palliative care service. *Support Care Cancer*. 2000;8:458–63.

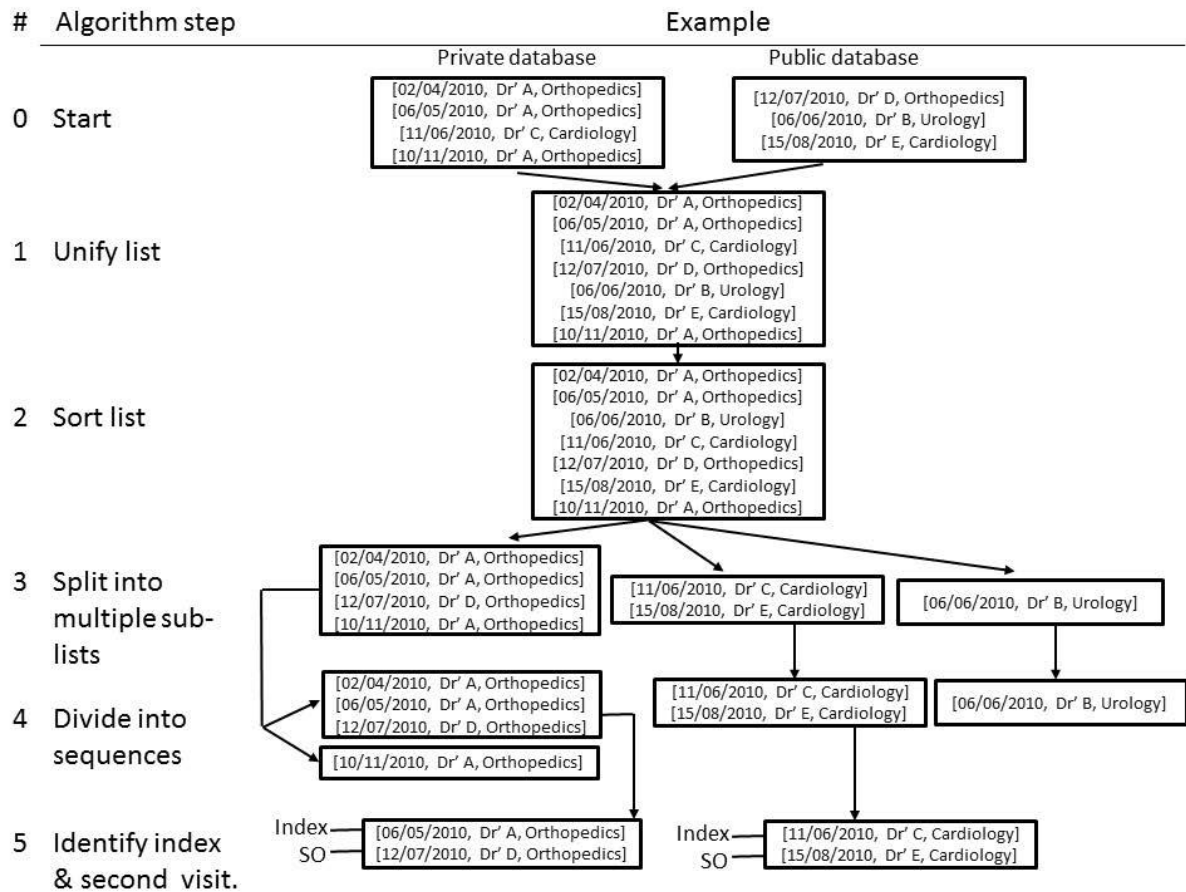
27. National Patient Safety Foundation. Public opinion of patient safety issues [Internet]. 1997 [cited 2012 Apr 30]. Available at: http://www.npsf.org/wp-content/uploads/2011/10/Public_Opinion_of_Patient_Safety_Issues.pdf.
28. Greenfield G, Pliskin JS, Wientroub S, Davidovitch N. Orthopedic surgeons' and neurologists' attitudes towards second opinions in the Israeli healthcare system: a qualitative study. *Isr J Health Policy Res*. 2012;1(1):30.
29. Charlson ME, Pompei P, Ales KL, MacKenzie CR. A new method of classifying prognostic comorbidity in longitudinal studies: Development and validation. *Journal of Chronic Diseases*. 1987;40(5):373–83.
30. Chang H-R, Yang M-C, Chung K-P. Can cancer patients seeking a second opinion get better care? *Am J Manag Care*. 2013 May;19(5):380–7.
31. Israeli Ministry of Health IM of. A public report on supplementary health programs of the Israeli Health Funds in 2011 [Internet]. 2011 [cited 2013 Feb 23]. Available from: http://www.health.gov.il/PublicationsFiles/sbn2011_17122012.pdf
32. Grafe WR, McSherry CK, Finkel ML, McCarthy EG. The Elective Surgery Second Opinion Program. *Ann Surg*. 1978 Sep;188(3):323–30.
33. Leape LL. Unnecessary surgery. *Health Serv Res*. 1989 Aug;24(3):351–407.
34. Graboys TB, Headley A, Lown B, Lampert S, Blatt CM. Results of a second-opinion program for coronary artery bypass graft surgery. *JAMA*. 1987 Sep 25;258(12):1611–4.
35. Davidovitch N, Filc D, Novack L, Balicer RD. Immigrating to a universal health care system: Utilization of hospital services by immigrants in Israel. *Health & Place*. 2013 Mar;20:13–8.
36. Filc D, Davidovich N, Novack L, Balicer RD. Is socioeconomic status associated with utilization of health care services in a single-payer universal health care system? *International Journal for Equity in Health*. 2014 Nov 28;13(1):115.

37. Sutherland LR, Verhoef MJ. Why do patients seek a second opinion or alternative medicine? *J Clin Gastroenterol*. 1994 Oct;19(3):194–7.
38. Macpherson AK, Kramer MS, Ducharme FM, Yang H, Bélanger FP. Doctor shopping before and after a visit to a paediatric emergency department. *Paediatr Child Health*. 2001;6(6):341–6.
39. Wang M-J, Lin S-P. Study on doctor shopping behavior: Insight from patients with upper respiratory tract infection in Taiwan. *Health Policy*. 2010 Jan;94(1):61–7.

FIGURE LEGENDS

Figure 1: A time-sensitive algorithm for identifying second opinion consultations.

The figure illustrates our suggested five stages algorithm for identifying second opinion consultations.



Step 0: The input to our algorithm is all the consultations of a single patient extracted from the private and public databases. In this example, over the year of 2010, our patient had 4 consultations in the private database (3 consultations to doctor A in the Orthopaedics speciality, and 1 consultation to doctor C in the Cardiology speciality) and 3 consultations in the public database (1 consultation to doctor D in the Orthopaedics speciality, 1 consultation to doctor B in the Urology specialty and 1 consultation to doctor E in the Cardiology specialty).

Step 1: A unified list with the 7 consultations from the two databases is created.

Step 2: The list is sorted according to the visit time field: the first consultation in the list occurred in 02/04/2010 to doctor A in the Orthopaedics specialty, the last consultation in the list occurred in 10/11/2010 to doctor A in the Orthopaedics specialty

Step 3: The sorted list is split into 3 sub-lists, each contains a single medical specialty: Orthopaedics (4 visits), Cardiology (2 visits) and Urology (1 visit).

Step 4: Each sub-list is divided into sequences of consecutive visits where the time difference between each two consecutive visits does not exceed 90 days. For example: the orthopaedics sub-list is divided into two sequences: the first 3 visits in the sequence and the fourth visit (the time difference between the 3rd visit that occurred on 12/7/2010 and the 4th visit that occurred on 10/11/2010 exceeds 90 days).

Step 5: Each sequence is analyzed independently in order to identify index and second opinion visits. For example, the first Orthopedics sequence from the previous stage contains 3 consecutive consultations: the first two are to doctor A and the third is to doctor D. Therefore the second visit (occurred on 06/05/2010 to doctor A) is marked as the index visit and the third visit (occurred on 12/07/2010 to doctor D) is marked as the second opinion visit. It is also worth mentioning that some of the sequences that resulted from the previous stage may not contain SO visits. For example, the Urology sequence contains a single visit only and therefore is ignored.

Table 1: Baseline characteristics of study population- comparison of survey method to medical records analysis method

		Medical records analysis method	Survey method
Characteristic		n=1,392,907 (%)	n=609 (%)
Age group	18-39	463,695 (33.3%)	190 (31.2%)
	40-59	434,405 (31.2%)	241 (39.6%)
	60+	494,807 (35.5%)	178 (29.2%)
Gender	Male	621,610 (44.6%)	284 (46.6%)
	Female	771,297 (55.4%)	325 (53.4%)
Immigration	Recent Immigrants*	166,526 (12.0%)	78 (12.8%)
	Native-born and established immigrants	1,226,381 (88.0%)	531 (87.2%)
Socioeconomic level (by residential area)	Low	425,666 (30.6%)	161 (27.1%)
	Middle	730,468 (52.4%)	423 (71.1%)
	High	236,773 (17.0%)	11 (1.8%)
	Missing values		14
“Periphery” level	Periphery of country	204,535 (14.7%)	98 (16.4%)
	Intermediate	402,309 (28.9%)	221 (37%)
	Center of country	786,063 (56.4%)	278 (46.6%)
	Missing values		12
Charlson score	0	708,689 (50.9%)	N/A
	1-2	496,227 (35.6%)	N/A
	3-4	126,021 (9.0%)	N/A
	5-25	61,970 (4.5%)	N/A
Perceived health status	Very good	N/A	316 (52.6%)
	Good	N/A	213 (35.4%)
	Not so good	N/A	72 (12.0%)
	Missing values		8

* Defined as immigration to Israel after 1989, years of mass immigration mainly from the former USSR.

Table 2: Distribution of second opinion consultations by specialty- comparison of survey method to medical records analysis method

	Medical records analysis method	Survey method
Specialty	Number of second opinion consultations (%)*	Number of second opinion consultations (%)
Orthopedics	93,481 (36.7%)	111 (45.7%)
Ophthalmology	67,871 (26.6%)	31 (12.8%)
Ear, Nose, and Throat	24,960 (9.8%)	21 (8.6%)
Dermatology	24,452 (9.6%)	20 (8.2%)
General Surgery	19,134 (7.5%)	21 (8.6%)
Urology	9,781 (3.8%)	5 (2.1%)
Cardiology	8,872 (3.5%)	17 (7.0%)
Gastroenterology	3,893 (1.5%)	7 (2.9%)
Neurology	2,642 (1.0%)	10 (4.1%)
Total	255,086 (100.0%)	243 (100.0%)**

*The number of second opinion consultations in the specialty divided by the total number of second opinion consultations. Some of the patients may have more than one second opinion.

** The total number of second opinion consultations is excluding 101 consultations in specialties which appeared in the survey but did not appear in the database analysis (and therefore were removed from this analysis for the sake of comparison): orthopedics, ophthalmology, dermatology, ear, nose and throat (ENT), cardiology, general surgery, urology, gastroenterology and neurology.

Table 3: Characteristics of people who sought a second opinion vs. those who did not -survey method compare to medical records analysis method

		Medical records analysis method (n=1,392,907)			Survey method (n=848)		
Characteristic		Did not seek a second opinion (n=1,184,885)	Sought a second opinion (n=208,022)	p-value	Sought a second opinion (n=344)	Did not seek a second opinion (n=504)	p-value
Age group	18-39	416,414 (89.8%)	47,281(10.2%)	<0.001	98 (38.1%)	159 (61.9%)	0.07
	40-59	378,465 (87.1%)	55,940 (12.9%)		120 (37.7%)	198 (62.3%)	
	60+	390,006 (78.8%)	104,801 (21.2%)		126 (46.2%)	147 (53.8%)	
Gender	Male	529,915 (85.2%)	91,695 (14.8%)	<0.001	137 (35.8%)	246 (64.2%)	0.01*
	Female	654,970 (84.9%)	116,327 (15.1%)		207 (44.5%)	258 (55.5%)	
Immigration	Recent Immigrants	145,668 (87.5%)	20,858 (12.5%)	<0.001	32 (33.3%)	64 (66.7%)	0.12
	Native-born and established immigrants	1,039,217 (84.7%)	187,164 (15.3%)		312 (41.5%)	440 (58.5%)	
Socioeconomic level	Low	371,012 (87.2%)	54,654 (12.8%)	<0.001	68 (33.7%)	134 (66.3%)	0.07
	Middle	613,611 (84.0%)	116,857 (16.0%)		262 (42.7%)	351 (57.3%)	
	High	200,262 (84.6%)	36,511 (15.4%)		6 (46.2%)	7 (53.8%)	
	Missing values				8	12	

Periphery level	Periphery of country	180,176 (88.1%)	24,359 (11.9%)	<0.001	42 (33.3%)	84 (66.7%)	0.15
	Intermediate	343,123 (85.3%)	59,186 (14.7%)		139 (43.4%)	181 (56.6%)	
	Center of country	661,586 (84.2%)	124,477 (15.8%)		157 (40.8%)	228 (59.2%)	
	Missing values				6	11	
Charlson score	0	624,069 (88.1%)	84,620 (11.9%)	<0.001	N/A	N/A	N/A
	1-2	413,333 (83.3%)	82,894 (16.7%)				
	3-4	99,054 (78.6%)	26,967 (21.4%)				
	5-25	48,429 (78.1%)	13,541 (21.9%)				
Perceived health status	Not so good	N/A	N/A	N/A	80 (62.5%)	48 (37.5%)	<0.001*
	Good				131 (42.4%)	178 (57.6%)	
	Very good				128 (31.9%)	273 (68.1%)	
	Missing values				5	5	

Table 4: multivariate logistic regression model of patient characteristics associated with seeking a second opinion - comparison of survey method to medical records analysis method

Predictors	Medical records analysis method n=1,392,907			Survey method n=848		
	OR	95% CI	P	OR	95% CI	P
Age group						
18-39		Reference group			NS	
40-59	1.22	1.21-1.24			NS	
60+	2.03	2.00-2.06			NS	
Gender						
Male		Reference group			Reference group	
Female	1.02	1.01-1.03		1.4	1.05-1.88	0.02
Immigration						
Recent Immigrants*		Reference group			Reference group	
Native-born and established immigrants	1.36	1.33-1.38		1.85	1.15-2.99	0.01
Socioeconomic level (by residential area)						
Low		Reference group			NS	
Middle	1.17	1.15-1.18			NS	
High	1.05	1.03-1.06			NS	
“Periphery” level						
Periphery of country		Reference group			Reference group	
Intermediate	1.16	1.14-1.18		1.7	1.08-2.69	0.02
Center of country	1.25	1.23-1.27		1.46	0.93-2.28	0.1
Charlson score						
0		Reference group			N/A	
1-2	1.18	1.17-1.19			N/A	
3-4	1.33	1.31-1.35			N/A	
5-25	1.30	1.28-1.33			N/A	
Perceived health status						
Not so good		N/A			Reference group	

Good	N/A	0.44	0.29-0.69	0.00
Very good	N/A	0.27	0.17-0.41	0.00

* Defined as immigration to Israel after 1989, years of mass immigration mainly from the former USSR.