

## RESEARCH ARTICLE / ARTICLE DE RECHERCHE

## Veterinarians' Information Prescription & Clients' eHealth Literacy

Niloofer Solhjoo\*, Nader Naghshineh and Fatima Fahimnia

**Abstract: Introduction:** The aim of this study is to investigate the relationship between pet owners' perceived health literacy skills (in finding, evaluating, and applying online pet health information) and using the information prescription (IP) provided by veterinarians about education on the internet. **Methods:** Thirty telephone interviews were conducted with pet owners approximately two weeks after completing a questionnaire of eHealth Literacy Scale (eHEALS) followed by an IP which was provided by veterinarians in addition to pet owners' customary veterinary services in a vet clinic at the center of Tehran, Iran. Qualitative and quantitative data were merged to explore differences and similarities among respondents with different eHealth literacy levels. **Results:** Results indicate that pet owners with a higher score of eHealth literacy more often accessed the suggested websites and reported positive feelings about this addition to their veterinary services. Similarly, among the 8-item self-reported eHealth Literacy skills list, perceived skills at evaluating and applying information were significantly associated with the use of IPs. Lastly, eHealth literacy level was significantly associated with the outcomes of prescribed information, such as veterinarian-client communication and learning outcomes. **Conclusion:** Disparities in the application of the veterinarian's IPs for online pet healthcare information, and its outcomes are associated with different eHealth literacy skills. Veterinarians should collaborate with information specialists and librarians to perform education efforts to raise awareness on online pet health information quality and the impact of veterinarian-directed information prescription, especially among pet owners with low health literacy.

### Introduction

The Internet has become a primary source of health information that potentially provides many benefits for both humans and animals. To make better decisions about pet health, sickness, and wellness, pet owners are turning to the Internet for information [1]. For instance, Kogan & et al. (2018) reported that most UK pet owners use the Internet as the main source of pet health information [2]. Another study in Iran shows that there is a high willingness (65%) to search and use online pet health information among the population, and more than half of this information is complementary to what veterinarians provide [3]. Digitization in veterinary science has changed rapidly over the last decades, and online information and applications are playing a growing role in pet health care. Veterinarians and their clients are using the

internet to seek and share health information about companion animals, interact with each other, and promote client education programs [4-5].

One of the novel programs to help veterinary clients access relevant (in print/online) information is information prescription (IP). It was introduced in the early part of the twenty-first century as a means for a physician to direct a patient to reliable, understandable, up-to-date information about a particular disease or condition [6], and it leads to the active and informed participation of the patients in the healthcare process. In other words, IP provides specific evidence-based information to patients to help them understand and manage their health/disease status [9]. So, we can define IP in veterinary medicine as a provision of high-quality, reliable pet health information to a specific client to help him/her makes better-informed pet health care decisions. Information

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may be prescribed by the veterinarians, librarians or IPs websites, such as *MedlinePlus Pet Health*. The IP may include the URL (universal resource locator) to a general veterinary medicine website or it may be a compilation of booklets and other pre-printed materials. In previous studies the impact of IP has been examined in relation to clinic success [8-7]. These examinations clearly illustrate the positive reactions reported by pet owners when given an IP and that they would like to receive guidance in their online searches for pet health information websites; however, no scale was used to measure the impact of IPs on their health literacy.

Health literacy is defined by a systematic literature review of existing health literacy definitions as “the knowledge, motivation and competences to access, understand, appraise and apply health information in order to make judgments and take decisions in everyday life concerning health care, disease prevention and health promotion to maintain or improve quality of life” [10]. The Internet-era equivalent to health literacy is eHealth literacy [11] which includes skills to search, select, appraise, and apply online health information and healthcare related digital applications [12]. Pet owners play an active role in pet health and contributes to the pet health decision-making process, and these goals can be achieved by having a high level of health literacy. Since pets are dependent upon their caregivers, Landue (2016) suggests that we consider the collective health literacy of all those responsible for a pet’s care [13]. In fact, collective eHealth literacy—including the pet owner, all family members, and other pet health care providers—is particularly important in finding and using online information and services for pet health purposes. The relevance of this form of literacy is demonstrated in human health studies, showing that parents and siblings’ skills to use online information actually affect the health of their child and that a lack of such skills may lead to adverse outcomes [14-15].

Given the fact that online pet health information and IP websites are not always reliable, and their contents are sometimes poorly designed, we expect that pet owners’ eHealth literacy level would be positively related to using veterinarian-prescribed online information and after-visit information behaviors. Therefore, the aim of this study is to investigate the relationship of pet owners’ use of IPs with their perceived eHealth literacy skills (in finding, evaluating, and applying online pet health information).

## Materials and Methods

This case study used a mixed-methods approach to collect and analyze data from pet owners. This approach was particularly suited to the largely unexplored nature of the topic. Thirty pet owners with their companion animals (cat or dog) who were clients of a veterinary clinic in Tehran, Iran received an IP consisting of a handout that included several tips to help clients with searching and evaluating online pet health information as well as a blank space for writing addresses to reliable and up-to-date veterinary medicine websites in the Persian and English languages. The IP was created collaboratively: authors customized the IP template based on information provided by Ann Viera [16], a veterinary librarian at the University of Tennessee, and then veterinarians recommended trusted websites (i.e. [veterinarypartener.com](http://veterinarypartener.com), [dampezeskan.com](http://dampezeskan.com), or [medlineplus.gov/pethealth](http://medlineplus.gov/pethealth)).

Quantitative data was collected from participants (n=30) via standardized questionnaires about eHealth literacy at the clinic waiting room before the IP was handed out in the examination room by vets. Once questionnaires were submitted, dog/cat treats were given to participants in return for completion. All participants were subsequently (10-15 days later) surveyed on their reaction towards IP using a semi-structured telephone interview. This allowed us to distinguish individuals with low and high eHealth literacy and to link the participants’ description of their application of IP and its outcome to a quantitative self-assessment of their eHealth literacy skills. Written informed project consent was obtained from participants in the waiting room, all of whom were Persian speaking. The form asked for clients’ contact information and if they would be willing to participate in a follow-up interview on their veterinary visit experience. This study was approved by the Research Office of Faculty of Management, University of Tehran.

### *Setting and participants*

Data was collected in the Aran small animal veterinary clinic, in the central metropolitan Tehran area, Iran, with the participation of its healthcare providers and clients. Purposeful sampling methods such as convenience sampling were used to recruit pet owners who meet the sampling criteria of the study: young and middle-aged adults (between 18-55 years old), patients (have a veterinary medical record at the

Aran vet clinic), and internet users. Sampling continued up to 30 participants until informational redundancy or saturation was achieved - the point at which no new information or themes emerged from the data.

#### *Data collection*

Thirty telephone interviews were conducted after receiving an IP with suggested websites in addition to clients' customary veterinary services; each interview lasted between twenty to thirty minutes. Four open-ended questions were used followed by prompts as necessary (see Appendix A) and they were audio recorded. Call-back appointments were made whenever the selected respondent was unavailable. All interviewing was conducted during August 2017 by a professional interviewer from the University of Tehran.

eHealth Literacy was assessed by the eHealth Literacy Scale (eHEALS), an established validated instrument to evaluate these skills [17]. The eHEALS was designed to assess health consumers' perceived skills at using information technology for health and to aid in determining the fit between eHealth information/services and consumers. It comprises six skill domains: traditional literacy, health literacy, information literacy, scientific literacy, media literacy, and computer literacy [12]. The scale was previously translated into Persian [18] and continues to perform consistently across settings and populations. The internal consistency of the data collected using the eHEALS in this study was high (Cronbach alpha=0.88) and the test-retest coefficients for the items were reliable ( $r=0.96$ ,  $P<0.001$ ) [18]. It provides insight into the self-reported skills of health care consumers when searching and using online health information. The scale comprises 8 items on a 5-point Likert scale (1=strongly disagree, to 5=strongly agree). Higher scores on the eHEALS indicate higher eHealth literacy.

In addition, demographic information on pet owners' age, gender, education, frequency of internet/web usage in general and for pet health information specifically, and pet's species and reason for the visit was obtained as part of the background variables.

#### *Data analysis*

Qualitative and quantitative data were merged to explore differences and similarities among respondents with different eHealth literacy levels. NVivo 10,

qualitative data analysis software from QSR International (qsrinternational.com) was used to manage and code recorded interview data. Content analysis was performed on the recorded pet owner interviews. As a recognized qualitative analytic technique, content analysis was used to examine the data for meaning within the context of all the recorded information [18]. This approach identified the major opinions, feelings, reactions, and responses to IPs that repeated and were common to several participants. Also, IBM SPSS Statistics 22 was used to compute frequency and descriptive statistics to summarize demographic and frequency statistics for each eHEALS item. Since this case study had a small sample size and nominal and ordinal level data, several non-parametric tests (e.g. Kruskal-Wallis test, and Spearman's rank correlation coefficient) were performed to examine the association between eHealth literacy skills and pet owners' satisfaction with IPs. The Kruskal-Wallis test can be used to determine if there are statistically significant differences between groups of an independent variable (IP outcomes) on an ordinal dependent variable (eHealth literacy). Also, the Spearman's rank-order correlation is the nonparametric version of the Pearson product-moment correlation which measures the strength and direction of the association between two ranked variables (eHealth literacy and frequency of using IPs) [20]. Analyses were considered statistically significant at the  $P<0.05$  alpha level (two-tailed).

## **Results**

#### *Participants' characteristics*

A total number of 30 participants completed the questionnaire and participated in the follow-up telephone interview. Although both sexes were fairly represented in the sample, more women (60%) than men took part in the study. The age of our participants varied, with an average age of 35 years (range 20-50 years). In terms of participants' education, a majority of them had undergraduate degrees 53% ( $n=16$ ), 30% ( $n=9$ ) had graduate/postgraduate degrees, and 17% ( $n=5$ ) had college degrees. Also, participants were asked how frequently they accessed the internet in general, and for pet health information specifically. Nearly all participants accessed the internet at least daily (28, 92%). Eleven participants accessed the internet for pet health information at least weekly (37%), while 19 (63%) reported at least once a month.

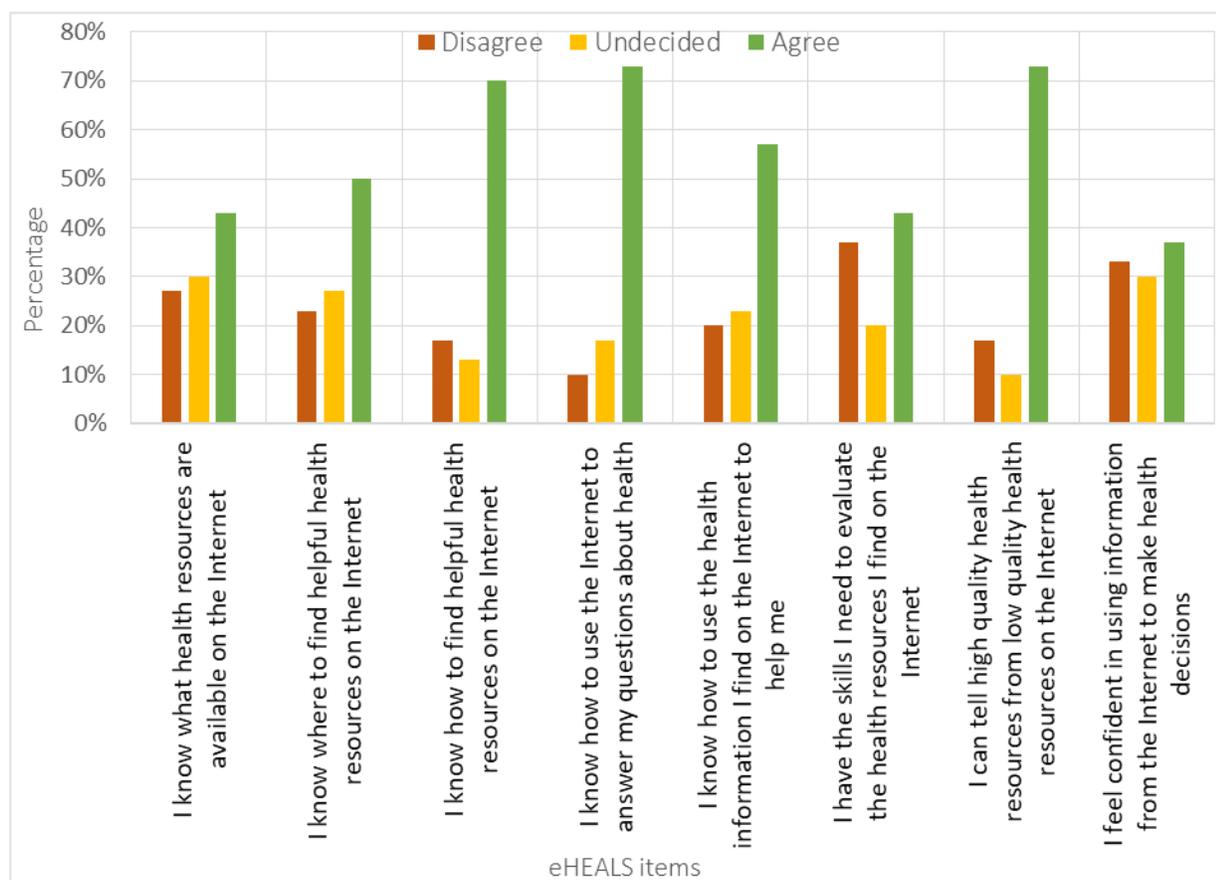
When asked to indicate what species the participant owned or cared for, 15 (50%) were dog owners, and the other half were cat owners. Among the pet population, most visits (29, 97%) involved a single species of cat/dog and in one case the participant brought a mother cat with three kittens. As well, 13 of 30 visits (42%) were problem appointments, and 58% (n=17) were wellness appointments, namely routine checkup, vaccination, and deworming.

#### eHealth literacy

Participants scored on average 3.52 (SD=1.01) on the eHEALS (range 1–5), indicating a moderate perceived ability to perform online pet health

information tasks. According to Figure 1, which illustrates the frequency of responses for each eHEALS item, over 70% of participants agreed with the following three statements on the eHEALS: “I can tell high quality health resources from low quality health resources on the internet” (22/30, 73%); “I know how to use the internet to answer my questions about health” (22/30, 73%); and “I know how to find helpful health resources on the internet” (21/30, 70%). Two statements with the greatest level of disagreement were related to confidence using online health information to make health decisions (10/30, 33%) and the ability to evaluate the health resources on the internet (11/30, 37%).

**Fig. 1** Frequency of responses to 8-item eHEALS

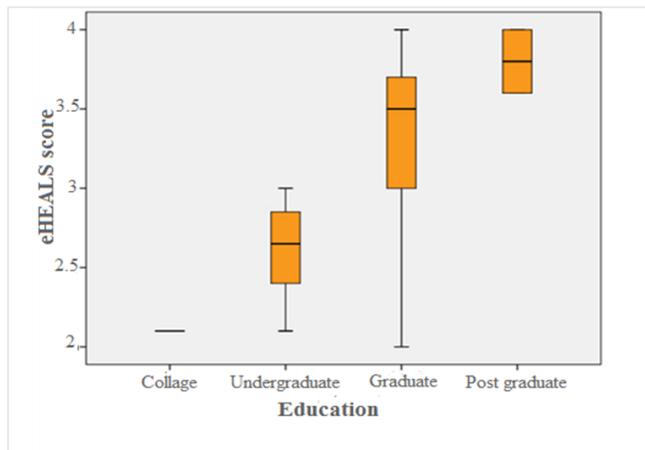


eHEALS scores were rank ordered from lowest to highest and divided into tertiles (i.e., low, moderate, and high scores), with the 33rd and 66th percentile used as cutoff points.

There was a statistically significant difference in total eHEALS scores based on education level

( $p=.041$ ), whereby highly educated participants reported higher levels of eHealth literacy compared to lower educated respondents (Figure 2). There was no statistical difference based on age ( $p=.501$ ) or gender ( $p=.323$ ).

**Fig. 2** Distribution of eHealth literacy level based on pet owners' education



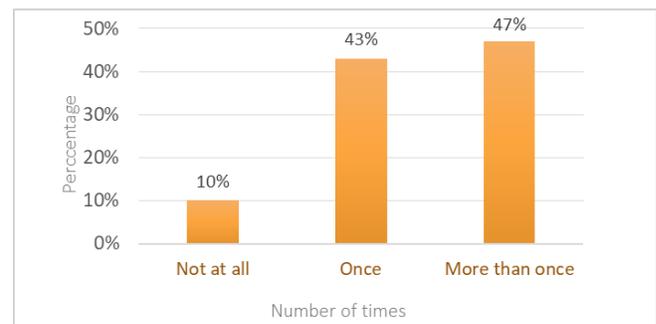
#### Information prescription outcomes

The follow-up telephone interview, conducted 10-15 days after the initial visit, was deemed successful at determining outcomes of veterinarians prescribed information. The recorded telephone interviews of 30 pet owners were analyzed using NVivo and after several passes through each interview, the emerging trends and patterns were organized into themes which are described in Table 1. In the following paragraphs, both quantitative and qualitative results will be presented.

During the interview, participants were asked how many times they used IP to access pet health online information since their veterinary visit. As Figure 3 shows, nearly 50% (14) of our participants used IP more than once, while 43% (13) of participants using it one time. Only 3 (10%) clients reported not viewing the IP at all. There was no significant difference in the number of times clients reported accessing the website based on gender ( $p=0.75$ ), age ( $p=0.88$ ) or education level ( $p=0.82$ ). However, there was a statistically significant difference in the number of times using IPs based on type of appointments ( $p<0.001$ ), whereby clients with problem appointments used IP more compared to clients with wellness appointments.

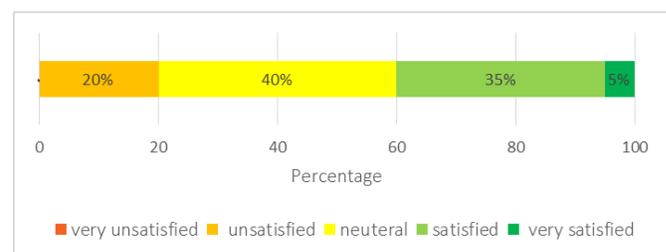
In general, pet owners' feedback about IPs were positive. Among the participants who used the IP, 22 (81.8%) found it helpful and 5 (18.5%) said it was unhelpful. Since IPs were suggested by veterinarians, all the participants trusted the recommended websites. The majority (20, 74%) of clients felt that receiving IP was a good idea, and 62.9% (17) stated they planned to visit the website again in the future.

**Fig. 3** Frequency of using IPs among participants



Participants were asked to indicate their satisfaction with IP from 1 (very unsatisfied) to 5 (very satisfied) and results are illustrated in Figure 4.

**Fig. 4** Frequency of satisfaction with IPs among participants



Moreover, we sought to extract and group all the outcomes reported by interviewees. The outcomes for pet owners were divided into three main themes of communication, learning and instrumental outcomes with their subthemes (Table 1). For instance, as a communication outcome, a cat owner who had used the IP stated that: "I talked with my husband about paying attention to the health website's domain that I read in the IP because he's a better internet user than me." Also, as an instrumental outcome, a dog owner talked about obtaining health information evaluation skills: "Within the last week I evaluated any piece of information I saw online following the tips in IP. In general, I pay more attention to the dates and sources."

In general, the following frequencies were reported for each group of outcomes by those who used the IP at least once ( $n=27$ ): "Improving the understanding of pet health issues" (21, 77.7%), "Using recommended pet health-related websites" (19, 70.37%), "discussing with veterinarian about pet health information" (19, 70.37%), "obtaining pet health information evaluation skill" (12, 44.4%), "changing in pet owner's health behavior" (10, 37%), and "discussing with family and

friends about pet health information” (9, 33.3%). Relevant participants’ quotes to illustrate the results from the interviews can be found in Table 1.

**Table 1** Main themes of information prescription outcomes

#	Main-theme	Sub-theme	Participant’s quote
<b>1</b>	<b>Communication outcomes</b>		
1-1		Discussing with veterinarian	(Female cat owner, 37 years old, undergraduate degree): “The IP was useful to give me some basic knowledge, but there were some weird medical term in recommended website that I didn’t understand them. In my next visit I need to ask my vet to explain them for me.”
1-2		Discussing with family and friends	(Female cat owner, 23 years old, undergraduate degree): “...I talked with my husband about paying attention to the health website’s domain that I read in the IP, because he’s a better internet user than me.”
<b>2</b>	<b>Learning outcomes</b>		
2-1		Understanding pet health issues	(Female dog owner, 26 years old, undergraduate degree): “a documentary video of a dog suffering from <u>Pyometra</u> worried me a lot (on the recommended website), because the vet suggested to <u>spay</u> my middle-aged dog early in life, but in that time I didn’t care enough about this issue.”
2-2		Changing in pet owner’s health behavior	(Male cat owner, 36 years old, graduate degree): “I found good tutorials on the suggested website for cat’s teeth brushing. I tried many of them at home to see which suits my cat better. After a week, he [cat] still resists the brushing, but I’ll continue to practice with him.”
<b>3</b>	<b>Instrumental outcomes</b>		
3-1		Using recommended pet health-related websites	(Female dog owner, 42 years old, undergraduate degree): “I usually refer to a website, which is written by a veterinarian I know. But IP helped me to look for way more information, in particular information that could be more easily trusted, such as animal health-related websites published by nonprofit organizations.”
3-2		Obtaining pet health information evaluation skill	(Male cat owner, 25 years old, undergraduate degree): “Within the last week I evaluated any piece of information I saw online following the tips in IP. In general, I pay more attention to the dates and sources.”

#### *Relationship between eHealth Literacy and Information Prescription outcomes*

In Table 2 we present bivariate statistics of what is the relationship between clients’ eHealth literacy and the use of veterinarians prescribed information. The

results outlined in Table 2 suggest that pet owners with the higher score of eHealth literacy accessed more to the suggested websites and reported positive feelings about this addition to their veterinary services. There was a moderate, positive association (Spearman

correlation coefficient,  $r_s=0.890$ ,  $p<0.001$ ) which means that the higher score of eHealth literacy is associated with more use of IPs among pet owners. Also, there was a significant correlation between eHealth literacy and pet owner’s level of satisfaction with IPs (Spearman correlation coefficient,  $r_s=-0.525$ ,  $p=0.03$ ).

**Table 2** Comparison of the total eHealth literacy scores between frequency of using IPs, and levels of satisfaction

eHealth literacy score		
Frequency of using IPs	$r_s$	<b>0.890</b>
	$p$ -value	<0.001
	n	30
Level of satisfaction with IPs	$r_s$	<b>0.525</b>
	$p$ -value	0.03
	n	30

The different frequencies of IP use (not at all/once/more than once) were compared with each of the 8 items for eHealth literacy skills with one-way ANOVA. There were significant differences between using websites that suggested in the IPs and the three following eHealth literacy items: “I know how to use the internet to answer my questions about health” ( $p=0.014$ ), “I know how to use the health information I find on the internet to help me” ( $p=0.013$ ), and “I have the skills I need to evaluate the health resources I find on the internet” ( $p=0.004$ ).

By observing the Spearman correlation coefficient between each of these items in Table 3, findings suggest the following:

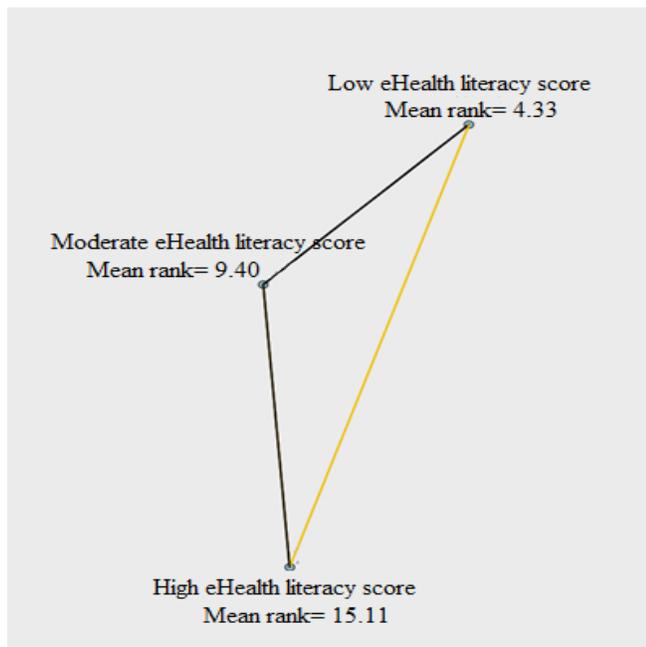
- Correlations between perceived skills at evaluating online health information and the frequency of using veterinarians prescribed information showed a strong association ( $r_s=0.715$ ,  $p<0.001$ ).
- Also, the correlation between using IP and perceived skills of applying online health information (including eHEALS items of “I know how to use the internet to answer my questions about health” and “I know how to use the health information I find on the internet to help me”) was  $r_s=0.551$  ( $p=0.01$ ).
- There was no significant correlation between pet owners’ ability to find online health information and using IPs ( $r_s=-0.381$ ,  $p=0.089$ ).

**Table 3** Spearman Correlation Coefficients between 8 items of eHealth literacy and frequency of using IPs among pet owners

		eHealth literacy skills							
		I feel confident in using information from the Internet to make health decisions	I can tell high quality health resources from low quality health resources on the Internet	I have the skills I need to evaluate the health resources I find on the Internet	I know how to use the health information I find on the Internet to help me	I know how to use the Internet to answer my questions about health	I know how to find helpful health resources on the Internet	I know where to find helpful health resources on the Internet	I know what health resources are available on the Internet
Frequency of using IPs	$r_s$	0.087	<b>0.714</b>	<b>0.715</b>	<b>0.551</b>	<b>0.490</b>	0.234	0.381	0.103
	$p$ -value	0.32	<0.001	<0.001	0.012	0.038	0.321	0.089	0.15
	n	30	30	30	30	30	30	30	30

In terms of outcomes, by applying one-way ANOVA on ranks results showed that there were statistically significant differences between IPs outcomes (veterinarians-client communication outcome and learning outcomes) and eHealth literacy scores. Participants with the higher score of eHealth literacy significantly ( $p=0.01$ ) discussed more with veterinarians about health information they've found in IPs. According to Figure 5, participants with the high score of eHealth literacy (mean rank=15.11) understood more of their pet's health issues after using IPs compared with participants with the low level of eHealth literacy (mean rank=4.23) ( $p=0.01$ ).

**Fig. 5** Pairwise comparison of understanding pet health issues (as a learning outcome) between pet owners with different eHealth literacy levels



There were no significant differences based on other IPs outcomes: Using recommended pet health-related websites ( $p=0.278$ ), obtaining pet health information evaluation skill ( $p=0.309$ ), changing in pet owner's health behavior ( $p=0.335$ ), and discussing with family and friends ( $p=0.362$ ) among participants with different eHealth literacy scores. Table 4 illustrates frequencies of information prescription outcomes for each eHealth literacy groups.

**Table 4** Frequencies of information prescription outcomes based on different eHealth literacy levels

		eHealth literacy scores			Total	
		Low	Moderate	High		
IP Outcomes	<b>Instrumental outcomes</b>					
	Obtaining pet health information evaluation skill	n	2	1	6	9
	Using recommended pet health-related websites	n	4	5	4	13
	<b>Learning outcomes</b>					
	Changing in pet owner's health behavior	n	1	1	5	7
	Understanding pet's health issues	n	2	4	8	14
	<b>Communication outcomes</b>					
	Discussing with family and friends about pet health information	n	3	3	0	6
	Discussing with veterinarian about pet health information	n	3	0	9	12
	<b>Total</b>	n	15	14	32	61

**Discussion**

Past studies show that low health literacy had a negative impact on the use of the internet for health information, and the adoption of online services [21], however, never addressed the role of eHealth literacy on the application of IPs. It has been suggested that with a greater awareness of the issues of health literacy, health providers will elevate the information and services they provide to patients and clients alike [22-23]. The thematic analysis of the semi-structured interviews in our case study provided new insights to veterinary information prescription research by showing that different eHealth literacy skills have different associations with the use of IPs, and the relevant outcome categories for pet owners. Although our findings show that using IP is favorable in all groups with different eHealth literacy level, there are some indications that individuals with low eHealth literacy reported fewer IP outcomes.

The outcomes of IPs included changes in pet owner's attitudes and behavior (i.e., discuss pet health information with veterinarians). A participant mentioned that "I usually refer to a website, which is written by a veterinarian I know. But IP helped me to look for way more information, in particular information that could be more easily trusted, such as animal health-related websites published by nonprofit organizations." It seemed that for those who already use the internet, the IP can help direct such pet owners to recommended reliable websites. Also, the results emphasized IP program as a way to increase pet

owners' understanding of their pets' conditions. As an example a dog owner said, "a documentary video of a dog suffering from Pyometra (on the recommended website) worried me a lot, because the vet suggested to spay my middle-aged dog early in life, but in that time I didn't care enough about this issue." However, we were unable to provide evidence of efficacy of IP in improving pet health more than pet owners' behavioral changes.

It is also worth mentioning that participants who didn't find the IPs helpful seem to be highly dependent on direct communication with their vets and have a negative attitude toward the internet health information in general. For instance, they indicated that "I need to consult the vet for all my questions and concerns," "I don't want to replace my vet with the internet," or "I only trust information which is coming from my vet."

Findings show that most participants have at least a moderate eHealth literacy (30% of them identified with low eHealth literacy scores). Pet owners' education levels significantly related to their eHealth literacy skills. Previous studies note that educational background influences eHealth literacy [15, 24-25] in some instances. Similarly, in the pet/eHealth context having a higher level of education has been associated with greater overall eHealth literacy. However, these data should be interpreted with care, as the sample size was small.

In our study pet owners with higher eHEALS scores accessed the recommended websites more and reported positive outcomes to these additional veterinary services. The result is in line with findings of a recent systematic review of information interventions to assist pet owners which demonstrates health literacy (along with human-pet bond, and veterinarian-client relationship) as one of the most influencing factors on online pet health information behavior [23]. As suggested by Huber et al., the ultimate goal of any consumer health information program, requires that individuals be health literate [6]. According to Table 3, among the 8 items of eHealth literacy skills the following skills were significantly associated with the use of IPs among pet owners:

- Health information evaluation skill (items: "I have the skills I need to evaluate the health resources I find on the internet," "I can tell high quality health resources from low quality health resources on the internet")

- Health information application skill (items: "I know how to use the internet to answer my questions about health," "I know how to use the health information I find on the internet to help me")

One plausible explanation for these results may be due to the fact that information evaluation skills play an important role in pet owners' decisions to seek health information from multiple resources and enable them to understand specialized terminology, compare and evaluate information, and interpret them for their pet health. Thus, it is more likely to use veterinarian's information prescription and suggested websites.

The level of eHealth literacy is significantly related to the veterinarian-patient communication outcome and learning outcome. In other words, clients with a higher score of health literacy indicated more often that they would consult with their vet about online health information they found via IP and they seem more aware of their pet's health status.

Finally, these results suggest several opportunities for information specialists and librarians to become more active in different settings: veterinary clinics, veterinary schools, animal hospitals, and private sectors. Based on existing literature, it is obvious that the IP programs can be effective if librarians are used in the training process, targeting the appropriate audiences, and providing assistance to patients searching for health information online [26]. Therefore, veterinary librarians, as well as community librarians, can play a supportive role by providing evidence-based, accurate, up-to-date information to veterinarians and directly to veterinary clients [6-8, 23, 27]. For example, librarians can provide expert advice to veterinary clinical teams evaluating their patient education products and processes. They can help to raise awareness on animal health information quality and impact of veterinarian-directed IP especially among low health literate owners. Librarians can directly perform IP practices in animal hospitals or be involved in training the vets to use the IP since they are more engaged with pet owners. A good example of direct engagement of librarians with patients is the Info Rx program of the University of Virginia Health System where they measure long-term effects of the library service for consumer health information [28]. Also, the University of Tennessee Libraries has launched a portal of services for the veterinary practice team [16], which offers resources for techniques to evaluate what veterinary clients find on the internet,

high quality and easy-to-read veterinary medicine website, and templates for IP program.

## Conclusion

Information prescription is increasingly considered as indispensable in animal health care services. Developing countries like Iran also have perceived its significant role in pet owner's health outcomes. While the aim of IP is to help to assess the quality of online health information, inadequate eHealth literacy of pet owners can prevent the application of IP to understand and evaluate online pet health information.

Limitations to the current study include a limited number of pet owners and the gathering data tools used in this research. Obtaining a larger and more diverse sample of pet owners is a possible avenue for future research. Also, open-ended interview questions and coding is subjective to the interpretation of the team and may be interpreted differently by other researchers.

eHealth literacy scale (eHEALS) is based on the individual's perception about their knowledge, skills, or feelings, and does not identify the true competence of their eHealth literacy. It is possible that pet owners who were interviewed could have overestimated their eHealth literacy abilities. A recent study shows that there is a moderate association between perceived and performed eHealth literacies which indicates that they should be assessed separately [17].

Another limitation is that the reported results are important for pet owners who have a positive overall attitude towards the internet and online health information. This study cannot help us to understand whether IP outcomes are important in improving the perception and behavior of individuals who do not use the internet.

## Acknowledgements

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## Appendix A

### Topic list qualitative follow-up interview about veterinarian's prescribed information

Probes (in italics) were used only if the interviewee did not mention the topic spontaneously.

Question 1. Could you tell me how many times have you used veterinarian's prescribed information?

- *Did you check recommended websites?*
- *What were they about?*
- *Can you describe them?*
- *Why did you decide to use them?*
- *Could you describe what you did?*
- *What was the reason for not using IP?*

Question 2. Did you encounter any problems during using the information prescription or recommended websites?

- *What kind of problems?*
- *How did you solve them?*

Question 3. Do you think that the information prescription was useful?

- *Are you satisfied with IP?*
- *How much of it was helpful?*
- *Will you use IP in the future?*
- *Was it useful in understanding your pet health issue? How?*
- *Did you discuss what you found online with a veterinarian (e.g. your physician or pharmacist)? Why (not)?*
- *Did it have any effect on your pet health/ disease? How?*
- *Did it change your health behavior about your pet?*

Question 4. Overall, how much do you trust the information prescription and recommended websites?

- *Why?*
- *How do you evaluate online health information on the recommended websites?*
- *Can you say some aspects that are important in making online information credible for you?*