



## **The Awareness and Perception of Health Care Specialists about Precision Medicine**

**Nehad J. Ahmed<sup>1\*</sup>, Abdulrahman S. Alrawili<sup>2</sup>, Faisal Z. Alkhawaja<sup>2</sup>  
and Mohammad Javed Ansari<sup>3</sup>**

<sup>1</sup>Department of Clinical Pharmacy, College of Pharmacy, Prince Sattam Bin Abdulaziz University, Alkharj, Saudi Arabia.

<sup>2</sup>College of Pharmacy, Prince Sattam Bin Abdulaziz University, Alkharj, Saudi Arabia.

<sup>3</sup>Department of Pharmaceutics, College of Pharmacy, Prince Sattam Bin Abdulaziz University, Alkharj, Saudi Arabia.

### **Authors' contributions**

*This work was carried out in collaboration among all authors. Author NJA designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors NJA, ASA, FZA and MJA managed the analyses of the study and managed the literature searches. All authors read and approved the final manuscript.*

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### **ABSTRACT**

**Aim:** There are a small number of studies about the populations' knowledge and perceptions on precision medicine in Saudi Arabia till now. Therefore, this study aimed to assess the awareness and knowledge of health care specialists about precision medicine in Saudi Arabia.

**Methodology:** This study was a cross sectional study that included an online survey targeting health care specialists. The survey was converted to an online survey using google forms.

**Results:** More than half of the participants have heard about the different terms of precision medicine. Most of the health care specialists in the present study said that they have an insufficient knowledge about precision medicine (68.00%). Additionally, most of them said that they are interested to learn more about precision medicine and showed a positive attitude about it.

\*Corresponding author: E-mail: [n.ahmed@psau.edu.sa](mailto:n.ahmed@psau.edu.sa), [pharmdnehadjaser@yahoo.com](mailto:pharmdnehadjaser@yahoo.com);

**Conclusion:** The present study found that health care specialists had a insufficient knowledge about precision medicine but they are interested to learn more about this field. Therefore, more training and awareness programs about precision medicine are needed to ease its introduction in Saudi Arabia.

*Keywords: Awareness; healthcare specialists; knowledge; precision medicine.*

## 1. INTRODUCTION

Precision medicine aims to provide tailor-made treatment and prevention approaches for defined groups of individuals. The European Health Ministers defined it as: A medical model using characterization of individuals' genotypes and phenotypes for tailoring the correct therapeutic strategy for the correct person at the correct time, in addition to determining the predisposition to disease and delivering a timely and targeted prevention [1].

Precision medicine refers to the evolving discipline that combines genetic, environmental and clinical data to provide optimal healthcare services based on the correct diagnosis and treatment per the needs of patients. It relies significantly on the genetic sequencing of patients and compares them with their clinical data to help in expecting the future prognosis [2-7]. Actually, this field has grown intensely in the preceding years to include other diagnostically essential parts including the use of genomic biomarkers in predicting the future risks on health [7-10].

Precision medicine is important to support the prevention and the management of diseases and also to deliver optimal and targeted healthcare services that lead to achieving better outcomes [10-12]. Precision medicine is considered a relatively new discipline nonetheless growing evidence is supporting its implementation these days [13,14]. Numerous studies reported that precision medicine produced a significant reduction in the burden of several diseases. For example, it caused a 34% decrease in chemotherapy administration in women suffering from breast cancer [15,16]. Besides, it is also thought that precision medicine prevents the occurrence of thousands of strokes yearly if a genetic test was conducted before the beginning of treatment [15,17].

As precision medicine discipline is developing rapidly and contributing to vital improvements in the diagnosis and the management of both

diseases, national efforts were carried out by the Saudi Human Genome Project to put genomic research basis and to operationalize the evidence based precision medicine in Saudi Arabia [18]. However, these arrangements must be supported by the national surveys that evaluate the willingness of the populations for this discipline [19]. This study included health professional not the public because this topic is a new medical topic so it is more important for health care professionals than other persons.

There are a few studies about the knowledge of the health care professionals and the publics on precision medicine in Saudi Arabia till now that included primary care physicians and the public [19,20]. So, this study aimed to assess the awareness and the knowledge health care specialists regarding precision medicine in Saudi Arabia.

## 2. METHODOLOGY

This study was a cross-sectional study that included a survey targeting health care specialists in different cities in Saudi Arabia. The survey was adapted from a previous study [19]. The survey was translated to Arabic and after that it was validated and converted to an online form using google forms. It was distributed to be completed by health care providers using Instagram and WhatsApp.

This survey included 3 parts: personal data of health care professionals, health care professionals' knowledge about precision medicine and health care professionals' perception about precision medicine. We use online form to ease the collection of the data due to the spreading of corona virus disease.

The survey included health care professional. workers in other non-health occupations were excluded. Furthermore, the incomplete surveys were excluded from the study. Some questions could be answered by more than 1 answer and as a result the total percentages for these questions could be more than 100%. The data were collected and analyzed using Excel sheet

and represented as a frequencies and percentages.

### 3. RESULTS AND DISCUSSION

The survey was completed by 50 respondents. Nearly 66.00 % of them were females and the age of about 86.00 % of them was less than 30 years old. Most of them were single (88%). Personal data of health care professionals are shown in Table 1.

The health care professionals' knowledge about precision medicine is shown in Table 2. More than 50% of the respondents said that they had not heard about precision medicine and only 46.00 % of the participant said that they heard the term precision medicine. Approximately half of the healthcare professions heard the terms 'individualized care', 'healthcare reform' and 'pharmacogenomics', however, only 32.00 % of them had good knowledge about precision medicine.

In general, more than half of the respondents have heard about the different terms regarding precision medicine (precision medicine, pharmacogenomics, healthcare reform and individualized care) as shown in Fig. 1.

Altayyari et al. reported that, more than 60% of the respondents have heard about precision medicine and relevant terms [19]. Lee et al stated that approximately 28 % of the respondents were fully aware of precision medicine [21].

Most of the health care professionals said that they have a poor knowledge regarding precision medicine (68.00%). Similarly, Altayyari et al reported that about 8 % of the respondents scored their level of knowledge about precision medicine at "extremely knowledgeable" and nearly 12% scored their knowledge level at "moderately knowledgeable" [19].

Approximately 76.00% of the participants said that they are interested to learn about precision medicine and about 90.00 % of them said that they would like to know if they are at high risk of developing different chronic diseases. Moreover, 62.00 % of the respondents reported that they are interested in undertaking a genetic test.

The most important value of precision medicine was reducing the impact of diseases through preventive medicine (46.00%) followed by

tailoring treatment and predicting the effect of the medication before using it (32.00%). In contrast to that, Altayyari conducted a study about the knowledge and awareness on personalized medicine among medical students medical and reported that nearly 35% of the students agreed that most valuable benefit to them was 'predicting what disease they may get in the future' [19]. Most of the respondents said that they don't take any education or training about precision medicine (90.00%) and about 88.00 % of them think that all health students should take a course about precision medicine during their study.

The majority of health care professionals (66.00%) said that it is important to learn more about all issues around precision medicine including the basic information, ethical implications, costs, general Availability and the success of the approach. Health care professionals' perception about precision medicine is shown in Table 3.

Most of the participants in the present study were interested to learn about precision medicine and showed a positive attitude about it. Similarly, Altayyari et al reported that about 63 % of the students in their study were interested to learn about precision medicine [19]. Lee et al reported that approximately 90% of the participants in their study showed a positive attitude towards personalized medicine [21]. In addition, similar to the results of the present study; Altamani stated that the unsatisfactory degree of precision medicine knowledge was observed in about 88% of primary care physicians, while, good enthusiasm (70.84%) and favorable attitudes (51.39%) have been detected amongst them [20]. Around 88.00% of the respondent said that all of the students in health colleges should take a course about precision medicine in their university studying. Similarly, Altayyari et al informed that about 82% of students were interested in attending grand rounds focusing mainly on precision medicine [19]. In the present study, most of the respondents said that all issues around precision medicine are important. Altayyari et al reported that the most important topic about precision medicine was the basic information including tools, definitions and benefits (29.4%), followed by the success of the approach (23%) [19].

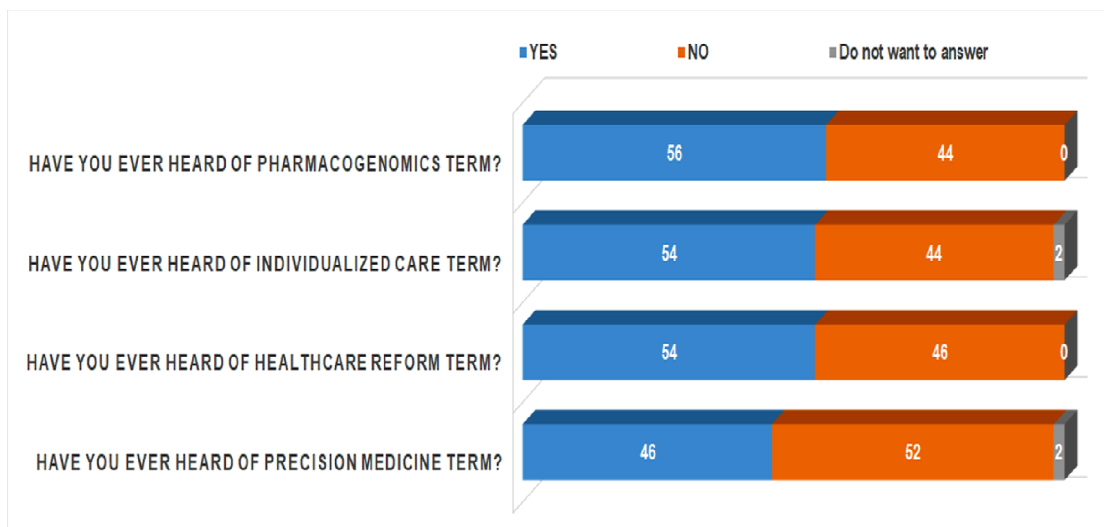
The main limitation in this disease was that only few health care professionals responded to the present survey.

**Table 1. Personal data of health care specialists**

Variable	Category	Number	Percentage
<b>Gender</b>	Male	17	34.00
	Female	33	66.00
<b>Age</b>	Less than 30	43	86.00
	More than 30	7	14.00
<b>Marital status</b>	Single	44	88.00
	Married	6	12.00

**Table 2. The knowledge of Health care specialists about precision medicine**

Variable	Category	Number	Percentage
Have you ever heard of precision medicine term?	Yes	23	46.00
	No	26	52.00
	I don't want to answer	1	2.00
Have you ever heard of Healthcare reform term?	Yes	27	54.00
	No	23	46.00
	I don't want to answer	0	0.00
Have you ever heard of Individualized care term?	Yes	27	54.00
	No	22	44.00
	I don't want to answer	1	2.00
Have you ever heard of Pharmacogenomics term?	Yes	28	56.00
	No	22	44.00
	I don't want to answer	0	0.00
Rank yourself based on your perceived knowledge level about precision Medicine	Not at all knowledgeable	19	38.00
	Can't score my knowledge level	8	16.00
	Only minimally knowledgeable	7	14.00
	Moderately knowledgeable	12	24.00
	Extremely knowledgeable	4	8.00



**Fig. 1. The responses of health care specialists about precision medicine**

**Table 3. Health care specialists' perception about precision medicine**

Variable	Category	Number	Percentage
Are you interested to learn about precision medicine?	Not interested at all	2	4.00
	I am not sure	2	4.00
	Only minimally interested	8	16.00
	Moderately interested	14	28.00
	Extremely interested	24	48.00
Would you like to know if you are at high risk of developing chronic diseases based on genetic sequencing	Yes	45	90.00
	No	5	10.00
If you don't want to know if you are at high risk of developing chronic diseases, what are the reasons behind that (out of 5)	I fear to know what potential diseases were ahead of me	5	100 (Out of 5)
	I am concerned about privacy issues	1	20.00 (Out of 5)
	I am concerned about other ethical issues	1	20.00 (Out of 5)
Are you interested in undertaking a genetic test?	I am not sure	3	6.00
	Not interested at all	7	14.00
	Only minimally interested	9	18.00
	Moderately interested	9	18.00
	Extremely interested	22	44.00
Amongst these, what is the most important value of personalized medicine?	Predicting what diseases I may get in future	11	22.00
	Minimizing the impact of diseases through preventive medicine	23	46.00
	Once diagnosed with a disease, tailor treatments, predicting whether a medication is likely to help or hurt me before I ever take it.	16	32.00
Do you take any education or training about precision medicine?	Yes	5	10.00
	No	45	90.00
Do you think that all health students take a course about precision medicine in their university teaching?	Yes	44	88.00
	No	6	12.00
Issues around precision medicine to learn more about.	Basic information	8	16.00
	The success of the approach	5	10.00
	Costs	1	2.00
	General Availability	0	0.00
	Ethical implications	1	2.00
	All important	33	66.00
	Not interested	2	4.00

#### 4. CONCLUSION

The present study found that health care professionals had a poor knowledge about precision medicine but they have a positive attitude towards it, besides they are interested to

learn more about this field. Therefore, in the future, more training and more programs regarding precision medicine are needed in order to increase the awareness of health care workers about precision medicine and to ease its introduction in Saudi Arabia. Moreover, more

focus on this field should be introduced into the curricula of health colleges in the future.

## CONSENT

As per international standard or university standard, Participants' written consent has been collected and preserved by the authors.

## ETHICAL APPROVAL

It is not approval.

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## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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