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Research Paper

Applications of Nanomedicine in Iran

Economics

KEYWORDS : Nanotechnology, Application of Nanotechnology, Nanomedicine, Application of Nanomedicine and awareness.

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ABSTRACT

The present paper attempted to analyze the awareness of Iranian people about nanotechnology and nanomedicine and their applications. Primary qualitative data used for the study with the help of Probit model. Iranian people have sufficient awareness about nanotechnology and moderate awareness about nanomedicine but their awareness about applications of nanotechnology and nanomedicine is inadequate. Therefore, considering the significance of nanomedicine application in providing health care as a new technology in prevention, diagnose and treatment of diseases with numerous of advantages such as high efficiency, less side effects, easiness of use and reduction of duration of treatment, the study suggest to increase the awareness among the people about the usefulness of nanotechnology and nanomedicine with effective implementation of nanomedicine practices in hospitals of Iran.

Introduction:

Nanotechnology is more significant revolution in the world after industrial revolution and communication and information technology. Nanotechnology is the manufacturing and utilize of functional structures planned from atomic or molecular scale with minimum characteristic dimension estimated in nanometers. Nanotechnology is quickly expanding worldwide and is appearing as one of the key technologies of the 21st century that is anticipated to enable developments across a vast range of industrial sectors to profit people. Nanotechnology has the potential to profoundly change our economy and to improve our standard of living, similarly to the impact information technology had in the past two decades. Numerous products featuring unique properties of nanoscale materials are already available to consumers and industry today. (Lane, 2005). Nanotechnology will influences all branches of science such as: physics, chemistry, electronic, computer, aerospace, biology, medicine ,environment, economics .For example in economics field it will impact on markets, costs, wages, employment, purchasing, investment, stock, exchange rates, asset, currencies, supply and demand . Nanotechnology may good run economic welfare or minimum be an enabling factor in forming efficiency and universal competitiveness. One of the most important applications of nanotechnology is medicine field. Nanomedicine is a subfield of nanotechnology. It is often defined as the repair, construction and control of human biological systems using devices built upon nanotechnology standards. Basically, nanomedicine is the medical application of nanotechnology. Nanomedicine is the process of diagnosing, treating, and preventing disease and traumatic injury, of relieving pain, and of preserving and improving human health; using molecular tools and molecular knowledge of the human body (Robert A. Freitas, 2005). Nanomedicine or the application of nanotechnology in human health care is quickly expanding across much medical area. Because of the ongoing advances in nanotechnology expansion, there is currently much interest in many other countries world in the field of nanomedicine and in the concepts nanotechnology will have for the future in the human healthcare section.

Review of literature:

Nano is a prefix meaning "extremely small." When quantifiable, it translates to one-billionth, as in the nanosecond. Nano comes from the Greek word "nanos," meaning "dwarf." (Rouse, 2007). Nanotechnology is the science and technology of small things, in particular things that are less than 100nm in size. Nanotechnology combines solid state physics, chemistry, electrical engineering, chemical engineering, biochemistry and biophysics, and materials science. (Lynn Rathbun, 2005). Nanotechnology is a multidisciplinary science that looks at how we can manipulate matter at the molecular and atomic level (Strickland, 2010). Nanoeconomics is the branch of economics that studies the creation and distribution of wealth related to the technological changes brought by nanotechnology (Cupoli, 2007) .Nanomedicine is the application of nanotechnology (the engineering of tiny machines) to the prevention and treatment of disease in the human body. This evolving discipline has the potential to dramatically change medical science. Established and near-future nanomedicine applications include activity monitors, chemotherapy, pacemakers, biochip s, OTC tests, insulin pumps, nebulizers, needleless injectors, hearing aids, medical flow sensors and blood pressure, glucose monitoring and drug delivery systems. (Freitas, 2007).

Methodology:

The field study was aimed at capturing the opinion and perception of respondents on Importance of nanotechnology and nanomedicine in improving the health facilities in order to full fill the requirements of Iranian people. The present study uses primary data. The analytical tools and techniques have been used for analysis and interpretation of data. In this paper an attempt has been made to analyze the field survey data collected from hospitals in Iran. There were two types of hospitals considered for survey; SSO hospitals and hospitals under contract of SSO. For the analysis the statistical techniques; Probit models have been used.

Perception on Use of Nanotechnology and Nanomedicine:

The field study was aimed at capturing the opinion and perception of respondents on Importance of nanotechnology and nanomedicine in improving the health facilities in order to full fill the requirements of Iranian people.

Awareness of Nanotechnology:

Individual's awareness of nanotechnology has been analyzed based on organization, type of respondents, age, gender, length of education. The binary Probit model was used for the analysis.

$$P = \beta_0 + \beta_1 Or + \beta\ 2TR + \beta_3 Ag + \beta\ 4Gr + \beta_5 LE + e$$

Where,

P = Perception of respondents on nanotechnology

P= -2.072 -0.020Or +0.628TR -0.018Ag -0.067Gr +0.158 LE

Z= (-2.13) (-0.11) (2.79) (-1.78) (-0.36) (+0.95)

Sig= (0.033) (0.912) (0.005) (0.075) (0.717) (0.003)

Number of obs = 300 LR chi2 (5) = 146.48 Prob > chi2 = 0.0000 Pseudo R2 = 0.3850s

The Probit model was used to estimate the impact of dimensions on respondents' perception on awareness of nano. It has been found from the results that the constant parameter has negative sign and it is significant. The organization has negative sign and it is not significant. The type of respondents has positive sign and it is significant; therefore the doctors have more

awareness about nanotechnology compared to medical staff and patients. The age has negative sign and it is significant; thus the young respondents have more awareness about nanotechnology in comparison to older. The gender has negative sign and it is not significant. Length of education has positive sign and it is significant; those having higher level of education also had more awareness about nanotechnology. Accordingly, sixty seven percent of respondents have awareness about nanotechnology. Thus, the awareness of people about nanotechnology is high, irrespective of organization and gender.

Awareness of Nanotechnology Applications:
Awareness of nanotechnology applications has been analyzed based on organization, type of respondents, age, gender, length of education. The binary Probit model was used for the analysis.

P = β0 + β 1Or + β 2TR+ β 3Ag + β 4Gr+ β 5LE + e
Where,
P = Perception of respondents on applications of nanotechnology
P= -1.376 -0.235Or +0.319TR -0.010Ag -0.883Gr +0.070 LE
Z= (-1.95) (-1.47) (+1.62) (-1.19) (-0.55) (+1.53)
Sig= (0.051) (0.141) (0.105) (0.233) (0.581) (0.125)
Number of obs = 300 LR chi2 (5) = 43.82 Prob > chi2 = 0.0000 Pseudo R2 = 0.1170

The Probit model was used to estimate the impact of dimensions on respondents' perception on applications of nanotechnology. It has been found from the results that the constant parameter has negative sign and it is significant. The organization has negative sign and it is not significant. The type of respondents has positive sign and it is not significant .The age has negative sign and it is not significant. The gender has negative sign and it is not significant. Length of education has positive sign and it is not significant. Therefore, only thirty one percent of respondents have awareness about application of nanotechnology. Thus the awareness of people about nanotechnology applications is less, irrespective of organization, type of respondents, age, gender and length of education.

Awareness of Nanomedicine:
Individual's awareness of nanomedicine has been analyzed based on organization, type of respondents, age, gender, length of education. The binary Probit model was used for the analysis.

P = β0 + β 1Or + β 2TR+ β 3Ag + β 4Gr+ β 5LE + e
Where,
P = Perception of respondents on nanomedicine
P= -3.137 +0.046 Or +1.137TR -0.009 Ag -0.063Gr +0.092 LE
Z= (-3.37) (+0.25) (+5.05) (-0.9 0) (-0.35) (+1.72)
Sig= (0.001) (0.800) (0.000) (0.369) (0.728) (0.086)
Number of obs =300 LR chi2 (5) = 163.30 Prob > chi2 = 0.0000 Pseudo R2 = 0.3928

The Probit model was used to estimate the impact of dimensions on respondents' perception on nanomedicine. It has been found from the results that the constant parameter has negative sign and it is significant. The organization has positive sign and it is not significant. The type of respondents has positive sign and it is significant; therefore the doctors have more awareness about nanomedicine compared to medical staff and patients. The age has negative sign and it is not significant. The gender has negative sign and it is not significant. Length of education has positive sign and it is significant; those having higher level of education also had more awareness about nanomedicine. Accordingly; forty nine percent of respondents have awareness about nanomedicine. Thus, the awareness of people about nanomedicine is moderate, irrespective of organization, age and gender.

Awareness of Nanomedicine Applications:
Awareness of nanomedicine application has been analyzed based on organization, type of respondents, age, gender, length of education. The binary Probit model was used for the analysis.

P = β0 + β 1Or + β 2TR+ β 3Ag + β 4Gr+ β 5LE + e
Where,
P = Perception of respondents on applications of nanomedicine:
P= -4.411 + 0.274Or +1.166TR -0.004 Ag -0.226Gr +0.117LE
Z= (-4.52) (+ 1.44) (+4.81) (-0.41) (-1.20) (+1.96)
Sig= (0000) (0.149) (0.000) (0.682) (0.231) (0.050)
Number of obs = 300 LR chi2 (5) =165.98 Prob > chi2 = 0.0000 Pseudo R2 = 0.4128

The Probit model was used to estimate the impact of dimensions on respondents' perception on application of nanomedicine. It has been found from the results that the constant parameter has negative sign and it is significant. The organization has positive sign and it is not significant. The type of respondents has positive sign and it is significant; therefore the doctors have more awareness about application of nanomedicine compared to medical staff and patients. The age has negative sign and it is not significant. The gender has negative sign and it is not significant. Length of education has positive sign and it is significant; those having higher level of education also had more awareness about applications of nanomedicine. Accordingly; thirty nine percent of respondents have awareness about nanomedicine application. Thus, the awareness of people about application of nanomedicine is relatively low, irrespective of organization, age and gender.

Conclusion:
Considering the importance of nanotechnology in medical sector and numerous advantages in diseases treatment, the present study attempted to examine the opinions of Iranian people about nanotechnology and nanomedicine. In Iran, doctors, younger people and the respondents with higher education have more awareness about nanotechnology compared to older people, less educated and patients and medical staff. The results indicated that Iranian don't have sufficient awareness about nanotechnology applications. Iranians have moderate awareness about nanomedicine and doctors and the respondents with higher education have relatively more awareness about nanomedicine. Sufficient awareness has not been found even among the doctors, highly educated young people about nanomedicine applications. considering the significance of nanomedicine application in providing health care as a new technology in prevention, diagnose and treatment of diseases with numerous of advantages such as high efficiency, less side effects, easiness of use and reduction of duration of treatment, the study suggest to increase the awareness among the people about the usefulness of nanotechnology and nanomedicine with effective implementation of nanomedicine practices in hospitals of Iran.

REFERENCE

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