Web Networks and Business Platform Models and their Reflection on Activating Pharmacovigilance in Healthcare Organizations - An Exploratory Study in Health Departments in the Northern Region of Iraq

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Abstract: The primary objective of this study is to propose and to examine the link between Web Networks (WN) and Business Platform Models (Web Platform) (WP) to enhance alertness in the Pharmacological (PH) domain during the dissemination of information and knowledge to relevant entities in the current research landscape. We thoroughly reviewed the concepts of web networks and web platforms, in relation to the contemporary business environment. Subsequently, we delve into the significance of harnessing digital platforms within business organizations. This culminates in an extensive review of platform models, ultimately leading to the development of a web platform model tailored to the specific environment and requirements of the organization under investigation. A questionnaire was designed to collect data from 156 managers/unit or department heads in the health departments of the northern region of Iraq. The research hypotheses were tested using AMOS software, and the findings were discussed in light of the results. Research conclusions and recommendations are then discussed. This research aims to identify the role of WP and its dimensions in the development and sustainability of the capabilities of the researched organizations in facing potential challenges. Additionally, it seeks to enhance PH alertness to a level that enables the researched organizations to keep pace with the rapid developments occurring in the dynamic environment in which they operate.

Keywords: Web Networks, Business Platform Models, Web Platform, Pharmacological Alertness, Health Departments in the Northern Region of Iraq.

Paper type: Research paper

Introduction

The current business environment has undergone significant and rapid technological advancements. A group of organizations has begun to embrace platform technology, facilitating interaction between product and service providers and buyers, as well as between information and knowledge providers and their beneficiaries, thereby rapidly expanding their reach (Sohaila & Bin Jamaa, 2016). Over the past decade, an increasing number of organizations have employed information and communication technology in their activities and operations. Today, organizations are shifting towards a more comprehensive concept: the web environment, web portals, and digital platforms in their operations. This shift has intensified competition, transforming these organizations into industry leaders due to their understanding of new business models, opportunities, and challenges posed by their organizational structures and operational processes, compared to traditional organizations.

Many healthcare organizations have begun to expand their use of web applications, integrating them with various social initiatives, both within and outside the organization. Consequently, web platforms, with their various dimensions and models, have become tools to address numerous challenges faced by employees and organizations alike. These platforms offer the potential to seize opportunities, extend support, and provide assistance to external stakeholders. Pharmaceutical alertness is currently a prerequisite, rather than an option, for all healthcare organizations. Achieving this necessitates the adoption of technological transformation strategies to ensure the continuity and future readiness of these organizations, enabling them to achieve a state of vigilance, awareness, and effective information dissemination during crises, especially in the context of the COVID-19 pandemic. Considering the above discussions, this research aims to focus on the role played by web networks and platforms in activating pharmaceutical alertness and the official functions of organizations.

The significance of this research lies in assisting organizations in facing exceptional circumstances and achieving success in a world characterized by continuous development, significant technological changes, intense competition, and the diversity and contradictions of information. This proposed platform becomes the foundation upon which the researched organization relies to achieve pharmaceutical alertness and disseminate accurate information interactively, thereby gaining a competitive advantage, enhancing its capabilities, and achieving its objectives.

Literature Review

This section discusses the theoretical foundations for the research. Drawing on the literature on Web networks, business platform models, and Pharmacovigilance, this study seeks to establish and test a theoretical, as explained below.

Web Networks

The World Wide Web (WWW) can be defined as an information system where web resources and documents are identified using Uniform Resource Locators (URLs). These resources are transferred through the Hypertext Transfer Protocol (HTTP), allowing anyone with a web browser to access them. Additionally, web resources can be published on the WWW using web servers. Web browsers access the World Wide Web via the internet, and it is commonly referred to simply as "the web." The web plays a crucial role in facilitating communication between internet users and empowers users to contribute to digital content. It fosters collaboration among internet users and organizations in building electronic communities (Al-Ruwaili and Al-Suaidi, 2015). Web networks, particularly in the era of Web 2.0, have significantly enriched interactive services and applications. This directly impacts content management and digital services across organizations (Ahmed, 2010).

The evolution of web generations, coupled with the integration of intelligent technologies and the shift from "pull" to "push" mechanisms, is evident in Web 4.0. In this context, the web proactively delivers information solutions that users require automatically. These advancements, including the emergence of sentient web technologies and the widespread use of smartphones, have led to timely information delivery (Al-Muti and Al-Khurainj,2010).

From the researchers' perspective, organizations need to reconsider how they deliver services to ensure business continuity and enhance organizational resilience within the rapidly evolving technological landscape. This is particularly important in responding to exceptional circumstances and adapting to changing situations, which organizations may face in light of web developments and the shift toward business platform models.

Business Platform Models (Web Platforms

Through a review of the literature on the subject, the researchers noted multiple definitions of the concept of Platform Business Model (including web platforms), one of them (Ruggieri, et. al,2018) defines a business platform as a new business model that enables the connection between individuals, organizations, and resources through technology in an interactive system, leading to the creation of significant value that can be shared. While Some others define them purely from a technical standpoint, others view them from a philosophical perspective in which technology is employed to provide new business models used by organizations to gain an advantage, adapt to changes, or address crises. This latter perspective aligns with the researchers' vision of defining electronic platforms as interactive environments that employ Web 2.0 technology, combining the features of content management systems with social networking. These platforms enable entities to disseminate information, interact, distribute roles, exchange ideas, and opinions through various technologies to create high-quality value (Al-Qaysi, et.al, 2020).

Fatolahi et al. (2011) defined web platforms as one of the technology models sharing common characteristics with web applications. Implementing them requires passing through various stages. Meanwhile, Escrito (2018) pointed out that web platforms are fundamentally web-based in structure. They typically consist of web applications, mobile applications, and other external services that integrate and interact to generate value.

Helmond (2015) defined Web 2.0 as the web as a platform, a phrase used to situate the web as a “robust development platform” in which “websites become software components”. Web platforms have proven their effectiveness, worthiness, and superiority over traditional economic systems of regular companies that have prevailed for centuries. This qualitative leap in the history of the global economy will shape a new future. As an inevitable result of this escalating platform revolution, the near future promises an era that is more intelligent, information-based, and interconnected—the platform era

Web Platform Models

Recent technological developments have given rise to new business models built on digital platforms. Web platform models refer to a virtual social environment that connects users, enhances networking relationships, and defines the conditions for exchanging and sharing value among parties based on the nature of the interactive relationship that binds them, as well as the role or function that each party plays (Täuscher & Laudien, 2018).

According to Al-Swaidi (2020), platforms are a three-sided model consisting of three main poles: the producer, the consumer, and the platform itself. The platform provides these interactors with a virtual infrastructure and a set of rules that simulate a multi-party market. Value is exchanged within the platform through interactions and network effects among external partners.

Ahmed and Khalef (2019) pointed out that the electronic platform model, which is a web-based platform, consists of three elements: the infrastructure as the material and software foundation of the platform, the human element, which includes producers, consumers, platform management and staff, stakeholders, and third parties who offer a range of services, including products, knowledge, advice, collectively referred to as "content." Content influences the enhancement of the organization's competitive advantage in a study conducted on a group of private schools, and it can be considered one of the web platform models.

Neittaanmäki et al. (2016) highlighted that the web platform model consists of three main elements: channels, capabilities, and essential integration points. Each of these elements includes sub-elements that interact, benefiting from the networking feature, to achieve mutual value through time-saving, sharing digital resources, and a set of web tools that suit a large segment of users and organizations (de Reuver, *et.al.*, 2018).

As Gawer (2021) and (Mlčúchová,2022), it indicated business platform models can be classified into transaction platforms, innovation platforms, and hybrid platforms or integrated and Investment platforms based on three boundaries: firm scope, meaning the owned assets and executed activities, the Platform sides' configuration and composition aspects, referring to the set of customers who can access the platform, and digital interfaces, which means the degree of openness and the balance of data exchange.

In light of the above, the researchers believe that the mentioned models share several points while differing in others, depending on the nature of each study. This prompted the researchers to construct a hybrid model that relies on a combination of the four models. This hybrid model is designed to serve the nature of the research and the studied organization, to achieve the desired results, as illustrated in Figure 1.

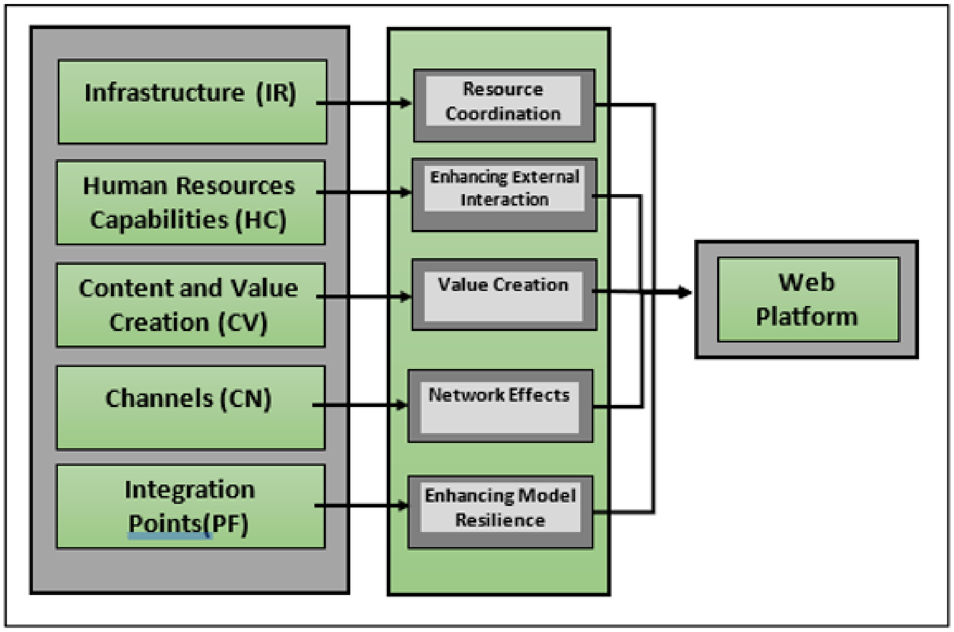


Figure 1: Proposed Business Platform Model

Pharmacovigilance - Concept, Importance & Objectives

Pharmacovigilance is the concept that has emerged in response to the negative aspects of pharmaceutical marketing and the warnings issued by the World Health Organization. It addresses various issues such as counterfeit and smuggled drugs, policies of pharmaceutical companies in third-world countries, the absence of effective national pharmaceutical policies, inadequate regulatory frameworks, the weakness of domestic pharmaceutical industries, registration of drugs without scientific standards, unnecessary drug imports, uncontrolled distribution of drugs, the marketing of withdrawn medicines in global markets, and unethical drug promotion.

All of these factors have prompted researchers to consider the concept of pharmacovigilance within the context of post-marketing and the activities of government health organizations, especially in light of rapid technological advancements. The World Health Organization defines pharmacovigilance as the science that studies the detection, evaluation, understanding, and prevention of adverse drug effects and any other issues arising from drug use (Aronson, 2009; Edwards& Aronson, 2000).

Pharmacovigilance is also defined as a system used by organizations to fulfill their legal duties and responsibilities related to drug vigilance. It is designed to monitor the safety of licensed medical products and evaluate their benefits compared to the risks that may result from their use (Montastruc, 2011). Thus, it is considered synonymous with post-marketing surveillance of drugs. Surveillance and monitoring differ in that surveillance includes populations, while monitoring involves individuals. Pharmacovigilance reflects real-world drug vigilance and has recently been defined as a form of public health consisting of a set of continuous processes for systematic data collection, aggregation, querying, analysis, and interpretation of data on benefits and harms. This includes spontaneous reports, electronic health records, and trial data (Aronson et al., 2012).

The importance of pharmacovigilance has evolved into a comprehensive system encompassing the holistic assessment of risks and benefits. This system is essential at both the individual patient level and the population level (epidemiological perspective) as it provides the necessary tools for preventing, detecting, monitoring, and countering adverse drug reactions. Recently, the European Medicines Agency (EMA) adopted pharmacovigilance legislation in EU Regulation No. 1235/2010. This legislation marks the most significant regulation of human medicines in the European Union since 1995 and became effective as of July 2012. It significantly emphasizes the role and objectives of pharmacovigilance in "promoting and protecting public health by reducing medication errors and improving their use" (Shetty Dalal, 2011).

As highlighted by Aronson (2012), the importance of pharmacovigilance lies in "identifying previously unrecognized harmful drug interactions, providing brief descriptions of relative adverse reactions to drug products, and conveying appropriate information to healthcare professionals." Therefore, the primary goal of pharmacovigilance is to detect a signal (i.e., identify a potential risk event) (Poluzzi, et al., 2010). The World Health Organization defines a "signal" as "information that arises from one or multiple reports suggesting a potential causal relationship between an adverse event and a drug, the relationship being previously unknown or incompletely documented" (Aronson, 2009).

In pharmacovigilance, a signal is more than just statistical data collection. It comprises hypotheses along with data and arguments, both in favor of and against the hypothesis. It may also refer to results of an experimental nature. Importantly, it should be noted that a single report or a few reports can sometimes form a signal. This is the case when the reports are well-documented and of high quality, and they may not necessarily require further formal confirmation (Hauben, 2007).

To gather information arising from a single report or multiple reports (including observations and experiments), it should be considered in generating the signal. After raising suspicion, it should be supported by the accumulation of additional data (signal strengthening). The final step involves confirming and assessing the relationship between risks and benefits (quantitative signal assessment). Each step in this process involves a combination of individual case reports, analytical techniques, and the relative importance of these risks. The actions taken may vary depending on the priority assigned to the signal. Prioritization is primarily based on evaluating the impact on public health, the severity of the adverse event, and regulatory measures that can range from ongoing monitoring of the signal over time (referred to as "wait and see" vigilance) to product withdrawal from the market due to heightened risk awareness (Hauben & Aronson, 2009).

Responsibilities of Government Health Organizations and Pharmacovigilance

Government health organizations are responsible for licensing, collecting, monitoring, and preventing the harmful effects of medicines within their jurisdiction. The pharmacovigilance system, like any system, has its structures, processes, and outcomes, and for each specific process, there is a state of pharmacovigilance. Therefore, holders of marketing authorization must ensure that they have an appropriate pharmacovigilance system in place to take responsibility for their products in the market and to ensure appropriate actions are taken when necessary. Hence, marketing authorization holders must ensure the provision of all relevant information and balance the risks and benefits of the medical product to the pharmacovigilance department, medical devices, and the Ministry of Health (Poluzzi, 2010).

Marketing authorization holders must have a permanent and continuous pharmacovigilance officer, who can be either within the organization or in local medical factories, responsible for establishing and maintaining the pharmacovigilance system for the organization.

Based on the above discussions, the following hypotheses are developed:
H1: There is a direct and significant relationship between WN and WP.

H2: There is a direct and significant relationship between WN and PH.
H3: There is a direct and significant relationship between WP and PH.
H3a: There is a direct and significant relationship between the dimensions of WP and PH.
H3b: The dimensions of WP vary in their impact on PH.
H4: “WP” mediates the link between WN and PH.

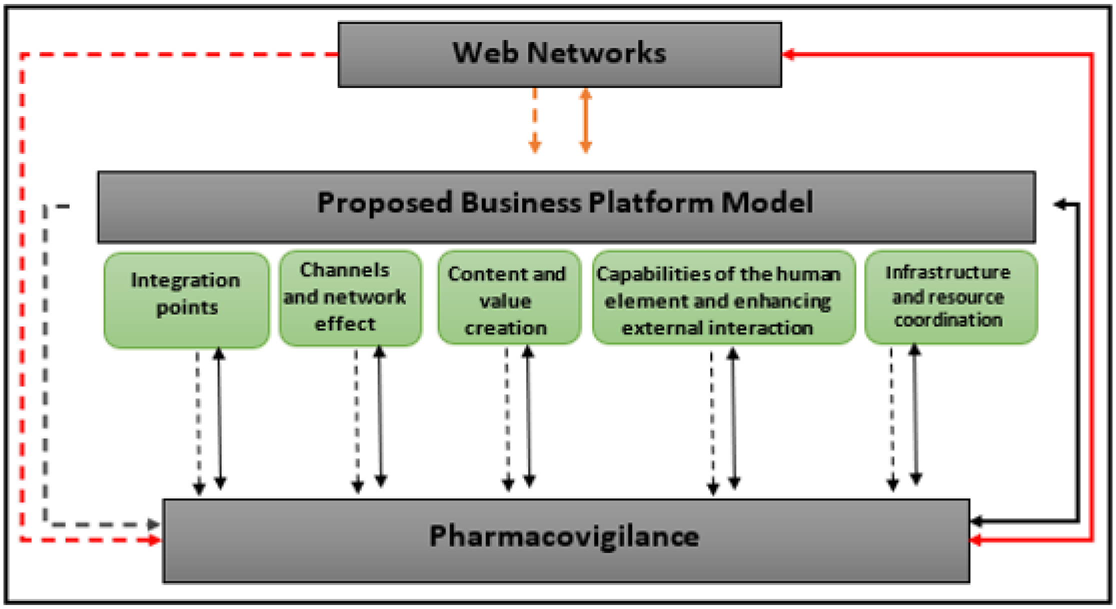
Methodology

The researchers began field research on June 29, 2023, distributing questionnaires and collecting data until September 3, 2023. The research was conducted in healthcare organizations - health directorates in the Northern region of Iraq. A set of statistical methods was used to achieve the current research objectives and test its hypotheses, relying on the statistical software "AMOS" for analysis.

The researchers aimed to address the topic of web networks and business platform models in activating pharmacological alertness in line with the rapidly changing environmental developments in customer demands and society. Therefore, healthcare organizations were selected as the model for this research. The researchers employed purposive sampling to select individuals working in the researched field.

Data was collected of a sample consisting of 165 individuals, primarily employees, including managers, whose questionnaires were collected. A total of 156 questionnaires were retrieved, representing 94.54% of the selected sample's total population.

The research requires the design of a unidirectional hypothetical model. Figure 2 illustrates the logical relationships between the research variables, which were developed in light of the research problem and its objectives. A diagram was constructed to define the variables along with their relationships.



Correlation Relationship ⟷
Impact Relationship ←-----------

Figure 2: Research Model

Results and Discussion

Results of Descriptive Statistical Analysis for the Web Networks (WN) Dimension
Table 1 presents the results of descriptive statistical analysis for the Web Networks dimension of the research sample, indicating the central tendency parameters, the level of dispersion of these responses from the hypothetical mean of the measurement tool (3), as well as the analysis of the relative importance of the sub-dimensions in terms of their weighted percentage. The (WN) dimension for the surveyed sample achieved an overall mean of (4.00), with a standard deviation of (0.749), and a weighted percentage of (80%), as illustrated in the table.

Table 1: Statistical Description of Web Networks Dimension Items

NO.	Mean	Standard Deviation	W. Percentage	Rank
X1	4.24	0.634	84.8	1
X2	4.15	0.698	83	2
X3	3.97	0.662	79.4	6
X4	4.08	0.662	81.6	4
X5	3.99	0.815	79.8	5
X6	3.85	0.818	77	9
X7	3.79	0.827	75.8	10
X8	3.97	0.850	79.4	7
X9	4.12	0.773	82.4	3
X10	3.88	0.753	77.6	8
Overall rate (WN)	4.00	0.749	80	

Descriptive Statistical Analysis Results for Variables of Business Models Platforms (WP) Dimension

Table 2 presents the descriptive statistical analysis results for variables of the Business Models Platforms dimension for the research sample, including the central tendency parameters of their responses, the level of dispersion of these responses around the hypothetical mean of the measurement tool set at 3, and the relative importance analysis of the sub-variables based on their weighted average.

The Integration Points (PF) sub-variable for the research sample achieved an overall mean of (3.98) with a standard deviation of (0.832) and a weight of (79.6%), ranking as the first dimension. Meanwhile, the Channels and Network Effects (CN) sub-variable for the research sample obtained an overall mean of (3.92) with a standard deviation of (0.739) and a weight of (78.4%), ranking as the second dimension. The Human Element Capabilities and External Interaction Enhancement (HC) sub-variable achieved an overall mean of (3.88) with a standard deviation of (0.745) and a weight of (77.6%), ranking as the third dimension. The Infrastructure and Resource Coordination (IR) sub-variable obtained an overall mean of (3.86) with a standard deviation of (0.791) and a weight of (77.2%), ranking just before the last. Lastly, the Content and Value Creation (CV) sub-variable for the research sample achieved an overall mean of (3.82) with a standard deviation of (0.829) and a weight of (76.4%), ranking as the last dimension. Overall, the Business Models Platforms variable for the research sample attained an overall mean of (3.89) with a standard deviation of (0.787) and a weight of (79.6%), as illustrated in the Table 2.

Table 2: Descriptive Statistics for Business Models Platforms Variables

NO.	sub-variables	Mean	Standard Deviation	W. Percentage	Rank
Y11	IR	3.74	0.843	74.8	1
Y12		3.85	0.844	77	4
Y13		3.92	0.795	78.4	2
Y14		3.91	0.757	78.2	3
Y15		3.85	0.720	77	5
Overall rate		3.86	0.791	77.2	
Y16	HC	3.93	0.683	78.6	1
Y17		3.80	0.830	76	4
Y18		3.87	0.751	77.4	3
Y19		3.92	0.723	78.4	2
Overall rate		3.88	0.745	77.6	
Y20	CV	3.83	0.746	76.6	2
Y21		3.84	0.766	76.8	1
Y22		3.79	0.921	75.8	4
Y23		3.80	0.883	76	3
Overall rate		3.82	0.829	76.4	
Y24	CN	3.84	0.783	76.8	4
Y25		3.96	0.699	79.2	1
Y26		3.94	0.751	78.8	2
Y27		3.92	0.723	78.4	3
Overall rate		3.92	0.739	78.4	
Y28	PF	3.94	0.885	78.8	3
Y29		4.01	0.861	80.2	2
Y30		4.03	0.762	80.6	1
Y31		3.93	0.820	78.6	4

Overall rate	3.98	0.832	79.6	
Overall rate (WP)	3.89	0.787	79.6	

Descriptive Statistical Analysis Results for the Pharmacovigilance (PH) Dimension

Table 3 presents the descriptive statistical analysis results for the Pharmacovigilance dimension for the research sample, including the central tendency parameters of their responses, the level of dispersion of these responses around the hypothetical mean of the measurement tool set at 3, and the relative importance analysis of the sub-dimensions based on their weighted average. The Pharmacovigilance dimension for the research sample achieved an overall mean of (3.91) with a standard deviation of (0.828) and a weight of (78.2%), as illustrated in the table.

Table 3: Descriptive Statistics for Pharmacovigilance Dimension Variables

NO.	Mean	Standard Deviation	W. Percentage	Rank
Z32	3.88	0.765	77.6	10
Z33	3.83	0.903	76.6	8
Z34	3.96	0.782	79.2	3
Z35	3.99	0.799	79.8	1
Z36	3.93	0.771	78.6	5
Z37	3.90	0.848	78	7
Z38	3.94	0.896	78.8	4
Z39	3.87	0.835	77.4	9
Z40	3.96	0.790	79.2	2
Z41	3.92	0.884	78.4	6
Overall rate (PH)	3.91	0.828	78.2	

Research Hypothesis Testing

Data supported H1 which indicated that there is a significant direct relationship between the variable “Web Networks” and the variable “Business Models” at a significance level of $\alpha \geq 0.05$. From Table 4, which illustrates the values of standardized regression coefficients, confidence intervals, and the p-value, it is observed that the relationship between the variable “Web Networks” and the variable “Business Models” was positive (H1), indicated by the positive sign of the regression coefficient, which was (0.820). This value signifies that an increase of one unit in the “Web Networks” variable leads to an increase in the “Business Models” variable by a magnitude of (0.820) units. The true value of this coefficient ranges between the lower and upper values of (0.398 – 0.893), respectively, with a standard error (S.E.) of (0.051). Additionally, it can be inferred from the p-value (0.00) that it is less than (0.05).

Table 4: Impact Analysis Values of the “Web Networks” Variable on the “Business Models” Variable

Influential variable	Impact path	The variable affecting it	Estimate	S.E.	Confidence Interval 95%		P
					Lower Bound	Upper Bound	
WN	→	WP	0.820	0.051	0.398	0.893	0.00

Based on the provided information, we accept the primary hypothesis, which states that "there is a direct and statistically significant relationship between the variable Web Networks and the variable Business Models at a significance level of α ≥0.05." The results can also be illustrated in Figure 3.

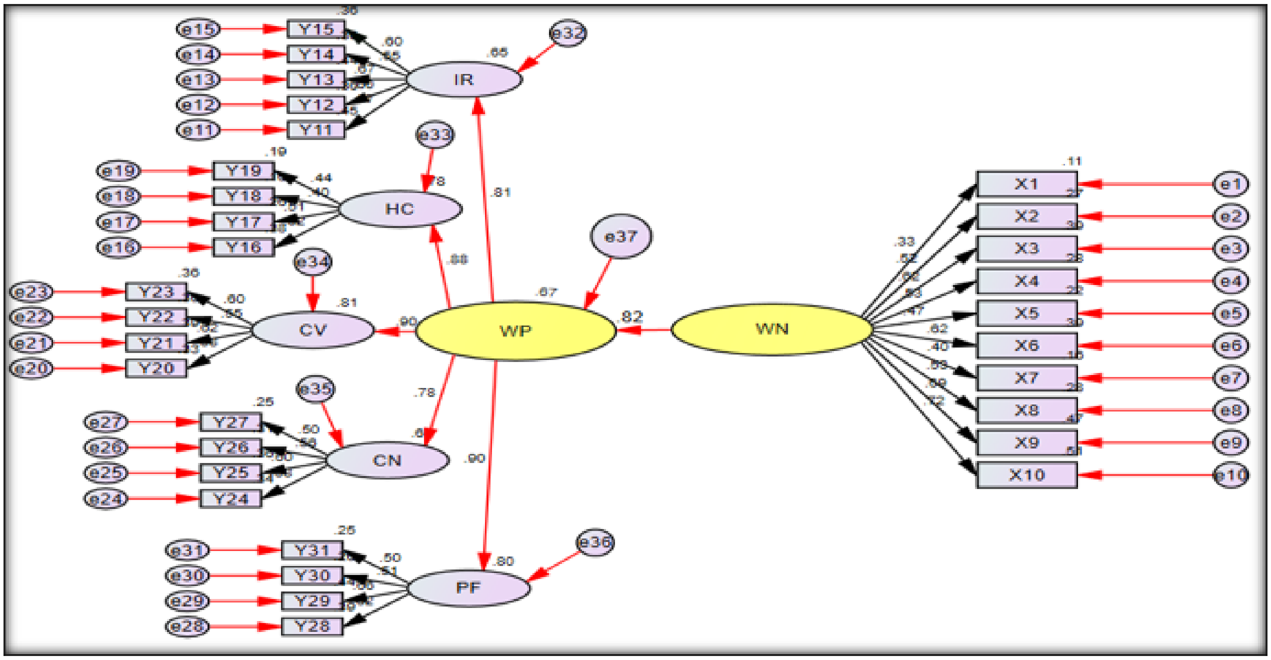


Figure 3: The Impact Relationship of the Web Networks Variable on the Business Models Variable

H2 also was found supported which represents that there is a direct and statistically significant relationship between the variable "web networks" and the variable "pharmacovigilance" at a significance level of α ≥0.05. Table 5 illustrates the values of standard regression coefficients, confidence intervals, and the P-value, it can be observed that the relationship between the "web networks" variable and the "pharmacovigilance" variable is a positive relationship. This is evident from the positive sign of the regression coefficient, which amounted to (0.670). This value indicates that an increase of one unit in the "web networks" variable leads to an increase in the "pharmacovigilance" variable by approximately (0.670) units. Furthermore, the true value of this coefficient falls within the range of the lower and upper limits, which are (0.371 – 0.686) respectively. Additionally, the standard error (S.E.) has a value of (0.022). Moreover, it can be inferred from the p-value (0.00) that it is less than (0.05).

Table 5: Values of the Impact Analysis for the Variable "Web Networks" on the Variable "Pharmacovigilance"

Influential variable	Impact path	The variable affecting it	Estimate	S.E.	Confidence Interval 95%		P
					Lower Bound	Upper Bound	
WN	→	PH	0.670	0.022	0.371	0.686	0.00

Based on the presented findings, we accept the second main hypothesis, which states that there is a statistically significant direct impact relationship between the "Web Networks" variable and the

"Pharmacovigilance" variable at a significance level of α ≥0.05). The results can also be illustrated in Figure 4.

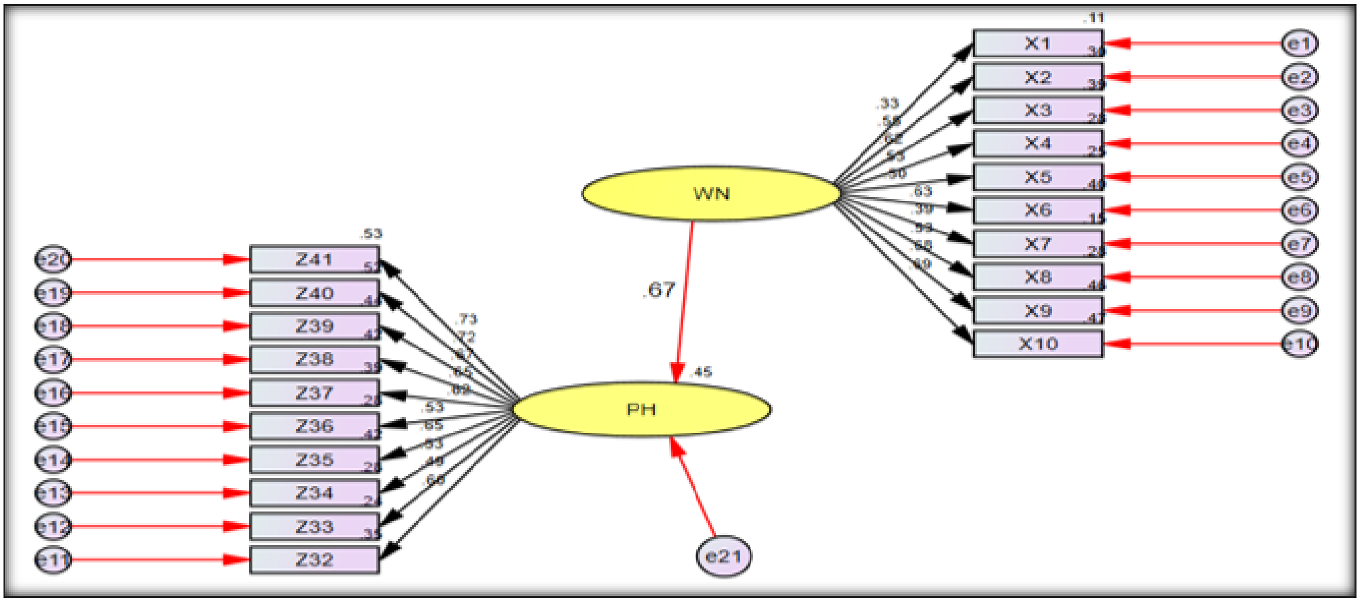


Figure 4: The Impact Relationship of the "Web Networks" Variable on the "Pharmacovigilance" Variable

H3 which postulated that there is a direct and statistically significant relationship between the "Business Models" variable and the "Pharmacovigilance" was found supported by the data at a significance level of α ≥0.05. Table (6) illustrates the values of standardized regression coefficients, confidence intervals, and p-values, it can be observed that the relationship between the "Business Models" variable and the "Pharmacovigilance" variable was positive. The standardized regression coefficient value was (0.810), indicating that an increase of one unit in the "Business Models" variable leads to an increase in the "Pharmacovigilance" variable by (0.810) units. Furthermore, the true value of this coefficient ranges between the lower and upper limits of (0.456 – 0.928), with a standard error (S.E.) of (0.022). Additionally, it can be inferred from the p-value (0.00) that it is less than (0.05).

Table 6: Values of the Effect Analysis for the "Business Models" Variable on the "Pharmacovigilance" Variable

Influential variable	Impact path	The variable affecting it	Estimate	S.E.	Confidence Interval 95%		P
					Lower Bound	Upper Bound	
WP	→	PH	0.810	0.054	0.456	0.928	0.00

Based on the provided information, we accept the third main hypothesis, which states that "there is a significant direct relationship between the variable 'Business Models' and the variable 'Pharmacovigilance' at a significance level of α ≥0.05." The results can also be illustrated in Figure 5.

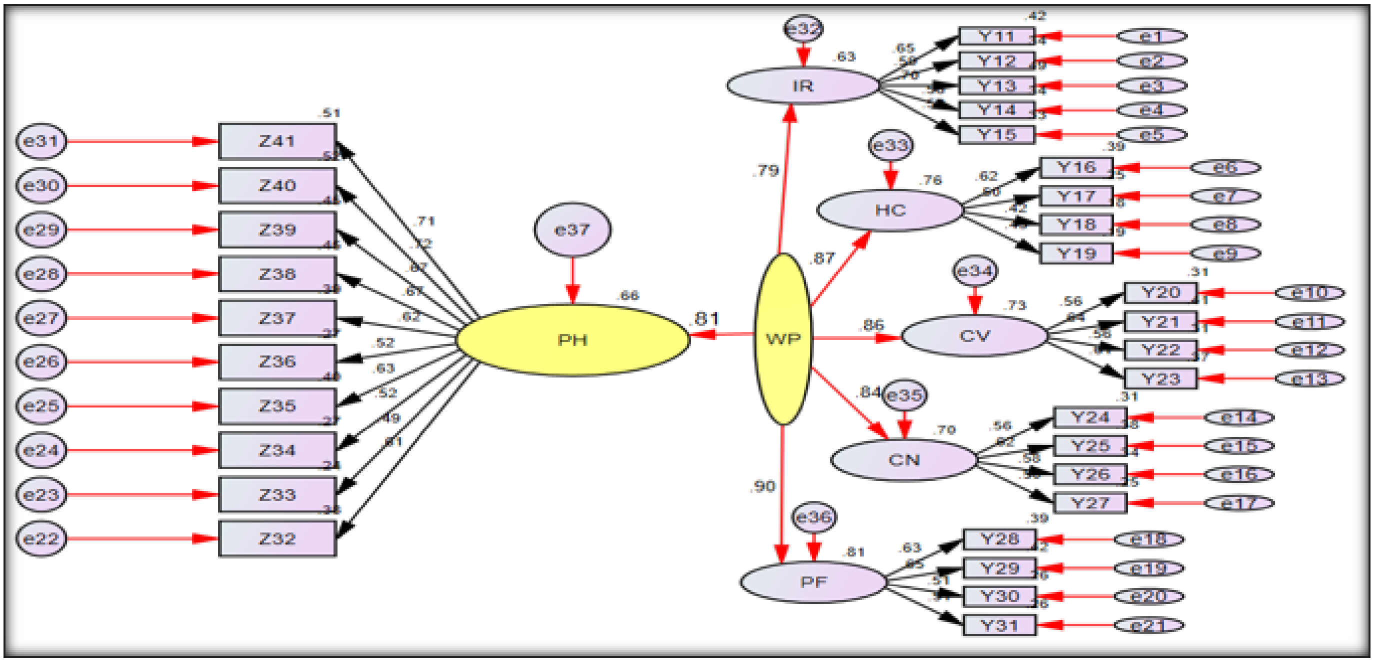


Figure 5: The Impact Relationship of Business Platform Models Variable on Pharmacovigilance Variable

H3a postulates that there is a significant direct relationship between the dimensions of the 'Business Models' variable and the 'Pharmacovigilance' which was supported. Through Table 7 which presents the values (standard regression coefficients, confidence intervals, and p-values), it is observed that the relationship between the 'Infrastructure and Resource Coordination' dimension and the 'Pharmacovigilance' variable was positive. The regression coefficient value was (0.660), indicating that an increase of one unit in the 'Infrastructure and Resource Coordination' dimension leads to an increase of the 'Pharmacovigilance' variable by (0.660) units. The true value of this coefficient ranges between the lower and upper values of (0.432 – 0.758), with a standard error (S.E.) of (0.058). Additionally, it can be inferred from the p-value (0.014) that is less than (0.05).

Table 7 presents the values (standard regression coefficients, confidence intervals, and p-values), it is observed that the relationship between the 'Human Element Capabilities and External Interaction Enhancement' dimension and the 'Pharmacovigilance' variable was positive. The regression coefficient value was (0.680), indicating that an increase of one unit in the 'Human Element Capabilities and External Interaction Enhancement' dimension leads to an increase of the 'Pharmacovigilance' variable by (0.680) units. The true value of this coefficient ranges between the lower and upper values of (0.391 – 0.814), with a standard error (S.E.) of (0.064). Additionally, it can be inferred from the p-value (0.015) that is less than (0.05).

Table 7 illustrates the values (standard regression coefficients, confidence intervals, and p-values), it can be observed that the relationship between the 'Content and Value Creation' dimension and the 'Pharmacovigilance' variable was positive. The regression coefficient value was (0.610), indicating that an increase of one unit in the 'Content and Value Creation' dimension leads to an increase of the 'Pharmacovigilance' variable by (0.610) units. The true value of this coefficient ranges between the lower and upper values of (0.356 - 0.883), with a standard error (S.E.) of (0.048). Additionally, it can be inferred from the p-value (0.011) that is less than (0.05).

Table 7 presents the values (standard regression coefficients, confidence intervals, and p-values), it is observed that the relationship between the 'Channels and Network Impact' dimension and the 'Pharmacovigilance' variable was positive. The regression coefficient value was (0.710), indicating that an increase of one unit in the 'Channels and Network Impact' dimension leads to an increase of the 'Pharmacovigilance' variable by (0.710) units. The true value of this coefficient ranges between the lower and upper values of (0.263 - 0.912), with a standard error (S.E.) of (0.032). Additionally, it can be inferred from the p-value (0.013) that is less than (0.05).

Table 7 which presents the values (standard regression coefficients, confidence intervals, and p-values), it can be observed that the relationship between the 'Integration Points' dimension and the 'Pharmacovigilance' variable was positive. The regression coefficient value was (0.830), indicating that an increase of one unit in the 'Integration Points' dimension leads to an increase of the 'Pharmacovigilance' variable by (0.830) units. The true value of this coefficient ranges between the lower and upper values of (0.332 - 0.938), with a standard error (S.E.) of (0.029). Additionally, it can be inferred from the p-value (0.012) that is less than (0.05).

Table 7: Impact Analysis Values for Business Models Dimensions on Pharmacovigilance Variable

The variable affecting it	Impact path	Influential variable	Estimate	S.E.	95% Confidence Interval		P
					Lower	Upper	
IR	→	PH	.0660	.0058	.0432	0.758	0.014
HC	→		.0680	.0064	.0391	0.814	0.015
CV	→		.0610	.0048	.0356	.0883	0.011
CN	→		.0710	.0032	.0263	0.912	0.013
PF	→		0.830	0.029	0.332	0.938	0.012

Based on the presented information, we accept the first sub-hypothesis of the third main hypothesis, which states: "There is a significant direct relationship between the dimensions of the business models variable and the pharmacovigilance variable at a significance level of $\alpha \geq 0.05$." The results can also be illustrated in Figure 6.

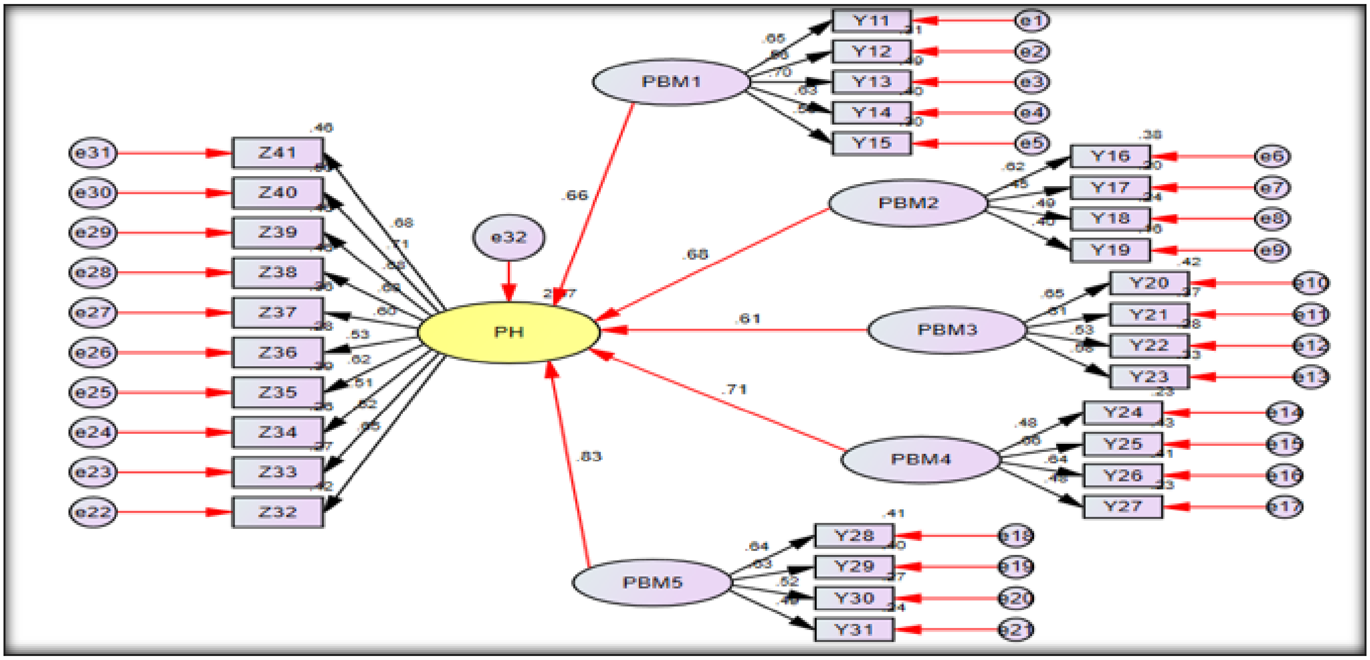


Figure 6: The Impact Relationship of the Dimensions of the Business Models Variable on the Pharmacovigilance Variable

H3b is accepted based on the observation of the results in Table 7 and Figure 6. The dimensions of the business models variable have shown variations in their impact on the pharmacovigilance variable. The dimension "Integration Points" ranked first with a regression coefficient of (0.830). In second place, is "Channels and Network Influence" with a regression coefficient of (0.710). In third place, is "Human Element Capabilities and External Interaction Enhancement" with a regression coefficient of (0.680). The dimension "Content and Value Creation" ranked second to last with a regression coefficient of (0.660), and finally, the dimension "Infrastructure and Resource Coordination" ranked last with a regression coefficient of (0.610).

Therefore, we accept sub-hypothesis 2 of the main hypothesis 3, which states that there are variations in the dimensions of the business models variable in their impact on the pharmacovigilance variable.

H4 suggested that, there is an indirect and statistically significant relationship between the "Web Networks" variable and the "Pharmacovigilance" variable, mediated by the "Business Models" which was supported.

According to Table (8), the direct effect between the "Web Networks" variable and the "Pharmacovigilance" variable was found to be negative, as indicated by the regression coefficient of (0.290). This direct effect was also statistically significant, with a p-value of (0.01), which is less than (0.05).

Furthermore, the indirect effect between the "Web Networks" variable and the "Pharmacovigilance" variable, mediated by the "Business Models" variable, was also negative, with a regression coefficient of (0.550). This indirect effect was statistically significant with a p-value of (0.00), which is less than (0.05). These results indicate that there is both a direct and an indirect (partial mediation) effect between the "Web Networks" variable and the "Pharmacovigilance" variable, with the mediation occurring through the "Business Models" variable.

Table 8: Direct and Indirect Effect Test of the Web Networks Variable on Pharmacovigilance with the Mediation of Business Models Variable

independent variable	Impact path	mediator variable	Impact path	dependent variable	type of effect	Estimate	S.E.	Confidence Interval 95%		P	type of mediation
								Lower Bound	Upper Bound		
WN	→	WP	→	PH	indirect	0.550	0.031	0.284	0.653	0.00	Partial mediation
WN	→				direct	0.290	0.045	0.186	0.561	0.01	

Based on the provided information, we accept the fourth main hypothesis, which states that there is an indirect and statistically significant relationship between the "Web Networks" variable and the "Pharmaceutical Vigilance" variable, mediated by the "Business Models" variable at a significance level of α ≥0.05.

This means that there is evidence to suggest that the relationship between "Web Networks" and "Pharmaceutical Vigilance" is not a direct one. Instead, it is influenced by the presence of the "Business Models" variable as a mediator. The statistical analysis, as illustrated in Figure 7.

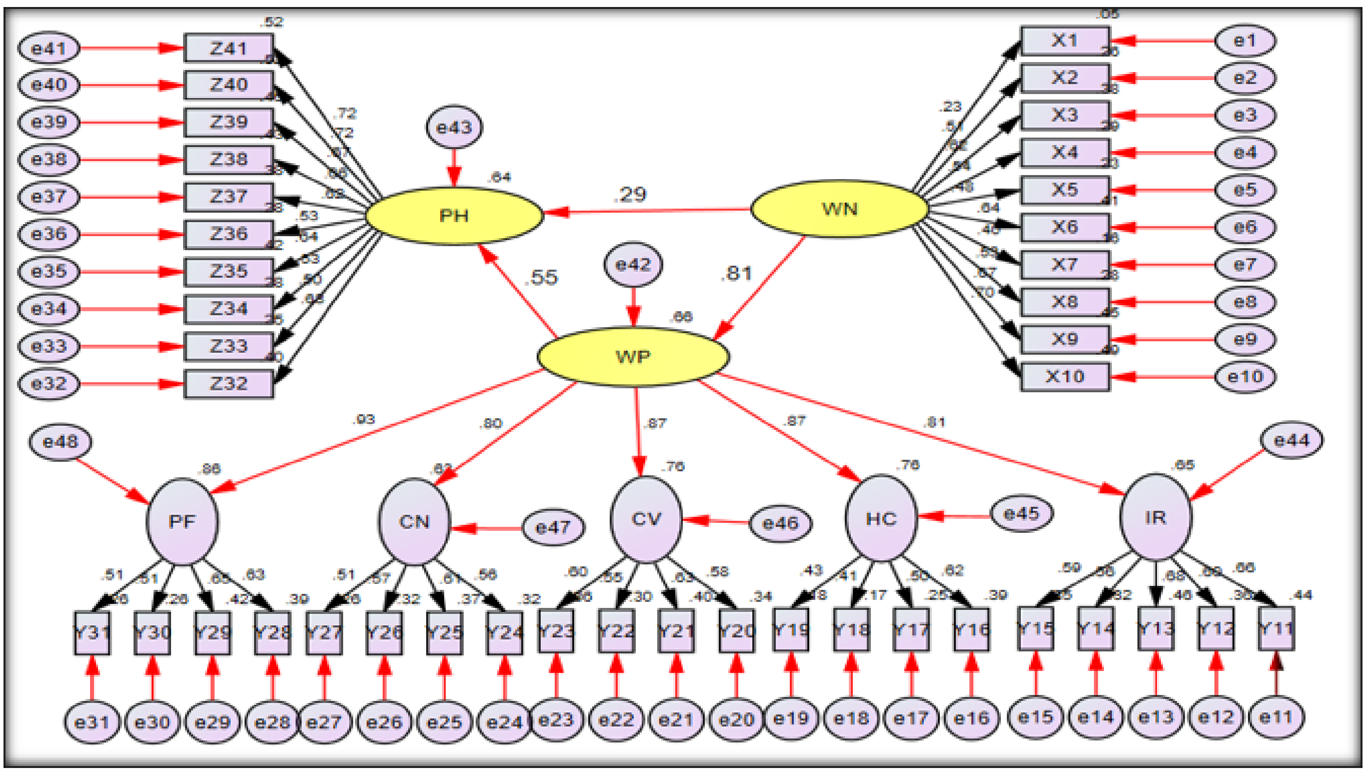


Figure 7: Relationship of the Impact of Web Networks on Pharmaceutical Vigilance through Business Mode

Conclusion and Implication

Web networks represent a scientific approach aimed at facilitating communication between internet users and organizations in building digital communities. They enrich digital content by transforming the user's effort to search for information into the web providing the necessary information. The concept of pharmacovigilance is essential for monitoring the safety of medical products. It involves systematic collection, questioning, analysis, and interpretation of data regarding the benefits and risks, evaluating the benefits in comparison to the potential risks associated with their use. There are deficiencies within organizations concerning the feedback through web networks that they use and interact with positively. The researched organizations need computers with good and efficient specifications that are suitable for managing a web platform. Senior management within the organization may not fully realize the importance of a pharmacovigilance program and the mechanisms for its implementation.

Organizations should enhance feedback through the web networks they use and interact with positively by adopting channels of communication with the beneficiaries of their services. The researched organizations should possess computers with good and efficient specifications that are suitable for managing a web platform. This is crucial as the internet has become the backbone of organizations in this digital age. Senior management within the organization must recognize the importance of a pharmacovigilance program and the mechanisms for its implementation. This can be achieved through educational workshops and raising awareness about pharmacovigilance and its execution.

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