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Review Article

Moderating effects of contextual factors on relationship between pharmaceutical marketing strategies and physician prescription decision: A review

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Abstract

Decision-making by physicians on patients' treatment has received increased research attention. Research on the effect of marketing strategies on prescription behaviour has tended to generate controversial results. While some researchers reported a strong influence, some found only moderate effects, while others find no influence at all. The main objective of this paper is to review the influence of the marketing strategies by pharmaceutical firms and contextual factors on physician attitude to drug prescription. The paper presents comprehensive information on pharmaceutical marketing efforts through exhaustive review of relevant literature, and identifies the moderating effects of contextual factors on physician prescribing decisions. It also presents a crucial conceptual model for explaining the theoretical linkages between marketing strategies of pharmaceutical firms, contextual factors and the decision of the physician regarding drug prescription.

Keywords: Drugs, marketing strategy, Physician prescription, Drug characteristics, Physician persistence, Cost/benefit

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INTRODUCTION

Prescription drug marketing is unique. This uniqueness arises from the fact that the marketing strategies employed in the pharmaceutical industry differ from those used in other types of industries [1]. The decision maker is the physician, who decides which drug a patient will purchase, so the main focus of pharmaceutical firms is to influence the decision of the physician. Since prescription drugs constitute the major source of revenue for the pharmaceutical industry [2], marketing practices for prescription drugs have received the most attention from the industry [1]. The industry invests heavily in marketing efforts, using 20 – 40

% of its revenue [3]. Most of these investments are directed to the physicians through medical representatives (MRs), and also through sampling and advertisements in medical journals [4]. According to industry data, visits by MRs represent the largest percentage of total promotion expenditure [5].

Aggregate prescription data suggest that promotion efforts increase drug prescription by physicians [6] and also stimulate sales of the drugs [7]. Thus traditionally, pharmaceutical firms spend more on promotion, and employ varieties of marketing strategies to maximize sales. Pharmaceutical industries claim that promotion efforts provide scientific and educational

information to physicians [8]. Indeed research findings suggest that many physicians see drug promotion as a useful and convenient source of information [7,9]. Other studies show that marketing tools have positive effects on the prescription behaviour of physicians [2,10]. However, there is still considerable debate on the effects of marketing strategies of the pharmaceutical firms on physician prescription attitude [11]. Some physicians deny being influenced by pharmaceutical promotional strategies [12,13]. Nonetheless, many of these physicians are willing to give significant amounts of time to promotional activities [14].

However serious concerns have been raised over the possibility that pharmaceutical firms might have undue influence on the prescription behaviour of physicians [15]. Indeed the World Health Organisation, WHO and some professional organizations are worried about the unethical promotion activities of pharmaceutical firms [16]. In particular, there is increased concern that a significant population of physicians might be prescribing a narrow range of heavily promoted, but needlessly expensive drugs, or exclusively branded products to the detriment of patient welfare [4]. Alongside the concern regarding the growth of pharmaceutical expenditure, there is also a concern regarding irrational or sometimes even harmful prescriptions [17], especially in developing countries [18]. Factors that affect decision to prescribe drugs are likely to be important in determining responses to over-prescription [19]. Marketing activities are crucial factors in this perspective [20]. The consequence of the above issues can result in loss of health and quality of life for patients and society. There is available evidence that pharmaceutical marketing efforts adversely influence prescription. Thus, governments, firms, and managers are beginning to pay attention to these factors that may affect physician drug decision-making [11].

Recently, Salmi *et al* [21] in a review that covered the period between 1990 and 2014, concluded that the marketing efforts of pharmaceutical companies exerted the greatest influence on the prescription of antibiotics by physicians. Kremer *et al* [10] conducted a meta-analysis with the aim of formulating generalizations about the effectiveness of the pharmaceutical promotions, and concluded that these promotions are moderated by price. A 2010 review reported no evidence of net improvements in prescription as a function of information (promotion tools) from

pharmaceutical companies [8]. However these reviews narrowly focused on the relationship between marketing efforts and physician prescription in general.

The objective of this review is to examine the relationship between prescription behavior of physicians, and marketing efforts such as drug information, drug brand, promotion mix and medical representatives directly provided by pharmaceutical companies. In addition, moderators of this relationship will be explored.

Effects of pharmaceutical marketing strategies on physician prescription decision

Review of literature has revealed significant influence of marketing promotion tools on physician prescribing behaviour [2,10]. The key role of these promotion techniques is to increase the number of prescriptions made [22]. Available evidence suggests that marketing strategies have impact on physician prescribing behaviour either in the short – term [23] or in the long-term [24]. However it is not clear how these factors affect prescribing behaviour [25]. Even in the relatively developed research stream on marketing efforts and prescription behaviour, controversy has been raised recently [11]. While some authors have found significant effects of marketing tools on physician prescribing attitude [2,11,25,29], others have reported negative effects [30]. Moreover, the effect of promotion on prescription is not linear and shows diminishing returns [23] or no significant effect [15,31,32] or heterogeneity in physician responsiveness [10,33]. Although it is widely stated that marketing instruments increase prescription by physicians, this influence is thought to be, at most modest by some researchers [10,12,28,34].

The overall consensus is that marketing efforts frequently have a positive effect on physician prescribing [35]. Narayanan *et al* [6] and Venkataraman *et al* [11] have argued that marketing efforts may actually have both an informative role (e.g., reducing cognitive uncertainty) and a persuasive role (e.g., inducing positive effect). Both roles play a part in determining which drug to prescribe. However, the understanding of the link between marketing efforts and the prescription is far from complete. Moreover, the components of contextual circumstances under which this influence is exerted lack solid evidence. The study context, design and methodology used and main findings of studies on the effect of marketing efforts on prescribing are summarized in Table 1.

Table 1: Summary of previous research on pharmaceutical marketing strategies

First author [ref no.] & country	Methodology used	Main findings
Ladeira et al [2] Brazil	A survey was conducted among physicians (n = 232).	The results indicate that information on drug has the weakest effect, while the drug benefit/cost has moderate effect. Drug brand and its related advertising have the strongest effect.
Hartono et al [30]. Indonesia	Quantitative method involving physicians (n = 160)	The main results showed that marketing mix negatively affect decision to prescribe drugs.
Zahrani [15] Saudi Arabia	A cross-sectional study conducted by questionnaire for physicians (n = 204)	Drug characteristics are the most important factors influencing physician prescription, while the least influence factor was MRs. There was no correlation between promotion tools and prescription.
Ahmed et al [26]. Pakistan	Survey of 100 physicians with randomly sampling.	Marketing tools were positively related to prescribing behavior of physicians
Parihar [28]. India	Survey data was collected from 150 physicians.	The findings indicate that (1) physicians are more concerned about brand name (2) promotion efforts are less effective on prescription (3) MRs have significant effects on prescribing behaviour.
Saito et al [12]. Japan	Physicians both in office and hospital settings (n = 1411) completed the survey.	The findings suggest that promotional activities have a modest impact on physician prescription.
Parker et al [34]. USA	The questionnaire was distributed to 363 staff physicians.	The MRs have minimal impact on physician decision to prescribe drugs.
Gonul et al [27]. USA	Experiment using a comprehensive panel of physicians' data.	The results indicate that promotions (detailing and samples) have a mostly informative effect on physician prescription.
Klemenc-Ketis et al [31]. Slovenia	A cross-sectional survey including family physicians (n= 247).	The assessment of MRs by family physicians does not have any substantial correlations with their prescription behavior.
Al-Areefi et al [7]. Yemen	Qualitative study: An interview of 32 physicians.	Drug characteristics are the most important factors that influence prescribing decision, followed by marketing efforts of pharmaceutical companies.
UI-Haq et al [29]. Pakistan	Survey questionnaire responses from 260 physicians.	The results showed that promotional tools significantly affect the prescription of physicians, while branding is less affective.
Campo et al [24]. USA	An interview was conducted for Both GPs and specialists in the US.	The authors found that detailing may have a long lasting effect on prescription behavior. Detailing was found to increase prescription
Rosenthal et al [32]. USA	Panel data: examined monthly data from August 1996 to December 1999 for five therapeutic classes of drugs.	The main results show no significant effect of promotion on physician prescribing attitude.

Vancelik <i>et al</i> [14]. Turkey	A cross-sectional, survey was performed among 152 general physicians.	Results showed that promotional strategies influence physician prescribing behaviour
Sagar <i>et al</i> [36]. India	Data was collected through structured questionnaire from physicians (n = 100).	The results show that quality of a drug and the MRs are the most significant factors influencing prescription, while the promotional instruments have less influence.
Kerak <i>et al</i> [9]. Morocco	Survey was conducted among 160 physicians.	The results show that overall, physicians regard as useful the medical information provided by MRs.
Al-Hamdi <i>et al</i> [26]. Yemen	An interview with (n =30) physicians.	The current promotion activities of pharmaceutical firms are unethical.
Venkataraman <i>et al</i> [11] USA	The study employed physician-level panel data.	The results show that marketing efforts (detailing and meetings) affect physician prescribing. Drug attributes (effectiveness and side effects) moderate the relationship between marketing efforts and prescription.
Kremer <i>et al</i> [10]. Netherlands	Systemic review of 58 studies.	The results indicate that price moderates the effectiveness of promotion tactics on physician attitude to prescription.
Janakiraman <i>et al</i> [33]. USA	Panel data examining 9672 prescriptions written for depression by 108 physicians.	The research indicates significant levels of persistence in drug choice. The non-persistent physicians are responsive to promotion (detailing and symposium meetings), whereas persistent physicians seem to be responsive only to symposium meetings.

Information drug availability

Information provided by pharmaceutical companies to targeted markets is the main factor affecting physician in selecting a company's pharmaceutical products [37]. The decision of a physician to prescribe depends on currently available information about the pharmaceutical company and its drugs [38]. Physicians who prescribe drugs need and must acquire extensive information about the uses and limitations of new drugs [39]. In fact, physicians use the information about drugs to guide and justify their prescription choices [40]. There are various resources the physicians depends on when selecting one company's product over another: these include leaflets, manuals issued by the MRs, internet, and medical journals [8]. MRs are considered to be one of the important sources of information for physicians in making their prescription decisions [38] especially in the developing countries where there may be as many as one MR for every five physicians [7]. The internet provides easy information on drugs

to physicians [40]. The spread of the media, in general, has provided physicians with numerous sources of information for decision making when prescribing drugs [1]. Another resource is advertising in the medical journals which communication is the form of information used by firms to persuade the readers of medical journals to prescribe the drug being advertised [24]. In this case, pharmaceutical firms need to understand what information sources physicians rely upon when they need to prescribe a drug [41].

Furthermore, previous research studies on drug information relied mainly on information prompted by prescribing drug advertising [14]. However, a few studies on the effect of drug information on prescription have been carried out [1], and are included in this review. Al-Areefi *et al* [7] and Theodorou *et al* [17] found that commercial sources of drug information influence physicians' prescribing behaviour. Ladeira *et al* [2] found a positive effect of drug information on prescription drugs.

Brand prescription

Many theories consider a brand to be a critical factor for maximizing company profits, creating competitive advantage, and facilitating communication between the pharmaceutical companies and consumers [42,43]. Pharmaceutical firms often have large marketing budgets and use mass promotion to create a brand image among customers [44]. This has been considered a major marketing phenomenon in the twenty-first century [2]. In the process of prescription decision making, brand can create sustainable points of differentiation among competing products and thus influence physician decision on choice of drug [42]. Physicians are actually the ultimate decision makers on the brand to be prescribed to their patients [29].

Much research has been done on whether or not branding plays a role in physician prescription. Ladeira *et al* [2] found that drug brand had a significant positive effect on prescription. Parihar [28] found that brand is a prominent product feature influencing the physician prescription. In contrast, Ul-Haq *et al* [29] showed that brand does not have a strong influence on prescription. However, evidence from Yemen suggest that the branded drugs are prescribed very highly by physicians, which makes the role of the brand more evident [37].

Effectiveness of medical representatives (MRs)

Pharmaceutical sales representatives remain the most important marketing instruments available to the industry [24]. Among all promotional interventions employed by the pharmaceutical industry directed at influencing prescribing, MRs are the strongest appreciated by physicians [14]. It is widely stated that MRs influence prescription [7,10,23,27]. However, the picture painted in the literature is not as clear as it may appear at first glance. Effects of MRs on prescribing behaviour can loosely be categorised into two categories: increased prescribing and mixed effects.

Several authors find that MRs increase prescription at the physician level [17,27,45]. Strong evidence to support this notion stems from the fact that the pharmaceutical industry invests heavily in this promotional instrument. For example, \$20.4 billion was spent on MRs visits in the US in 2004, representing 35.5 % of the total promotional expenditure [7]. Another estimate is that MRs visits cost about \$3,300 million and accounted for 75 % of the overall cost

of promotion in 2008 [8]. Furthermore, using aggregate sales data, several authors also find that MRs increase physician prescriptions [6].

In the mixed effects category, several authors found that the effect of MRs is just modest [10]. Many studies that use quantitative data find a negligible positive effect of MRs on drug sales [15,34]. Also, some authors have found no significant effect of MRs on physician prescribing attitudes [31], while others have even found a negative effect [46]. In spite of some inconclusive results, in general, MRs serve two roles: information and persuasion [39]. Both roles play an important role in prescribing the drug.

Promotion mix

Pharmaceutical promotion mix (sampling, gifts, and sponsored medical education) play an important role in informing the physicians about differences between competing drugs available in the market [47,48]. Physician-oriented promotion increases the likelihood that physicians will prescribe the drugs [47]. There is significant empirical evidence that promotion instruments have a positive impact on prescription [10,14,26,36]. The recognition of the close interrelation of these two constructs has also affected managerial practice. For example, many pharmaceutical companies spend billions of USD every year on promotion to persuade the physicians to change their prescribing decisions [3].

However, it is desirable that the impact of promotion on the physician is not always strong. This assumption is also supported by previous empirical findings that reveal a broad range of effect strengths ranging from strong [2,29] to weak [28], supporting the earlier articulated view that the effects of promotional instruments are heterogeneous [10]. Furthermore, recent studies found a significant relationship between promotion and prescription, although the effects were small [10,48,49], while others find no effect [15]. In the context of persuasion, pharmaceutical promotion may exert large persuasive influence on physician decision-making.

Contextual factors as moderators

Contexts are a set of circumstances or facts surrounding prescription events. These contexts are present at the time of decision making/prescription, and by modulating the level of uncertainty, may influencing physicians' decisions [17]. Physician habit persistence [33],

drug attributes [11], and the cost-benefit ratio of a drug [2,17] are all contextual factors that have high influence on physician prescription attitudes, and modulates the interventions designed to create changes in prescription behaviour.

This study posits these contextual factors are potential sources affect the responsiveness of physicians to prescription in response to marketing efforts of pharmaceutical firms. These factors are examined and discussed in the following sections.

Moderating effects of drug characteristics

Even though prior research has stated that drug characteristics (drug's effectiveness and the side-effects) may moderate promotion effects [10], their role in conjunction with marketing efforts (such as drug brand, promotion mix, drug information and MRs effectiveness) on physician decision making remains unexplored. While a drug can be characterized along many dimensions, such as its approved interactions, collateral effects, kind of product category, and quality [2,26], this study will focus on all product characteristics.

Drug attributes play a key role in evaluating prescription decision in both developing and developed countries. Ladeira *et al* [2] investigated the effect of drug attributes on prescription in Brazil, and concluded that characteristics positively affect prescription. Al-Areefi *et al* [7] found that Yemeni physicians are influenced most by drug characteristics. Further support is provided by another study [28], which reported that product merits are strongly affect physician prescription behavior in India. Theodorou *et al* [17] found that clinical effectiveness is the most important factor, reaching 94.9 and 93.3 % in Greece and Cyprus, respectively. Schumock *et al* [50] found that drugs attributes are considered highly influential by all participants in the USA. Therefore, there appears to be a consensus on drug attributes as a strong factor influencing physician prescription behavior.

Venkataraman *et al* [11] stressed the significance of including drug characteristics in any study of the influence of drugs on the physician's treatment decisions. In light of this, it is argued that when a firm promotes higher drug attributes, as compared to lower characteristics, the physician's doubts about the drug are lowered due to stronger scientific evidence to back up the marketing efforts.

Moderating effects of benefit–cost profile of drugs

Product characteristics may not be enough to convince physicians to prescribe drugs. Enhancing the cost-benefit ratio of a drug is important in providing competitive advantages for the drug firm. According to the marketing literature, perceived value is the consequence of an overall assessment of perceived benefits and costs. The cost– benefit ratio of a drug could be important at the time of the prescription [2]. Kim *et al* [1] suggest that the physicians should be well– informed on the cost– benefit ratio at the time of prescribing drugs. The physicians use the dimensions related to benefits and the cost of the drug to evaluate prescription drugs. In practice, the physician is responsible for making this assessment on behalf of the patient [2].

Literature review showed that physicians rate cost to be an important influence on prescribing behavior [51]. Whilst physicians emphasize clinical efficacy, they seem willing to take cost under certain conditions [2]. The benefits of the drug were found to be a distinct factor influencing prescription [52]. In developing countries, the consumption of drugs is largely linked to the purchasing power of the patient [2]. For example, study by Al-Areefi *et al* [7] found that the financial situation of patients and their ability to pay exert a powerful influence on prescription by Yemeni physicians. In this situation, it is unreasonable to expect the cost-benefit profile of a drug as not to influence physician prescribing behavior.

The economic theory of utility perspective assumes that consumers are economically rational, so they will try to achieve the maximum utility with minimum resources such as cost, time, and risks [53]. In contrast, the means– end chain theory explains that personal values guide people's evaluations of relevant the benefits of a product, and then these evaluations initiate goal–direct purchase behavior [54]. Hence, in the case of prescription when the physician's perceived value is high, it has positive effect on the drug product. In other words, physicians are believed to choose certain drugs based on their superior value compared to competing products.

The benefit– cost profile of a drug is not a static factor. Kremer *et al* [10] found that effectiveness of pharmaceutical promotion on physician prescribing behavior is moderated by price. This research suggests that the benefit–cost ratio of a drug may be a significant moderator of effect,

which is suggested to be a key driver of physician behavior in a seminal work by Ladeira *et al* [2]. Logically as in developing countries context, it will be harder for companies to persuade physicians to treat patients with an expensive drug, or drug of low benefits, compared to a drug with a high value. Thus, the total interaction effect of benefits–cost ratio and a firm’s marketing efforts is difficult to predict ex–ante, and hence is worthy of empirical investigation.

Moderating effects of physician habit persistence

Physician’s habit persistence in this research refers to choice of a drug made without cognitive involvement, and a choice known to influence physicians’ decisions when prescribing [55]. From an economic theory perspective, it may be argued that habit persistence is brand loyalty created by persuasive pharmaceutical promotions [38,39]. In practice, physicians, during clinical duties, may develop certain methods in which to practice administering the drugs. This established practice has been suggested to be subject to the persistence of the habit [33]. Thus, habit persistence may simply be driven by the economy of decision–making, it is necessary for the physician to form habits to reduce the burden of decision making related to the act of prescribing.

The factor of habit persistence as a strong influence on physician prescribing is not surprising when considering the complexities of prescribing decision. Venkataraman & Stremersch [11] and Coscelli [56] found that there is substantial habit persistence in physician decision making. More importantly, Janakiraman *et al* [33] found habit persistence to be

responsive to sampling and detailing. Therefore, it can reasonably be argued that physician–level habit persistence must be overcome for the marketing effort to have meaningful influence on physician prescribing behavior. Conversely, it can also be argued that physician – level habit persistence modulates any influence imparted by marketing efforts on physician prescribing decision. However, there no research works have attempted to address physician persistence as a moderator of the relationship between marketing efforts, patient factors and physician prescription behavior.

CONCLUSION

This paper offers several theoretical insights. First, although marketing efforts influencing physician prescribing decision have been widely studied, there is a fair amount of debate on its effects on prescription behaviour. This needs further investigation. The linkage between these constructs and evidence of how and under which circumstances (contexts) influence is exerted is lacking. Thus, the paper argues that contextual factors such as drug attribute, physician persistence habit, and benefit – cost ratio of a drug may tip the balance in this debate. This paper proposes a novel model of physician prescribing decision in a delineated model where eight underlying constructs are identified and combined. Under such a theoretical model, irrational prescribing phenomena could be investigated, especially in developing countries, with the aim of determining how marketing factors influence prescription attitudes. The proposed framework (Figure 1) is a robust theoretical underpinning which can be tested empirically.

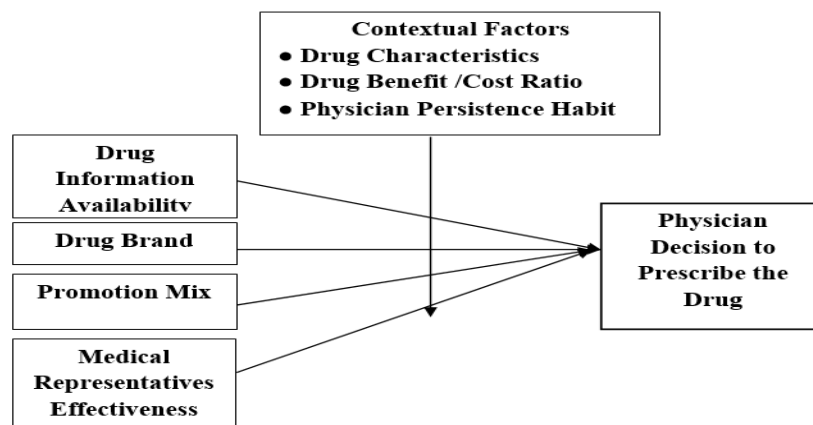


Figure 1: Proposed research model

DECLARATIONS

Conflict of Interest

No conflict of interest associated with this work.

Contribution of Authors

The authors declare that this work was done by the authors named in this article and all liabilities pertaining to claims relating to the content of this article will be borne by them.

REFERENCES

- Kim, W. J., & King, K. W. Product Category Effects on External Search for Prescription and Nonprescription Drugs. *Journal of Advertising* 2009; 5–20.
- Ladeira W., Dalmoro, M., Eduardo Maehler, A., & Falcão Araujo, C. Drug prescription practices in Brazil: a structural equation model. *International Journal of Pharmaceutical and Healthcare Marketing* 2011; 5(4): 262–278.
- Gagnon MA., Lexchin, J. The cost of pushing pills: A new estimate of pharmaceutical promotion expenditures in the United States. *PLoS Medicine* 2008; 5(1): 0029–0033.
- Joyce, G. F., Carrera, M. P., Goldman, D. P., & Sood, N. Physician prescribing behavior and its impact on patient-level outcomes. *The American Journal of Managed Care* 2013; 17(12): e462–71.
- Gonul, F. F., Carter, F., Petrova, E., & Srinivasan, K. Promotion of Prescription Drugs and Its Impact on Physicians' Choice. *Journal of Marketing* 2001 July; 65: 79–90.
- Narayanan, S., Desiraju, R., & Chintagunta, P. K. Return on Investment Implications for Pharmaceutical Promotional Expenditures: The Role of Marketing-Mix Interactions. *Journal of Marketing* 2005 October; 68:90–105.
- Al-Areefi, M. A., Hassali, M. A., & Mohamed Ibrahim, M. I. B. The role of pharmaceutical marketing and other factors in prescribing decisions: the Yemeni experience. *Research in Social & Administrative Pharmacy* 2013;9(6): 981–8.
- Spurling, G. K., Mansfield, P. R., Montgomery, B. D., Lexchin, J., Doust, J., Othman, N., & Vitry, A. I. Information from pharmaceutical companies and the quality, quantity, and cost of physicians' prescribing: A systematic review. *PLoS Medicine* 2010; 7(10).
- Kerak, E., Louhoudi, H., & Ouardouz, M. Assessment of the quality of the services provided by pharmaceutical representatives: Case of Moroccan delegates from the region of Salé. *International Journal of Innovation and Applied Studies* 2014; 8(2): 451–467.
- Kremer, S. T. M., Bijmolt, T. H. a, Leeflang, P. S. H., & Wieringa, J. E. Generalizations on the effectiveness of pharmaceutical promotional expenditures. *International Journal of Research in Marketing* 2008; 25: 234–246.
- Venkataraman, S., & Stremersch, S. The Debate on Influencing Doctors' Decisions: Are Drug Characteristics the Missing Link? Sriram Venkataraman and Stefan Stremersch REPORT SERIES. *Management Science* 2007; 35(11):1688 – 1701
- Saito, S., Mukohara, K., & Bito, S. Japanese practicing physicians' relationships with pharmaceutical representatives: A national survey. *PLoS ONE* 2010; 5(8): 1–7.
- Morgan M A, J Dana, G Loewenstein, S Zinberg, J. S. Interactions of doctors with the pharmaceutical industry. *J Med Ethics* 2006; 32: 559–563.
- Vancelik, S., Beyhun, N. E., Acemoglu, H., & Calikoglu, O. Impact of pharmaceutical promotion on prescribing decisions of general practitioners in Eastern Turkey. *BMC Public Health* 2007; 7: 122.
- Zahrani, H. The impact of pharmaceutical promotions on primary health care physician's prescribing behaviour in KAMC in central region. *International Journal of Medical Science and Public Health* 2014; 3(3): 355.
- Adibe, M. O., Igboeli, N. U., Michael, C., Udeogaranya, P. O., & Onwudiwe, N. P. Evaluation of Information Contained in Drug Advertisement and Promotion Materials in Nigeria. *Tropical Journal of Pharmaceutical Research* 2015 March; 14: 539–544.
- Theodorou, M., Tsiantou, V., Pavlakis, A., Maniadakis, N., Fragoulakis, V., Pavi, E., & Kyriopoulos, J. Factors influencing prescribing behaviour of physicians in Greece and Cyprus: results from a questionnaire based survey. *BMC Health Services Research* 2009; 9: 150.
- Afi Kayi, E., Atinga, R. a., & Ansa, G. a. Informational sources on pharmaceutical medicines and factors affecting medication prescriptions: Perspectives from Ghanaian physicians. *Journal of Medical Marketing: Device, Diagnostic and Pharmaceutical Marketing* 2015; 0(0): 1–6.
- Lucas, P. J., Cabral, C., Hay, A. D., & Horwood, J. A systematic review of parent and clinician views and perceptions that influence prescribing decisions in relation to acute childhood infections in primary care. *Scandinavian Journal of Primary Health Care* 2015; 33(1): 11–20.
- Al-Shami, A. M., Mohamed Izhah, M. I., & Abdo-Rabbo, A. Evaluation of the quality of prescriptions with antibiotics in the government hospitals of Yemen. *Journal of Clinical and Diagnostic Research* 2011; 5(4): 808–812.
- Salmi, R., Hassali, M., Saleem, F., Alrasheedy, A., Aryani, F., & Godman, B. Physicians' knowledge, perceptions and behaviour towards antibiotic prescribing: a systematic review of the literature. *Expert Rev. Anti Infect. Ther* 2015; 13(5): 665–680.
- Al-Hamdi, a. Y., Hassali, M. a. a., & Ibrahim, M. I. M. Impact of pharmaceutical promotion on healthcare professional's practices and behaviour: Views from general practitioners, medicine dispensers and medical

- representatives in Yemen. *Journal of Medical Marketing: Device, Diagnostic and Pharmaceutical Marketing* 2012; 12(4): 240–246.
23. Manchanda, P., & Honka, E. *The effects and role of direct-to-physician marketing in the pharmaceutical industry: an integrative review.* *Yale Journal of Health Policy, Law, and Ethics* 2005; 5(2): 785–822.
 24. Campo, K., MSc, O. D. S., Gijsbrechts, E., & Waterschoot, W. van. *Physicians' Decision Process for Drug Prescription and the Impact of Pharmaceutical Marketing Mix Instruments.* *Health Marketing Quarterly* 2005; 22(4): 73–115.
 25. Shibuya, A., Nakayama, M., Inoue, R., Imai, Y., & Kondo, Y. *Decision making and physician prescribing characteristics: A pilot study of Japanese physicians.* *AMIA Symposium Proceedings* 2009; 604–608.
 26. Ahmed, R. R., Sattar, I., & Parmar, V. *Product Strategies in Pharmaceutical Marketing: A Perspective of Pakistani Pharmaceutical Industry.* *Middle-East Journal of Scientific Research* 2014; 21(4): 681–688.
 27. Gonul, F. F., Carter, F., Petrova, E., & Srinivasan, K. *Promotion of Prescription Drugs and Its Impact on Physician ' Choice.* *Journal of Marketing* 2001 July; 65: 79–90.
 28. Parihar, S. S. *Influence of Pharmaceutical Marketing Promotion on Physicians Prescription Behaviour in Tier-III & Tier-IV.* *Asia-Pacific Marketing Review* 2012; Jan-Jun: 1. 45–49.
 29. Shamim-ul-haq, S., Ahmed, R. R., Ahmad, N., & Parmar, V. *Factors Influencing Prescription Behavior of Physicians.* *The Pharma Innovation Journal* 2014; 3(722): 30–35.
 30. Hartono, S., Sumarwan, U., & Suharjo, B. *MODEL OF PHYSICIAN DECISION MAKING PROCESS ON.* *International Journal of Information Technology and Business Management*, 2014; 24(1): 1–10.
 31. Klemenc-Ketis, Z., & Kersnik, J. *The assessment of pharmaceutical sales representatives by family physicians-does it affect the prescribing index?* *Family Practice* 2013; 30(3): 320–324.
 32. Rosenthal, M. B., Berndt, E. R., Donohue, J. M., Epstein, A. M., & Frank, R. G. *Demand Effects of Recent Changes in Prescription Drug Promotion.* *Forum for Health Economics & Policy* 2003; 6(1).
 33. Janakiraman, R., Dutta, S., Sismeiro, C., & Stern, P. *Physicians' persistence and its implications for their response to promotion of prescription drugs.* *Management Science* 2008; 54: 1080–1093.
 34. Parker, R. S., & Pettijohn, C. E. *Pharmaceutical Drug Marketing Strategies and Tactics: A Comparative Analysis of Attitudes Held by Pharmaceutical Representatives and Physicians.* *Health Marketing Quarterly* 2005; 22(4): 27–43.
 35. O'Connor, Elizabeth, G. *Emerging promotional and pricing approaches in the US pharmaceutical market.* *Journal of Product & Brand Management* 2014; 23: 572–580.
 36. Sagar, P. N. & P. B., & Kalaskar. *Factors influencing prescription behavior of physicians: A study with reference to Marathwada Region.* *Indian Streams Research Journal* 2012; 2(Iv): 1–4.
 37. Al-shaikh, M. S., Torres, I. M., & Zuniga, M. A. *Jordanian Pharmaceutical Companies: Are Their Marketing Efforts Paying Off? Jordanian Pharmaceutical Companies: Are Their Marketing Efforts Paying Off?* *Health Marketing Quarterly* 2011; 28; 174–189.
 38. Abdul Waheed, K., Jaleel, M., & Laeequddin, M. *Prescription loyalty behavior of physicians: an empirical study in India.* *International Journal of Pharmaceutical and Healthcare Marketing* 2011; 5(4): 279–298.
 39. Hurwitz, M. a., & Caves, R. E. *Persuasion or Information? Promotion and the Shares of Brand Name and Generic Pharmaceuticals.* *The Journal of Law and Economics* 1988; 31(2): 299.
 40. Delirrad, M., Javaezi, M., Majdi, L., & Sadigh-Rad, L. *Comparison of prescribing indicators of academic versus non-academic specialist physicians in Urmia, Iran.* *Journal of Research in Pharmacy Practice* 2015; 4(2): 45.
 41. Spiller, L. D., & Wymer, W. W. *Physicians' Responses to Marketing Strategies of Pharmaceutical Companies.* *Journal of Pharmaceutical Marketing & Management* 2002; 15(1): 15–30.
 42. Leonard, E., & Prevel Katsanis, L. *The dimensions of prescription drug brand personality as identified by consumers.* *Journal of Consumer Marketing* 2013; 30(7):583–596.
 43. Aaker, D. A. *Building strong brands.* New York: The Free Press; 1996.
 44. Joseph, M., Spake, D. F., & Godwin, D. M. *Journal of Medical Marketing: Device, Aging consumers and drug marketing: Senior citizens' views on DTC advertising, the medicare.* *Journal of Medical Marketing* 2008; 8(3): 221–228.
 45. Pinto, J. C., Ferreira da Silva, A., & Curto, J. D. *Determinant values in the medical act of prescribing in the Portuguese context.* *Journal of Medical Marketing* 2010; 10(3): 213–230.
 46. Muijers, P. E. M., Grol, R. P. T. M., Sijbrandij, J., Janknegt, R., & Knottnerus, J. A. *Differences in prescribing between GPs. Impact of the cooperation with pharmacists and impact of visits from pharmaceutical industry representatives.* *Family Practice* 2005; 22(6):624–630.
 47. Epstein, A. J., & Ketcham, J. D. *Information technology and agency in physicians' prescribing decisions.* *RAND Journal of Economics* 2014; 45(2): 422–448.
 48. Handa, M., Vohra, a., & Srivastava, V. *Perception of physicians towards pharmaceutical promotion in India.* *Journal of Medical Marketing: Device, Diagnostic and Pharmaceutical Marketing*; 2013: 13(2), 82–92.
 49. Mizik, N., & Jacobson, R. *Are Physicians Easy Marks?? Quantifying the Effects of Detailing and Sampling on New Prescriptions.* *Management Science* 2004; 50(12):1704–1715.

50. Schumock, G. T., Walton, S. M., Park, H. Y., Nutescu, E. a., Blackburn, J. C., Finley, J. M., & Lewis, R. K. Factors that Influence Prescribing Decisions. *Annals of Pharmacotherapy* 2004; 38(4): 557–562.
51. Chauhan, D, A, & Mason. Factors affecting the uptake of new medicines: a systematic literature review. *Manuscript under Review at BMC Health Services Research* 2008; 33: 339–348.
52. Tušek-Bunc, K., Kersnik, J., Petek-Šter, M., Petek, D., & Klemenc-Ketiš, Z. Explanatory model of prescribing behavior in prescription of statins in family practice. *Wiener Klinische Wochenschrift* 2010; 122(SUPPL. 2): 79–84.
53. Henderson, J.M. and Quandt, R.E. *Microeconomic Theory: A Mathematical Approach*, McGraw-Hill, New York, NY; 1958.
54. Chang, H. H., & Wang, H.-W. The moderating effect of customer perceived value on online shopping behaviour. *Online Information Review* 2011; 35(3): 333–359.
55. Zerzan, J., Lee, C. A., Haverhals, L. M., and Nowels, C. T. Exploring physician decisions about end-of-life opiate prescribing: a qualitative study. *Journal of Palliative Medicine* 2011; 14(5): 567–572.
56. Coscelli, A. the Importance of Doctors' and Patients' Preferences in the Prescription Decision. *Journal of Industrial Economics* 2000; 48(3): 349.