

Impact of Pharmaceutical Companies' Promotional Tools on Physicians' Prescription Patterns: A Systematic Review

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Abstract

Purpose: The role of pharmaceutical companies' promotional tools in the prescribing decision of physicians comprises five commonly-used promotional tools: sales promotions; advertising; public relations; direct marketing; and personal selling. The purpose of this paper was to examine the existing literature on promotional tools and then explore which medical practitioners' demographic factors influence the relationship between the various promotional tools and physicians' prescription behaviour.

Design/methodology/approach: A survey of the literature was carried out across online databases from 2008 to 2018, and 41 reviewed articles were identified. The influence of promotional tools on physician prescribing decisions was identified in the articles.

Findings: There have been numerous studies on the effect of promotional tools on physician prescription decision. They demonstrated that promotional tools strongly influence physicians' prescribing decision, but a few others found only minor or no relation. To resolve this ambiguity, there is a need to precisely understand how promotional tools affect prescribing decisions of physicians, under different contexts and conditions.

Research limitations/implications: The study recommends further studies on the influence of each factor on physician prescribing behaviour and an evaluation of the proposed model and moderating variables.

Originality/value: This paper provides a significant step towards recognizing the relationship between promotional tools and prescribing behaviour. This research contributes to the debate on the ways prescribing behaviour can be affected.

Keywords: Expectations; Prescribing; Physician; Promotional tools

Introduction

The appropriateness of marketing relationships between physicians and the pharmaceutical industry has been debated since the 1960s. The global pharmaceutical industry is one of the most important driving forces of, and dominant players in the modern global economy, securing approximately one trillion US dollars in revenues every year.

Prescription drug marketing is unique. The physician decides which drug a patient will purchase, so marketing strategies focus mainly on influencing the decision of the physician [1]. Since prescription drugs constitute the primary source of revenue for the pharmaceutical industry [2], marketing practices for prescription drugs have received the most attention from the industry [1]. Physicians, therefore, are the chief players in pharmaceutical marketing since they specify the prescriptions to be used by the patient. Thus, the focus relies on the physicians rather than on the patients.

Some of the promotional techniques that pharmaceutical companies have used to maximize their profit margins are informed by two factors: the need to promote specific drugs; and the need to enhance company reputation through stronger relations with physicians. However, a pharmaceutical company that improves its reputation is likely to sell more drugs, while a company that enhances the sale of specific drugs will also have improved chances of acquiring a positive reputation [3].

According to the International Trade Administration (2016), the US, China, and Japan occupy the first, second, and third position in the pharmaceutical markets, respectively, with an intense competition. Therefore, pharmaceutical companies understand that it is crucial to influence the prescription behaviour of physicians by utilizing different types of promotional tools and consequently, spend more than one-

third of their sales revenues on marketing in an attempt to retain and maximize their market share.

Previous studies revealed that pharmaceutical drug promotions influence drug prescription. More specifically, Spurling et al. showed evidence of an association between exposure to the information provided by pharmaceutical company representatives (PCRs) and a higher frequency of prescription. In fact, the World Health Organization (WHO) raised serious concerns over the possibility that pharmaceutical firms might have undue influence on the prescription behaviour of physicians [4] and promote unethical promotion activities of pharmaceutical firms [5].

Datta and Dave (2017) argued that promotions to physicians by pharmaceutical companies directly influence drug choices and prescriptions issued for a particular drug. Hence, physicians do not seem to widely use alternative information resources such as medical journals and formularies. Instead, information is mainly obtained from promotional packages, company medical representatives (MRs), and sponsored workshops. However, the same sources of information have

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been criticized by several scholars as biased, and some can compromise the integrity of care providers [6].

As an effective way of promoting specific drugs, companies use drug advertisements mainly in formularies and medical journals. Other promotional tools used include a presentation on new drugs at workshops and conferences, sending direct mails to physicians, sending MRs, and giving physicians free samples to distribute to patients. One of the conventional approaches is the use of MRs, with the most significant portion of the pharmaceutical budget for drug promotions being spent on this.

In part, MRs give detailed information about the new medications to care providers and also act as a support team in answering their queries. Besides the information provided orally by the MRs, they also give expensive gifts, such as buying dinners or lunches when they visit, or even more exclusive and lucrative gifts, such as event tickets, electronic devices, sponsored travel, meals and vacations for families, educational seminars, honorariums to promote the product at events, and funding for research projects.

In Sudan, pharmaceutical companies have been investing in numerous promotional tools to raise their market share and make more profits. As a result, most of these companies allocate large budgets for the various promotion tools as they seek to gain popularity and expand their market base. Indeed, as noted by Shepherd, although in a different context, most pharmaceutical companies appear to be employing trial-and-error marketing strategies that leave them open to various risks, including inadvertently raising the profile of the competition, missed opportunities, failing to understand the target market clearly, and wasting valuable time and resources. Investing in a variety of marketing and promotional tools, some of which are ineffective, increases the costs borne by the company and reduces profitability.

Consequently, there is still a need to fully understand the contextual and conditional influences of promotional tools on physician prescription behaviour. Given that contextual variable such as sales promotions; advertising; public relations; direct marketing; and personal selling are potential sources of the responsiveness of physician's prescribing behaviour, this paper may contribute to resolving the debate on the effect of patient characteristics (requests and expectations) on prescribing behaviour.

Also, previous reviews are now obsolete, narrowly focused and only partially indicate that promotional tools and patient's requests are the most influential factors of physician prescribing behaviour. The review by [7] Lotfi et al. concluded there is a shortage of evidence supporting the influence of promotional on physician prescribing behaviour. Thus, it can be inferred that there have been no comprehensive reviews of the relationship between patient characteristics and physician's prescription, including the moderators. To fill this gap, we performed a systemic review (a review uses predefined criteria to identify 41 studies on a given topic) to re-examine the influence of promotional tools on physicians' prescribing decisions.

Methodology for the Review

Search methods for identification of studies

A systematic search was conducted for English-based scientific articles indexed in Scopus, Ovid, Crossref, ScienceDirect, Google scholar, Hinari, Web of Science, CINAHL and Academic Search Premiere. An additional search was performed using PubMed. To minimize the discrepancy, which may arise from outdated references, date search settings were confined to years between 2008 and 2018.

Criteria for including studies

Studies, published in English, which described the physicians' prescribing behaviour from a marketing perspective, were included. Articles that assess the pharmaceutical influence on physicians were included only where their contribution involved marketing tools as well. Qualitative/interview, quantitative, cohort, focus group discussion, original articles and observational studies were eligible for inclusion.

Criteria for excluding studies

Abstracts, case series, case reports and short communications, short reports were excluded. Articles related to the patient request and expectation for health-care services were excluded from the current review (i.e., physician services and hospital services).

The term headings of search strategy

The search keywords included "prescribing" AND "physician" AND "marketing" AND "attitude" OR "behavior". All the synonymous words were applied. For example, doctor(s), prescriber(s), GP(s) are used as equivalents for physician(s).

Procedures for screening and eligibility

Full-text articles were downloaded and vetted for their eligibility to be included in the list of reviewed articles in line with the criteria mentioned above of inclusion. The initial search of the electronic search of databases resulted in 523 abstracted titles. Pubmed search retrieved 43 relevant articles. After uploading all the compiled articles into Mendeley, duplicate articles were removed. This amounted to 464 articles of which four articles were unrelated to physicians' perceptions of behaviour or the factors associated and/or governing such behaviour.

Search strings were then limited to the subject area of business and management, excluding articles which do not consider the marketing tools and the contributing factors at its central objective. Therefore, 70 articles were considered eligible for full-text screening.

All the 70 articles were downloaded and reviewed carefully. Of these, 41 articles were included in the final qualitative and quantitative analysis as on Figure 1.

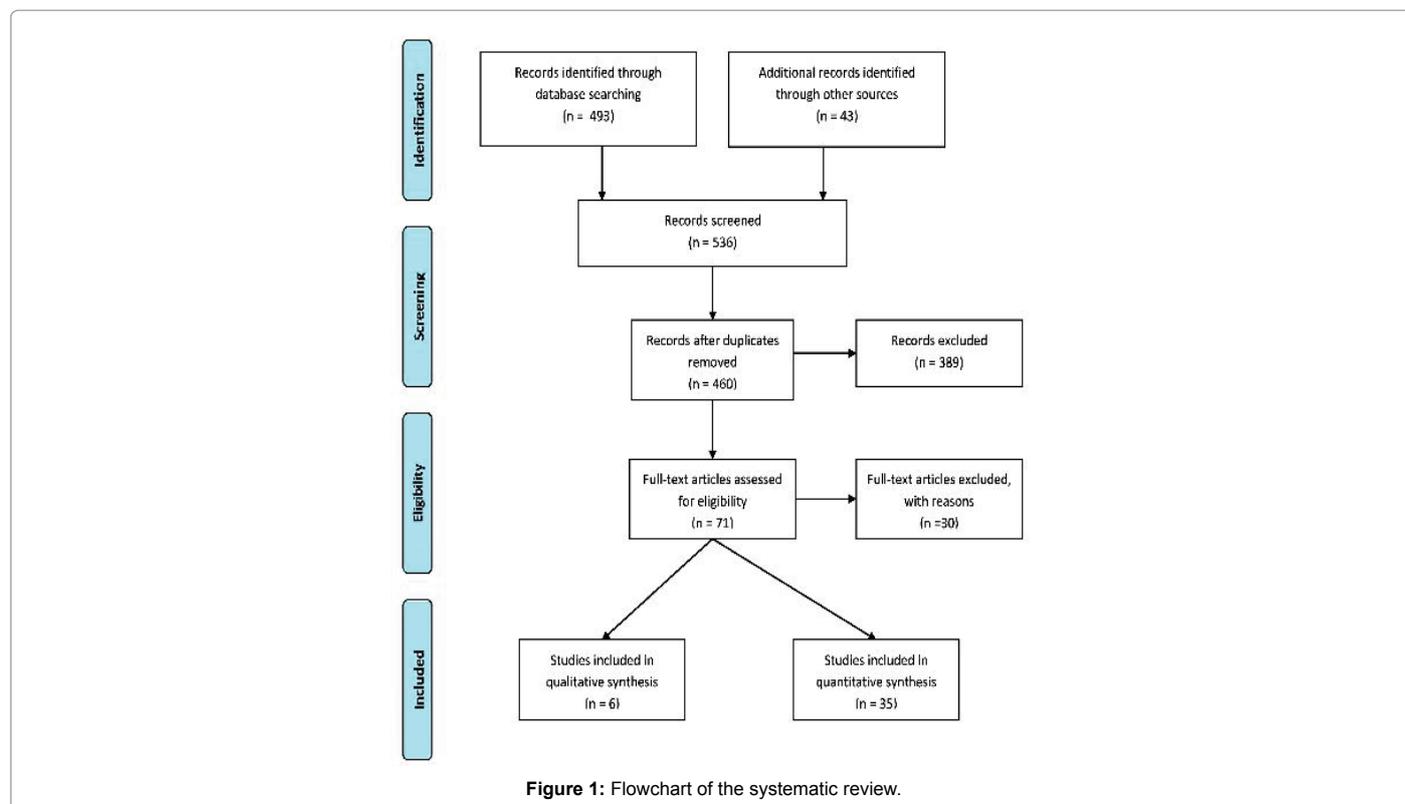
Results

Our selected studies reveal an overall consensus that marketing efforts influence physician prescribing. Marketing efforts may have both an advisory role (e.g., reducing cognitive uncertainty) and an influential role (e.g., inducing positive effect). However, the link between marketing efforts and the prescription behaviour remains uncertain. The study context, design, and methodology prescribing are summarized in Table 1.

Table 1 shows critical results of included studies in this review. The findings of each study were described. A careful review of the content of research articles reveals the main promotional tools influencing physician decision to prescribe the drug is the provision of free drug samples. Below, we summarize these findings.

Our review covered a broad array of marketing efforts (MRs and promotional tools). We evaluated the effects of MRs on physician prescribing behaviour [8-11].

Wang et al. reported the effect of free drug samples on doctors' prescribing behaviour [12-14]. The study conducted in Japan examined the overall effect of promotion tools on prescribing behaviour.



First Author, Year and Country	Participants	Promotional Tools	Design and Sampling Method	Main Findings
Workneh et al. (2016), Ethiopia	90 Physicians working in public and private facilities	Face-to-face talking; brochures and sticker; free medical sample; electronic materials; new product launching; meeting	Cross-sectional (Facility-based)	48.2% of the physicians believed that visits influenced their prescribing decisions
Ali et al. (2015), Pakistan	300 medical practitioners	Common promotional tools (regular visits of a medical representative, low-value gifts and physician sample); Personal Touch (Personality of company's representative, greeting doctors and family members on personal occasions and sending a personalized message through SMS or email)	Cross-sectional SAQ	This study also provides the right direction to product managers and CEOs while allocating promotional budgets and developing promotional mix strategies, to achieve maximum return out of the investment.
Shamimulhaq et al. (2014), Pakistan	260 physicians	New drug; Brand prescription; sponsorships to conferences; promotional tool (i.e., gifts, clinic renovations, free medicinal camps, patient awareness programs, roundtable exchanges, symposium, seminars, etc.); and drug sample	Cross-sectional SAQ	The results showed that promotional tools significantly affect the prescription of physicians, while branding is less effective.
Taneja (2008)	523 physicians	Personal selling; Sponsorship; Educational Promotional tools; Scientific promotional tools; Personal Touch	Cross-sectional SAQ	Influencing the physician is key to pharmaceutical sales, and by using appropriate promotional tools, a pharmaceutical company can increase the sales with lower promotional budget.
Kotwani et al. (2010), India	36 Physicians in the public and private sectors	MRs; Advertisement In hospital journal; Advertisement on TV	CSQ	MRs found to be the important factors identified for antibiotic prescriptions by physicians.
Naik et al. (2009), USA	25 physicians	Drug samples; formative training	CSQ	Detailing and direct promotion influence on prescribing behaviors And mediated through formative training and guidelines.
Lieb and Scheurich (2014), Germany	160 doctors	Day-to-Day items; Drug samples; Dinner invitations; Sponsoring events	CSS	Less than half of the doctors believed that they received adequate and Accurate information. They also believed that promotional tools might influence their prescribing attitude.
Pinckney et al. (2011), USA	630 primary care prescribers	Drug samples	CSS	Physicians with samples were less likely to prescribe preferred drugs for both hypertension and depression.
Ahmed (2014), Pakistan	100 physicians	Literature; samples; and gifts	CSS	Promotion tools positively Influenced physician prescribing behavior.

Bamoriya (2012), India	879 physicians	Sampling; Regularity of visits; Literature/Journals/Updates; Symposium/Seminars	CSS	Knowledge has reasonable influence prescription behavior. Sampling drugs seem to have great potential influence prescription behavior.
De Ferrari et al. (2014), Peru	155 Physicians of five different departments clinical, public hospital	Medical samples; gifts; Cocktails; lunches or dinners; funding conferences; industry-funded research	CSS	88% of study respondents disclosed that they believe receiving gifts or going for company sponsored lunches do not affect their prescribing. Drug samples Are the most received and ethically accepted benefit.
Handa et al. (2013), India	115 Physicians in private and government hospital	Educational programs; gifts; medical representative; advertisement; drug samples	CSS	A low positive correlation was found between promotion tools and the Extent to which they influence prescription behavior.
Jamshed et al. (2012), Pakistan	206 Physicians working in public and private health facilities	Advertisements; Sales promotion; Public relations; Personal selling; Direct marketing	CSS	56.8% of respondents believed that promotional tools influence their prescribing decision.
Wang et al. (2009), USA	122 Physicians Ophthalmology trainees	Promotion sample	CSS	Physicians reported (32%) having changed prescribing behavior based on the information provided
Klemenc-Ketis and Kersnik (2012), Slovenia	247 family of physicians	Conferences sponsored by pharmaceutical companies; lectures sponsored; objective product information; brief visits	CSS (anonymous postal)	No substantial correlations with their prescription behavior
Ladeira et al. (2011), Brazil	232 medical doctors	The cost-benefit ratio; product characteristics; product information; brand; advertising	CSS strategy conducted through a SAQ with some selected physicians	Information on drug produced the weakest effect, while the drug benefit/cost has moderate effect. Drug brand and its related advertising had the strongest effect.
Negash and Adamu (2017), Ethiopia	270 physicians	Sales Promotion; Personal Selling; Advertising; Image; Educational Promotional Tools; Public Relations	CSS strategy conducted through SAQ to some selected physicians in Addis Ababa	Sales promotion strongly influenced tandhe prescription attitude. The second most important influence was personal selling
Saito et al. (2010), Japan	2621 practicing physicians	Meetings; Drug samples; Stationery such as pens and notepads; Meals outside the workplace; Sponsoring events; Financial subsidies	CSS, anonymous, SAQ	Promotional activities presented a modest impact on physicians' prescribing behavior
Ibrahim et al. (2015), Saudi Arabia	106 physicians	Representatives; Symposiums/ Seminars; Medical Magazines or Journals; Internet; Media Advertisements	CSS, SAQ	Most impacting factors influencing include media advertising and frequent visits from pharmaceutical sales representatives
Ijoma et al. (2010), Nigeria	210 doctors in six major hospitals in Enugu	Stickers; drug presentations/ launches; and personal souvenirs	CSS, structured SAQ.	Most doctors (60%) attending a drug presentation felt influenced. While 87.5% appreciated the benefits of marketing strategies, about 70% would consider patients socioeconomic status before prescribing.
Hartono et al. (2014), Indonesia	160 physicians	Detailing to doctors and pharmacist by medical representative; mailing brochure and literature to doctors or pharmacist; advertisement in health medicine or medical journal; symposium; medical exhibition; clinical meeting; public relation campaign	Interview (Face-to-face) using a questionnaire	Marketing mix negatively a decision to prescribe drugs. However, Economic conditions and positive regulatory influences the prescription behavior.
Al-Hamdi et al. (2012), Yemen	30 doctors	Free medical samples; gifts; sponsoring for conferences	Interview (semi-structured) using a qualitative approach	Promotional tools influence prescription behavior
Scheffer (2014), Brazil	Physicians in Sao Paolo, Brazil (N = 300)	Informative materials; Visits by sales promoters and sales representatives; Inexpensive objects for the doctor's office; continuing education courses and events; Scientific journals sponsored by the laboratories	Interview (Structured) with a stratified random sampling	Pharmaceutical companies' actions strongly influenced (10 %) or slightly influence (50 %) physicians' prescribing of antiretrovirals.
Janakiraman et al. (2008), USA	108 physicians	Promotional actions include; f o r example; detailing activity; out-of- office meetings; and symposium meetings.	Panel data examining 9672 prescriptions were written for depression	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
Al-Areef et al. (2013), Yemen	32 physicians	MRs; Advertisement in hospital journal; Advertisement on TV	Qualitative study	Drug characteristics influenced more strongly the prescribing decision, followed by promotional tools
Epstein et al. (2014), USA	189 physicians	Formularies and formulary	Questionnaire developed from previous studies	Formulary IT influence physicians' prescribing decisions are influenced by formularies far more than by pharmaceutical firms' detailing and sampling

Oshikoya et al. (2011), Nigeria	163 Doctors in University College Hospital teaching hospital	Promotion materials; drug promotion forum/ product launches;	Questionnaire developed From previous studies	Respondents used drug information from pharmaceutical sales representatives as resources to determine their prescribing behavior. Thus, the influence of promotional tools may have been underestimated.
Narendran and Narendranathan (2013), India	50 physicians	Advertisements; Sales promotion; Public relations; Personal selling; Direct marketing	SAQ	Advertisements in journals and direct mailers, personal selling by salespersons, giving letter pads and even samples were rated less effective strategies influence prescribing
Pedan et al. (2011), USA	16,000 physicians	Drug details; Sample drops; Meals; Medical Journal Advertising	SAQ	The competitive promotional activities Adversely affect physician's prescription behavior
Siddiqi et al. (2011), Pakistan	200 General Practitioners and consultants	Sponsorships; Scientific promotional tools; Personal touch promotional tools; Common promotional tools	SAQ	General practitioners perceived common promotional gifts as most effective tool for changing the prescribing behavior. Consultants perceived scientific promotional tools as most influencing in changing prescribing behaviors.
Allsageer and Kowalski (2013), Lybian	608 Doctors from selected public and private practice settings	Gifts received from pharmaceutical company representatives (e.g.; printed materials; simple gifts or drug samples	SAQ (anonymous)	Perceived benefits: new information about products (95 % approved), invitations to conferences (35 % approved) and receipt of gifts (22 % approved). Acceptance of gifts according to educational value.
Kasliwal and Bansal (2013), India	431 physicians	Rapport with the doctors; drug samples; leaflets; and brochures	SAQ (anonymous)	Promotional factors which influenced the prescribing behavior were: the activities of the MR (medical representative), their rapport with the doctors, their personality traits, and the drug samples, leaflets, and brochures given by the MRs to the doctors.
Arif and Quraishi (2015), Pakistan	400 physicians	Knowledge of MR; Gifts; Reputation of the company; Peer group / senior doctor references; Medical in journals; Sponsoring Medical events; Sampling; Mailing; Packaging inserts; Audiovisuals material (film shows; videos; power point presentations); Seminars; Brochures and Booklets of the medicines provided by the company; Detail aids	SAQ (structured)	Significant influence of marketing Communication strategies and tools on physician's prescribing preferences. Most effective tools were the recommendation of senior doctor references, the reputation of the company, sampling, price of the product, detail aids, seminars and scientific activities. Gifting, packaging inserts, emailing and print ads in medical journal were found to be less critical.
Biswas and Ferdousy (2016), Bangladesh	500 physicians	Journal Advertisements; Direct Mailing; Transport Facilities; Low and High-Value Gift; Free drug Samples; Visit of senior sales Personnel; Sponsoring conferences	SAQ (structured)	Sales personnel activity, personal relation, product quality and reputation of the company influence the prescription behavior of a physician.
Dhanawade et al. (2009), India	50 physicians	CME; Scientific literature; Sponsored conferences; Samples; Books; Journal Advertisement; Promotional Gifts; Mailers	SAQ (structured)	CME and scientific literature, according to the doctors' perception, are the most important promotional tools and which have the maximum impact on the doctor's prescription intentions
Garg et al. (2013), India	100 physicians	Sponsorship for conferences; Medical Education Programs; Packaging; Personal Gifts; Drug Samples	SAQ (structured)	Presenting good quality literature, journals and sponsorship for conferences or personal tours are preferable promotional tools in comparison to organization of free camps, personal gifts, medicine samples or any other incentive
Joshi (2014), India	100 doctors	Highly Qualified And Knowledgeable MR; Gifts; Paid Vacations; Dinners And Other Local Obligations; Personal Touch	SAQ (structured)	Prescription Behaviors largely depends on the various Promotional campaigns of the Pharmaceutical Companies in which Medical Representatives play an essential role in implementations
Murshid et al. (2018), Yemen	393 physicians	Available information; brand; sales promotion and effectiveness of MRs	SAQ (structured)	Marketing elements (available information, brand, sales promotion and effectiveness of MRs) explain the prescribing decisions of physicians
Pathak and Bhola (2013), Indian	90 Physicians	Pens and Pads; Medical Books; Financial assistance for Travel; Sponsorship to an academic event	SAQ (structured)	Nine factors explain prescription behavior: motivation, product, association, tune-up for business, perfect blend, precision, skill sets, monetary aids, and contest
Soremekun and Omitiran (2014), Nigeria	20 physicians	Publications in medical journals; medical textbooks; medical libraries; internet; medical representatives;	SAQ (structured)	Promotional tools influenced prescription behavior, but clinical effectiveness is the primary factor.
Zahrani (2014), Saudi Arabia	204 physicians responded	Gifts offered by drug representatives; reference sources used for prescribing; CME hours characteristics and sponsorships by drug representatives and physicians' beliefs about impact of pharmaceutical companies on prescribing.	SAQ (structured)	Drug characteristics were the most critical factors in physician prescription. The authors showed no significant correlation between promotion tools and prescription.

Table 1: A summary of characteristics of included studies (by the author, participants, constructs, study design and the main findings) sorted on the adopted method.

Other studies were carried out in developing countries, which examined the frequency of visits by MRs [3,4,15,16]. One study analysed the effectiveness of MRs [17] and other studies examined promotion tools (gifts and others) [4,15,18]. Only the study performed in India reported on the influence of free drug samples [19]. Six studies evaluated the entire promotional tools [2,20-24]. One study investigated the influence of advertising in the media [25].

Promotion tools affecting physician prescribing decision

Our review evaluated studies that measured the impact of free drug samples, gifts, pharmaceutical firm-symposium seminars, information communication technology (ICT) promotion and complete promotional packages.

Drug samples

Studies carried out in the US suggested that drug samples influence physicians' prescribing decisions. Wang et al. (2009) reported that medicine samples influenced the prescribing decisions of 77% of their study physicians [11]. Bamoriya (2012) conducted a cross-sectional study in India to investigate the effect of pharmaceutical marketing strategies on prescribing practices [19]. They reported that promotional samples positively and strongly influenced physician prescribing. However, the study does not provide any in-depth information on how to measure the drug samples and how to quantify its effect on prescribing. One study by De Ferrari et al. investigated the physician attitudes towards the pharmaceutical industry [18]. The survey found that 91.2% of respondents were receiving drug samples and consider that receiving them is ethically correct and benefit to their patients. However, the physicians tended to believe that drug samples do not affect their prescribing behaviour.

Information communication technology

ICT promotion tools in this review comprise clinical software, emailed information, and adverts on the media. One of the four studies conducted in the US found that information technology (IT) provides physicians with a collection of relevant information, which influences their prescribing decisions [13]. A similar study conducted in Australia discovered that exposure to advertisements in clinical software has negligible influence on the prescribing behaviour of GPs [26]. In contrast, a recent study performed in Saudi Arabia reported that advertising in media is the most influential factors influencing drug prescribing decisions [27].

Promotional gifts

In developing countries, a cross-sectional survey indicated that 43.9% of specialists and GPs in Turkey believed that promotional gifts have a negligible effect on their prescriptions, while 27% supposed no effect existed. A study in India found that gifts, incentives, and sponsorship influence the prescribing behaviour of physicians, but not to a large extent [15]. However, another study evaluating the impact of mix marketing strategy on drug prescribing did not find any correlation between the promotion tools (gifts and sponsored lectures and) and prescribing behaviour of GPs and family physicians working in primary care centres in Saudi Arabia [4]. However, the studies do not provide a clear justification for the non-effect of 'promotion gifts' on drug prescribing. Also, a recent study in Peru reported that 88% of their study respondents divulged that receiving gifts and attending lunches sponsored by pharmaceutical firms do not affect their prescribing decisions [18].

Overall promotional tools

Total promotional tools denote the sum of exposures to different

promotion tools from pharmaceutical companies. Some of the reviewed studies combined various exposures to promotion or measured overall promotional tools. Pedan et al. found a negative relationship between promotional activities and prescribing decisions in the US, specifically reducing the prescription volume of the target brand. However, Saito et al. carried out a single cross-sectional survey among several specialists in Japan to evaluate the involvement of physicians in promotional activities such as meetings with MRs, gifts and pharmaceutical promotional events [27]. The study submitted the promotion activities have a moderate influence on prescribing behaviour. One a cross-sectional study in Turkey investigated the impact of pharmaceutical promotion on prescribing decisions. Cross-Sectional research conducted in Brazil also studied the factors associated with drug prescription [2]. These authors suggested promotional tools actively and positively affects physicians' prescription decisions. Three studies conducted in India over different years examined the influence of promotion on prescription behaviour. The studies similarly reported that overall promotional tools have a relatively less effect on prescribing decisions [17,21,23]. Nonetheless, promotion tools were shown to have a positive effect on the prescribing decisions of physicians in Pakistan [20,21]. Similarly, Ijoma et al. found that promotion activities have a high influence on prescribing in Nigeria [22].

Discussion

Review of literature demonstrated a significant influence of marketing promotion tools on physician prescribing behaviour. In general, drug prescribing decisions result in a sum of many different factors, which include marketing efforts by pharmaceutical MRs and other promotional activities. Our review identified 41 studies in the last ten years that investigated the impact of promotion tools and pharmaceutical MRs in both developed and developing countries. The empirical evidence provided in the reviewed studies show that pharmaceutical MRs and promotion affect prescription behaviour positively, although in different degrees.

Most doctors believe that their interaction with the pharmaceutical industry does not influence their prescription behaviour. Some studies found that, while doctors may acknowledge that such interaction may influence others, they believe it does not influence them personally. Despite that, MRs consists of the key promotional tool of the pharmaceutical industry receiving one-third of total marketing expenses [28]. Our reviewed studies demonstrated that MRs to increased drug prescription. In Oshikoya et al. physicians' expectations about promotional programs from drug companies included: reliable educational publications (82%); medical equipment (57%); free drug samples (54%); financial support for training courses (43%); social events (e.g., dinners, trips) (34%); and gifts up to \$50 for private use (27%) [29]. In our reviewed studies that reported qualitative data, we noticed that physicians considered the medical representatives as "information providers". They also reported, "Beneficial patronage" and "financial support" as reasons to accept their visits [3].

Nonetheless, some studies stated that MRs has a minimal effect on physicians' prescribing in the US [12]. These results are consistent with those conducted in European countries such as Slovenia, Germany, and Greece, which also reported that the effect of MRs might be minimal or absent in the prescribing decisions of physicians [7-9]. These results might indicate different influences regarding the country development. Evidence also suggested that frequent visits by MRs lowered the quality doctors' prescribing behaviour [8], likely due to sceptical or negative attitudes towards MRs. Another possible explanation is consistent that

doctors believe they are not involved in any marketing activity including the MRs. This result is in line with the systematic review conducted by Salmasi et al. which reported that most physicians believed that MRs would not influence their prescribing [6]. In summary, our findings suggest that, while physicians are aware of the potential influence of the interaction with pharmaceutical companies, they believe that they are themselves less prone to that influence.

Siddiqi conducted a study in Pakistan that compared the perception of general practitioners and consultants regarding three types of promotional tools: "scientific", "personal touch", and "common". The authors demonstrated that "common promotional gifts" effectively changed prescribing behaviour for general practitioners, and "scientific promotional tools" for consultants. In another study, the participants reported the following as essential factors in prescribing a specific drug: relationship with PCR (9%), frequency of PCR visits (34%), and PCR marketing activity (13%) [3]. One study asked the physicians to rate the influence of all actions of pharmaceutical companies on their prescribing behaviour, and the majority considered it of slight influence (50%) or no influence (40%).

Another important aspect to take into account is the physicians' attitudes towards the pharmaceutical industry and their tendency to be influenced by its marketing efforts are shaped very early in their careers and subsequently form their decision making. Recent review unanimously agrees that MRs positively and significantly affect the number of prescriptions for new drugs. To provide a more comprehensive depiction of prescribing behaviours, some models incorporated several other marketing variables. The studies found that MRs positively and significantly affect drug prescription decisions [13], even after controlling other marketing efforts. Research has shown that the interaction between MRs and the physicians can directly influence the latter's prescribing behaviour. The rate of prescriptions increased if doctors accept free samples [30].

According to the previous research, marketing strategies of pharmaceutical companies may positively affect prescription behaviour because frequent visits by MRs provide information to the physician on potency and side-effects of the drug. The promotion tools of pharmaceutical companies provide knowledge, increase product awareness, and direct further information acquisition. The reviewed studies that consider the information provided revealed almost unambiguously that pharmaceutical promotion tools have a significant and positive influence on prescribing. Thus the provision of information in countries or regions where it remains lacking constitutes a strong influence in prescribing behaviour.

Moreover, free drug samples also produce a positive and meaningful impact on the drug prescribing decision. A survey conducted by Pinckney et al. revealed 72% of all American physicians received free drug samples [13]. The results also reported that 94% of doctors working in for-profit clinics and 50% of prescribers in non-profit hospitals have free drug samples in their offices [14]. Both prescribers and manufacturers in the US believe that sample drugs provide a financial benefit to patients and largely serve to help patients who are unable to afford their drugs. In other words, physicians are aware that receiving drug samples influence their prescribing decisions. However, they believe that drug samples are ethical if it benefits the patients.

ICT promotional tools such as information formulary and other ICT marketing tools that include advert placements in clinical software and emailed information influenced prescribing; however, their impact was relatively moderate in Australia [26]. Besides that, Ibrahim et al.

claimed that advert placements in media produce a large impact on prescribing behaviour [25].

Strengths and Limitations of the Included Studies

This review merges two contexts via a systematic review that compares the effect of MRs and other promotion tools on physician prescribing behaviour. Recently, Salmi et al. reviewed a period between 1990 and 2014. They concluded that the marketing efforts influenced the physicians in the prescription of antibiotics. Moreover, Kremer et al. conducted a meta-analysis to determine the efficiency of pharmaceutical promotions [31]. They concluded that overall price moderates these promotions. However, these reviews lack focus on the relationship between promotional tools and physician prescription.

We reviewed the interaction of physicians with PCRs. We limited our studies to include only English publications. Moreover, our chosen studies used different questionnaires which were applied in different cultural and social backgrounds.

In general, the limitations of this review relate to marketing efforts. Only promotion tools (different techniques) and MRs were examined. The effects of direct-to-consumer advertising (DTCA), information on drug, drug brand and other marketing tools on the prescribing decisions of physicians were not reviewed. Therefore, no definite conclusions can be extrapolated from these studies to regulate promotional practices.

The reviewed studies carried out were survey oriented and thus able to measure relationships but not prove causation. Some of these studies tested multiple components of promotional activities that may have little or no combined effect on prescribing but have a significant effect when analysed separately. Also, the majority of the studies comprised non-validated questionnaires and were conducted in different countries with diverse cultural and social backgrounds. This variability is reflected in the results and deductions of the studies. This review is based on results of studies with different methodological objectivity.

Some studies posted that information on drugs is necessary to help physicians ensure the optimal use of medicines. However, a study unambiguously found that MRs' information was less effective on the prescribing decisions of physicians [4]. Zahrani reported that doctors in Saudi Arabia who believed they gained less information from MRs were less expected to prescribe new drugs. Therefore, we still lack an understanding on whether or not the information provided by MRs influence the prescription behaviour, especially in regions that lacks specialized knowledge.

More specifically, the studies of physician-ICT promotional tools interactions identified in the review presented a limited and fragmented research. They also presented a narrow scope, focusing on a particular type of interaction (for example, media advertising). Thus, these studies lack attention to other communication methods attention that the pharmaceutical industry.

Despite that, we remain lacking a complete understanding of the influence of drug sample in the prescribing behaviour. One survey conducted in Peru suggested that physicians view drug samples as a benefit to their patients, but it did not influence their prescribing attitude [18]. However, Bamoriya reported an opposite scenario in India, where drugs sample became more influential on prescribing [19]. However, the difference in health care systems, policies regarding pharmaceutical industry and attitudes towards marketing efforts may cause differences in the effect of drug sample between these two populations. All this

factors should be considered when determining the effectiveness of a certain promotional tool on physician's prescribing behaviour.

Finally, the lack of proper measurements to accurately study the causal relationships (e.g., Zahrani 2014) for promotion tools and small sample size e.g., Sager et al., is evident [4,15]. One needs to exercise caution as the positive effects of promotion tools on prescribing are in this case hypothetical, because the existing research is almost entirely based on the cross-sectional analysis [21,23]. Consequently, the direction of causality remains uncertain, therefore, leaving open the possibility that promotion tools lead physicians to prescribe more drugs.

Therefore, the published research that concerns prescription behaviour in the face of promotional tools still presents many gaps. Future studies should focus on these tools affect prescription attitudes. Our systematic review assessed the, and attitudes of physicians to assist in planning and implement policy interventions. In summary, it remains an open debate regarding the effects of these promotion efforts on physicians' prescription behaviour. Implications for future research.

Theoretical and methodological implications

Some recent review on marketing efforts of pharmaceutical firms focus on a limited set of activities, attitude of physicians regarding interacting with these companies [32], and more specifically on MRs visits, journal advertisements, sponsored meetings, mailed information and prescribing software. The outcomes measured were quality, quantity, and cost of physicians' prescribing. The current review analysed marketing efforts but was more extensive. It has searched MRs' effectiveness, information, visits, knowledge and specific promotional tools such as gifts, sampling, meetings, and ICT promotional tools [33-35].

Managerial implications

In addition to the theoretical contribution to research, this study also contributes to practice. The pharmaceutical industry will benefit from this research by improving their understanding of how they can enhance their drug prescribing and mitigate the criticism that pharmaceutical representatives are extravagant, excessive and potential contributors to the abuse, misappropriation, and mis-prescription of medications [4]. Moreover, since the information provided by MRs has the potential to change physicians' prescribing behaviour, our review suggests that current efforts to improve the information of MRs presented a critical importance [36-39]. The poor quality of information provided by MRs suggests that the pharmaceutical companies may be unable to deliver information effectually. This limitation emphasizes the need for pharmaceutical companies to be fully in charge of improving MR's information. Furthermore, this review discovered that majority of physicians thought promotional gifts do not influence their prescribing decision. Thus, the evolving role of numerous kinds of marketing efforts (increasing effect) is a crucial area of interest for pharmaceutical companies. Also, this review highlights the need to develop guidelines which specify what should be considered appropriate marketing interaction between physicians and pharmaceutical companies, while attempting to reduce if not eliminate the apparent ethical conflicts of interest in the interaction. Intrinsically, introducing and executing guidelines might be a more complex task especially if the country under study did not establish it previously [40-42].

Proposed conceptual model

Based on our current review, we attempted to develop and create a general conceptual theoretical model of promotional tools – physician prescribing based upon the concise review of existing literature [43-46]. The model comprises three major components:

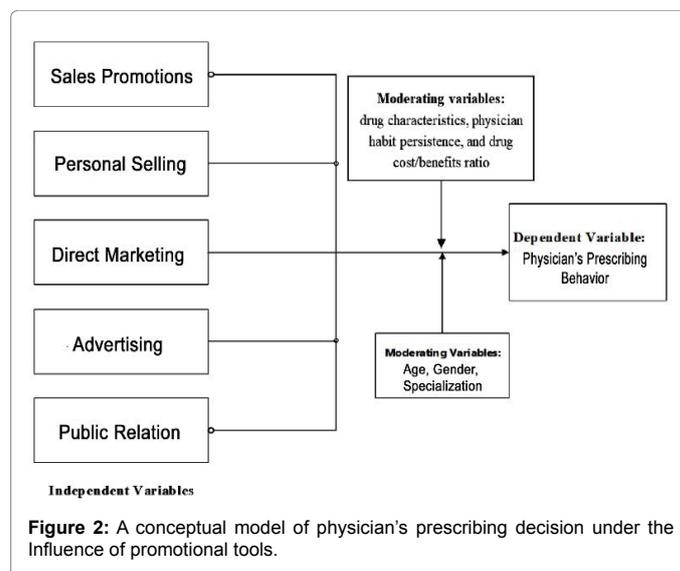


Figure 2: A conceptual model of physician's prescribing decision under the influence of promotional tools.

The promotional tools of many different sources (sales promotion, personal selling, direct marketing, advertising, and public relations); The moderators such as drug characteristics, physician habit persistence, and drug cost/benefits ratio; and The personal characteristics of the physician: age, gender, and the physician's specialty.

The theoretical model was developed to provide an all-inclusive view of promotional tools and their impact on physician prescribing (Figure 2) [47-51]. The conceptual framework of this study based on the stimulus-organism-response (SO-R) paradigm. The S-O-R model was initially proposed by Mehrabian and Russell and the model has subsequently been widely applied in the relevant literature to understand how customers make their buying decisions. Since our major interested relies on the physician prescribing behaviour we defined as independent variables as the stimuli from pharmaceutical companies (sales promotion, personal selling, direct marketing, advertising, and public relations). We also postulate that there are two types of moderator characteristics: those related to the drug (as drug characteristics, physician habit persistence, and drug cost/benefits ratio); and those related to the physician (age, gender, and the physician's specialty) [52-54]. These moderating variables are likely to inform the decisions and strategies of pharmaceutical companies with regard to which marketing tools to adopt; arguably, effective tools are meant to evoke positive feelings among physicians and influence their prescription decisions. Responses in the S-O-R model (i.e. the actual outcomes, in this case the final decisions by the consumer) can be either acceptance or avoidance/rejection. Physicians' prescriptions represent, in this conceptual paper, the dependent variable that is influenced by external stimuli [55-59].

Recommendations for Future Research

This study deduced that a significant amount of the existing studies on MRs and other promotion tools is investigative and based on the content analysis in developed and developing countries. This compensates for the fact that existing literature dealing with the influence of these marketing efforts on the prescribing behaviour are limited, unconvincing and highly debatable. In contrast, questionnaire data or focus group discussions and studies that directly test the relationships are limited. Therefore, future studies should consider these limitations to augment the development research on the influence

of marketing efforts on prescribing. This review also found that no independent review has been carried out to evaluate promotional tools on prescribing across countries [59]. Therefore, it would be beneficial to comparatively analyse how MRs and promotional tools influence prescribing in different countries. Furthermore, this review only focuses on MRs and promotion tools (such as sampling and gifts), which are one among several essential marketing practices. However, it has been reported that there are numerous marketing efforts developed by pharmaceutical firms such as information drug, advertising, internet marketing and various medical education.

Conclusion

This review aimed to comparatively analyse the influence of marketing efforts by MRs and other promotion tools on prescribing behaviour of physicians. We observed that doctors vary their views on the influence of marketing efforts (MRs and promotion tools) on drug prescription. This difference in opinions may be attributable to disparities in their health care systems and drug approval and regulatory systems, drug policies and marketing approaches of pharmaceutical companies. Some studies posted a strong and positive influence, several found only moderate effects, while others reported no or adverse effects.

The interaction between physicians and pharmaceutical occurred mainly via information and rewards. Generally, physicians perceived this interaction as of minimal influence in their prescribing behavior, but their attitudes toward receiving information varied across studies. In conclusion, we report significant interactions between promotion tools and drug prescribing behaviour.

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