The Effect of Pharmacotherapy Audit Meetings on Early New Drug Prescribing by General Practitioners

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BACKGROUND: New drugs are cornerstones of clinical practice. However, when included in practice in an erratic fashion, there is valid concern about uncertain risk–benefit for patients and increased healthcare expenditures. In several countries, general practitioners (GPs) and pharmacists work closely together to ensure proper use of new drugs in clinical practice.

OBJECTIVE: To estimate the effect of pharmacotherapy audit meetings (PTAMs) between GPs and community pharmacists on prescribing of newly marketed drugs by GPs.

METHODS: We conducted an observational study of new drug prescribing in a cohort of 103 GPs, working in 59 practices, from 1999 until 2003. The main outcome measures were the decisions to start therapy with a new drug or with an existing older drug from the same therapeutic category within the first 6 months after market introduction. Multilevel modeling was used for analyses.

RESULTS: Overall, in 6.1% of the decisions to start drug therapy, GPs chose the drug that was most recently introduced into the market. The GPs attending low-quality PTAMs made 1861 decisions to start therapy; in 112 (6.0%) of those decisions, a new drug was preferred over an older alternative. GPs participating in high-quality PTAMs preferred a new drug in only 3.4% of the 3138 decisions made. Compared with GPs participating in PTAMs on the highest quality level (level 4), GPS attending level 1 or level 2 PTAMs were more than twice as likely to start therapy with new drugs than with older drugs (OR 2.24; 95% CI 1.04 to 4.81 vs OR 2.31; 95% CI 1.30 to 4.09, respectively).

CONCLUSIONS: PTAMs may be an effective way to control early prescribing of new drugs in general practice. For PTAMs to be effective, it is vital that GPs and pharmacists set common goals on how to optimize pharmacotherapy. This concordance should be reflected in PTAMs that result in concrete decisions with auditing of GP prescribing behavior. Pharmacists should play an active role in organizing PTAMs to increase their influence on drug prescribing.

KEY WORDS: community pharmacy, prescribing.

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Innovation in pharmacotherapy is a cornerstone in clinical practice. However, prescribing of newly marketed drugs is not uniformly distributed among physicians, and some new drugs are prescribed more than medical need can account for.[1-3] Erratic inclusion of new drugs into clinical practice fuels the ongoing discussion about the trade-off between the wish to treat patients more effectively and ensuring sustainable cost-containment in health care.[4-6] With an aging population and an increasing ability to treat many chronic diseases with medicines, general practitioners (GPs) report difficulties in staying up-to-date with medical innovations.[7-9] To ensure that optimal care is given to patients, a teamwork approach by healthcare professionals is important.[10,11]

In the Netherlands, community pharmacists and GPs practicing in the same catchment area regularly organize pharmacotherapy audit meetings (PTAMs) to improve the quality of prescribing by making decisions on first choice treatment.[12,13] PTAMs are defined as a series of regular meetings between GPs and pharmacists during which information and views about pharmacotherapy are exchanged with the aim to improve the prescribing and dispensing of drugs.[13] Participation in PTAMs is voluntary for pharmacists and GPs, and the participants decide which topics are discussed during the meetings. Clinical assessment of newly marketed drugs is one important topic on the agenda in more than 70% of all PTAMs.[13,14] In 2003, 794 PTAMs, consisting on average of 9 GPs and 2 pharmacists, were active. These numbers indicate that nearly all Dutch GPs and community pharmacists participate in PTAMs.

The literature pertaining to the effect of PTAMs on GP prescribing behavior is limited and, in addition, does not

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address their effect on new drug prescribing.[13,15] Therefore, the purpose of the present study was to estimate the effect of PTAMs on prescribing of newly marketed drugs by GPs.

Methods

SETTING

This study used dispensing data from patients of 103 GPs who participated in the second Dutch national survey of general practice (DNSGP-2), conducted by the Netherlands Institute for Health Services Research in 2001.[16] All GPs who participated in the DNSGP-2 listed the pharmacies where most of their patients filled their prescriptions. These pharmacies were invited to participate in the study by letter and, if necessary, followed up with a telephone call 1–2 weeks later. From the pharmacies that agreed to participate, dispensing data of the GPs were collected from the SFK (Foundation for Pharmaceutical Statistics).[17] The 103 GPs worked in 59 nondispensing practices in all 12 provinces of the Netherlands. Dispensing data covered the years 1999 until 2003. Information on the selection of GPs and pharmacies and subsequent linking of the GP data to the pharmacy dispensing data is presented in detail elsewhere.[18] Because virtually all patients in the Netherlands designate a single pharmacy to fill prescriptions from GPs and medical specialists, dispensing data provide an almost complete account of drug exposure over time.[19] The 103 GPs worked in 59 nondispensing practices in all 12 provinces of the Netherlands. The characteristics of the GPs were comparable with those of the original sample of the DNSGP-2 with respect to type of office, location of those in deprived areas, and degree of urbanization.[18]

Data on PTAMs were collected through a questionnaire sent in December 2003 to 123 community pharmacies that worked closely together with the 103 GPs. The pharmacist most actively involved in the PTAMs filled in the questionnaire, which requested information on the quality, composition, and content of the PTAMs. In the Netherlands, PTAMs are categorized into 4 levels based on their capability to make decisions as follows[13]: level 1 = no structured meetings, level 2 = frequent meetings without concrete decisions, level 3 = frequent meetings with concrete decisions, and level 4 = frequent meetings with concrete decisions and evaluation of these decisions. The differences between the different levels are mainly the ability to make decisions and to evaluate these decisions in subsequent meetings. PTAMs do not have a legal basis, but merely consist of professional commitment of the participants to make decisions. If more than one pharmacist attended the same PTAM and their assessment of the PTAM's quality differed, the lowest value was used in the analysis to avoid overestimation of the effectiveness of the PTAMs.

In this setting, 5 new drugs were selected as study cases: (1) the combination of the long-acting bronchodilator salmeterol and inhaled corticosteroid fluticasone, (2) the cyclooxygenase-2 inhibitor rofecoxib, (3) the proton pump inhibitor esomeprazole, (4) the long-acting anticholinergic bronchodilator tiotropium, and (5) the statin rosuvastatin. Table 1 shows some relevant characteristics of these case study drugs. All 5 new drugs showed rapid market penetration and were listed within one year after market introduction in the top 10 drugs associated with the fastest growing expenditures in the Netherlands.[17] As reference drugs for the selected case study drugs, we used, respectively, (1) all long-acting β_2-antagonists and inhaled corticosteroids, (2) all nonsteroidal antiinflammatory drugs, except low-dose aspirin, (3) all proton pump inhibitors, (4) all ipratropium bromide–containing products, and (5) all statins.

DESIGN

With the introduction of a new drug, GPs can choose to treat a patient with either the older one that has proven effectiveness (if available) or the newly introduced agent. For this study, we included all patients receiving a new or an older reference drug during the first 6 months after the market introduction. The primary outcome measure was the GP's decision to start drug therapy in patients with a new or reference drug. The date of the patient's first prescrip-

Table 1. Characteristics of the Drugs Included in the Study

New Drug	Market Introduction	Main Indication[a]	Reference Group
Salmeterol/fluticasone	May 1999	asthma/COPD	long-acting β_2-agonists and ICS
Rofecoxib[b]	April 2000	rheumatoid arthritis	NSAIDs, excluding low-dose aspirin
Esomeprazole	November 2000	GERD	PPIs
Tiotropium	June 2002	COPD	ipratropium bromide–containing products
Rosuvastatin	March 2003	hypercholesterolemia	statins

COPD = chronic obstructive pulmonary disease; GERD = gastroesophageal reflux disease; ICS = inhaled corticosteroids; NSAIDs = nonsteroidal antiinflammatory drugs; PPIs = proton pump inhibitors.
[a]Main indication at registration derived from Dutch Medicine Evaluation Board (www.cbg-meb.nl).
[b]Rofecoxib was withdrawn from the market in 2004 after showing a twofold increased risk of myocardial infarction and stroke compared with placebo.

tion for either drug was termed the index date. Starting was defined as receiving a prescription for a new or reference drug and no prescription for the same drug the 6 months before the index date. Patients who had no refills within 6 months after the initial prescription were excluded. Both new starters and switchers were included in the analysis.

DATA ANALYSIS

To estimate the effect of PTAMs on new drug prescribing, we used a logistic multilevel model with 2 levels, namely, patients nested within GPs. For practical reasons, we eliminated the practice or the pharmacy where the GPs' patients usually go to as a level; a 3-level model would have been very difficult to create. Characteristics of PTAMs were modeled as characteristics of GPs. Using a multilevel model enabled us to adjust for differences between patients and clustering of patients within GPs that might affect a GP's decision to prescribe new drugs.[20] Instead of running separate analyses for the 5 different new drug and reference drug groups, we included dummies to represent the groups. In this way, we took into account that new drug prescribing in one group might be related to that in other groups. The patient's age, gender, and chronic disease score[21] were used to adjust for any patient influences. Odds ratios with 95% confidence intervals were estimated for all PTAM characteristics one by one and adjusted for all patient characteristics. Due to the relatively small number of GPs, we were unable to perform a multivariate multilevel analysis to adjust for all characteristics simultaneously.

Results

For 86 (83.5%) of the 103 GPs, both dispensing data and information on PTAMs were available. The average age was 46.6 years (SD = 6.3), 26.7% were female, and 53.5% worked alone. The GPs on which no information on PTAMs was available did not differ from the other GPs with respect to age and gender. The proportion of GPs prescribing the new drugs during the first 6 months after market introduction ranged from 31.6% for esomeprazole to 74.0% for tiotropium. Rofecoxib was prescribed by 69.0%, rosuvastatin by 43.2%, and salmeterol/fluticasone by 43.3% of the population.

In total, 849 patients were identified as having been started on 1 of the 5 new drugs and 13 149 patients as starters on 1 of the older reference drugs (Table 2). This means that, in 6.1% of the decisions to initiate therapy, the drug most recently marketed was prescribed. The number of patients starting on a newly marketed drug was highest for tiotropium (29.5%) and lowest for salmeterol/fluticasone (2.2%). Of all patients starting rofecoxib, 56.4% were switchers. For rosuvastatin, 55.9% were switchers; for tiotropium, 37.6%; for esomeprazole, 49%; and for salmeterol/fluticasone, 56.4%.

As shown in Table 2, the preference for the latest drug on the market increased when GPs participated in low-quality PTAMs. Out of the 1861 decisions to initiate new therapy, in 112 (6.0%) cases a new drug was chosen over an older alternative by the GPs attending low-quality PTAMs. The decision to prescribe a newly marketed drug was made in 108 of the total of 3138 (3.4%) times that therapy was started by the GPs attending high-quality level 4 PTAMs.

The findings shown in Table 2 were confirmed by multilevel analysis. When adjusted for the patients' age, gender, and chronic disease score, the GPs attending level 1 PTAMs (OR = 2.24; 95% CI 1.04 to 4.81) or level 2 PTAMs (OR = 2.31; 95% CI 1.30 to 4.09) were more than twice as likely to prescribe drugs in the early postmarketing period than GPs participating in PTAMs on the highest level (level 4) (Table 3).

In addition, we noted that, as the number of GPs attending the PTAMs increased, GPs prescribed new drugs more frequently (OR = 1.05; 95% CI 1.01 to 1.09) (Table 3). The same trend was observed for the total number of PTAM participants (OR = 1.06; 95% CI 1.02 to 1.10). GPs participating in PTAMs that made decisions about who receives pharmaceutical representatives were less likely to prescribe new drugs (OR = 0.36; 95% CI 0.24 to 0.56).

Table 2. Number of Decisions to Start Therapy

PTAM Level[a]	GPs, n (%)	Esomeprazole, n (%)	Rofecoxib, n (%)	Rosuvastatin, n (%)	Salmeterol/ Fluticasone, n (%)	Tiotropium, n (%)	Overall, n (%)
4	25 (29.1)	14/358 (3.9)	36/2092 (1.7)	10/148 (6.8)	4/394 (1.0)	44/146 (30.1)	108/3138 (3.4)
3	17 (19.8)	19/336 (5.7)	110/2186 (5.0)	35/134 (26.1)	7/617 (1.1)	73/241 (30.3)	244/3514 (6.9)
2	35 (40.7)	39/671 (5.8)	161/3222 (5.0)	50/218 (22.9)	37/1005 (3.7)	98/368 (26.6)	385/5484 (7.0)
1	9 (10.5)	12/142 (8.5)	46/1129 (4.1)	14/67 (20.9)	6/433 (1.4)	34/90 (37.8)	112/1861 (6.0)
TOTAL	86 (100)	84/1507(5.6)	353/8629 (4.1)	109/567 (19.2)	54/2449 (2.2)	249/845 (29.5)	849/13 997 (6.1)

GP = general practitioner; PTAM = pharmacotherapy audit meeting.
[a]Level 4 = frequent meetings with concrete decisions and evaluation of these decisions (highest quality); level 3 = frequent meetings with concrete decisions; level 2 = frequent meetings without concrete decisions; level 1 = no structured meetings (lowest quality).

Discussion

The objective of this study was to evaluate the effect of PTAMs on new drug prescribing by GPs during the first 6 months following market introduction. Our findings show that early new drug prescribing by GPs is restricted when the physicians and community pharmacists collaborate in high-quality PTAMs that make concrete decisions to optimize pharmacotherapy and evaluate GPs' prescribing behavior.

The main strength of our study is that we analyzed new drug prescribing by GPs in a multilevel structure of patients clustered in GPs, while also taking into account the physicians' professional interactions with community pharmacists. We noted that GPs participating in low-quality PTAMs, namely those that do not have frequent meetings and fail to make decisions to optimize pharmacotherapy, prescribe more new drugs compared with GPs participating in high-quality PTAMs. There may be several explanations for this finding. One explanation, of course, is a direct effect of PTAMs on a GP's decision to prescribe a new drug. Making decisions to optimize pharmacotherapy may result in a restriction on the number of drugs GPs can prescribe, especially when their prescribing behavior is evaluated.

Another explanation may be the participants' attitudes toward new drugs. GPs who are willing to professionalize PTAMs to function on level 4 may have different attitudes regarding new drug prescribing than those attending non-committal PTAMs. Prosser and Walley[22] noted that new drug prescribing depends on a GP's beliefs rather than objective evaluation of the literature. Those with a negative attitude toward prescribing of new drugs might also influence and support the decisions of other prescribers.[23] In addition, GPs participating in the same PTAMs show more resemblance in their prescribing behavior compared with GPs participating in different PTAMs.[13] Therefore, further research is needed to elucidate whether the GPs' restraint in new drug prescribing is the result of decisions made during PTAMs.

Some conditions need to be met before PTAMs are effective in influencing GP prescribing behavior. A key prerequisite for PTAMs to reach decisions about optimizing pharmacotherapy is a group of willing GPs and pharmacists. We found that only GPs participating in PTAMs with a sufficient internal basis to make decisions prescribed fewer new drugs. In addition, physicians participating in smaller PTAMs prescribed fewer new drugs. As the number of participants per PTAM increases, effectiveness seems to decrease and GPs prescribe more new drugs. Veninga et al.[24] recommended that the optimal number of participants for PTAMs is 5–6 healthcare practitioners and that participants in smaller groups were shown to be more satisfied with the climate in the group.

Our data show that PTAMs that made decisions about who receives visits from pharmaceutical representatives had a limiting effect on new drug prescribing. Moreover, our results may indicate that inviting pharmaceutical representatives to PTAMs resulted in more new drug prescribing. Numerous studies have shown that receiving visits from pharmaceutical representatives is a strong predictor for adopting new drugs.[25,26] The wish to stay up to date with medical advances is often mentioned by physicians as a reason for seeing pharmaceutical representatives.[7,22] In our study, some GPs who participated in level 4 PTAMs decided not to see pharmaceutical representatives themselves, but instead agreed that only pharmacists received visits. The information on a new drug can be filtered and assessed as to its scientific value by pharmacists and subsequently discussed during PTAMs. This might offer a

Table 3. Multilevel Regression Analysis of New Drug Prescribing[a]

Basic model including drugs and pt. characteristics		
New drug	Coefficient, % (95% CI)	
esomeprazole	1.5 (1.0 to 2.5)	
rofecoxib	1.9 (1.3 to 2.6)	
rosuvastatin	6.3 (4.0 to 10.0)	
salmeterol/fluticasone	1.6 (1.1 to 2.4)	
tiotropium	17.0 (12.0 to 24.0)	
Pt. characteristics		OR (95% CI)
female, n (%)	9706 (58.5)	**1.31 (1.15 to 1.48)**
age, mean ± SD	50.2 ± 20.2	**1.02 (1.02 to 1.02)**
chronic disease score, mean ± SD	2.32 ± 2.7	**1.06 (1.04 to 1.09)**
Basic model plus PTAM characteristics, introduced one at a time		
Quality level of PTAMs[b]	GPs, n (%)	OR (95% CI)
level 4	25 (28.1)	reference
level 3	17 (19.1)	1.49 (0.77 to 2.88)
level 2	35 (39.3)	**2.31 (1.30 to 4.09)**
level 1	9 (10.1)	**2.24 (1.04 to 4.81)**
Composition of PTAMs, mean ± SD		
pharmacists, n	3.5 ± 2.0	1.06 (0.97 to 1.16)
pharmacies, n	2.2 ± 1.0	1.05 (0.98 to 1.12)
GPs, n	9.5 ± 3.1	**1.05 (1.01 to 1.09)**
total participants	13.0 ± 5.3	**1.06 (1.02 to 1.10)**
Other PTAM characteristics	GPs, n (%)	OR (95% CI)
Are newly marketed drugs discussed during PTAMs?		
yes	82 (92.1)	0.59 (0.12 to 2.87)
Are decisions about which new drugs should or should not be prescribed made during PTAMs?		
yes	27 (30.3)	0.82 (0.50 to 1.33)
Are decisions about which drugs are first choice made during PTAMs?		
yes	68 (76.4)	0.88 (0.50 to 1.54)
Are pharmaceutical representatives invited to attend PTAMs?		
yes	11 (12.4)	1.54 (0.81 to 2.96)
Are decisions about who receives pharmaceutical representatives made during PTAMs?		
yes	41 (46.1)	**0.36 (0.24 to 0.56)**

GP = general practitioner; PTAM = pharmacotherapy audit meeting.
[a]Significant findings in bold type.
[b]Level 4 = frequent meetings with concrete decisions and evaluation of these decisions (highest quality); level 3 = frequent meetings with concrete decisions; level 2 = frequent meetings without concrete decisions; level 1 = no structured meetings (lowest quality).

valuable opportunity for GPs to save time and stay up to date, with limited commercial influences.

The results of our study need to be interpreted in light of its limitations. Our results are based on the prescribing of 5 new drugs; therefore, generalizing these results to all new drugs should be done with restraint. However, the case drugs used here are clear examples of rapid market uptake with a strong rise in healthcare expenditures. The main limitation of our study is that, due to the relatively low number of physicians, we were unable to estimate the effect of PTAMs in a multivariate model. Furthermore, characteristics of PTAMs were collected through a questionnaire completed only by pharmacists, and the most conservative assessments were used in the analysis. Other studies have identified differences between GPs' and pharmacists' perceptions regarding the quality of PTAMs.[13,27] In general, physicians rate the quality of PTAMs higher than the rating given by pharmacists.

Conclusions

Professional collaboration between GPs and community pharmacists in PTAMs is an effective way to control early new drug prescribing in general practice. For PTAMs to be effective, it is vital that GPs and pharmacists set common goals on how to optimize pharmacotherapy. This concordance should be reflected in PTAMs with frequent meetings that result in concrete decisions with auditing of GP prescribing behavior. Pharmacists should play an active role in organizing PTAMs to increase their influence on prescribing.

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EXTRACTO

INTRODUCCIÓN: Los nuevos medicamentos son elementos claves de la práctica clínica. Sin embargo, cuando su utilización responde a una moda errática, existe una legítima preocupación por el dudoso cociente beneficio–riesgo de cara a los pacientes y el incremento de gasto que suponen. En varios países, los médicos generales (GPs) y los farmacéuticos trabajan en estrecha colaboración para asegurar el uso adecuado de los nuevos medicamentos.

OBJETIVO: Estimar el efecto de las reuniones entre médicos y farmacéuticos para auditar la farmacoterapia (PTAMs) en la prescripción de los medicamentos de reciente comercialización.

MÉTODOS: Estudio observacional de prescripción de nuevos medicamentos en una cohorte de 103 médicos generales, de 59 centros sanitarios, de 1999–2003. Las principales medidas de resultados fueron las decisiones de empezar una terapia con un nuevo medicamento o con uno ya existente del mismo grupo terapéutico, en los 6 primeros meses tras su introducción en el mercado. Para el estudio de los datos obtenidos, se empleo el análisis multinivel.

RESULTADOS: En general, se eligió el medicamento de más reciente comercialización para iniciar el tratamiento en el 6.1% de los casos. Los GPs que participan en PTAMs de baja calidad decidieron iniciar 1.861 tratamientos, de los cuales en 112 (6.0%) eligieron un nuevo medicamento en lugar de una alternativa más antigua. Los GPs que participan en PTAMs de alta calidad eligieron un nuevo medicamento sólo en 3.4% de las 3138 decisiones de inicio de tratamiento que adoptaron. La probabilidad de iniciar un tratamiento con un nuevo medicamento fue más de 2 veces mayor para los GPs que participan en PTAMs de niveles 1 y 2 que para los que participan en PTAMs de la más alta calidad (nivel 4), (OR = 2.24; 95% CI 1.04 y 4.81 y OR = 2.31; 95% CI 1.30 y 4.09, respectivamente).

CONCLUSIONES: Los PTAMs pueden ser una forma efectiva de controlar la prescripción de nuevos medicamentos en medicina general. Para que los PTAMs sean efectivos, es vital que los GPs y los farmacéuticos fijen objetivos comunes de mejora de la farmacoterapia. Esta concordancia debe reflejarse en PTAMs que adopten decisiones concretas con auditorías de los hábitos de prescripción de los GPs. Los farmacéuticos deben tomar parte activa en la organización de PTAMs para ampliar su influencia en la prescripción de medicamentos.

Juan del Arco

RÉSUMÉ

CONTEXTE: L'innovation en pharmacothérapie est une pierre angulaire de la pratique clinique. Cependant, en cas d'adoption erratique des nouveaux médicaments, il se pose le problème réel d'un rapport risque–bénéfice douteux pour les patients et d'une augmentation des dépenses de santé. Dans plusieurs pays, les médecins généralistes (MG), et les pharmaciens travaillent étroitement associés pour assurer une utilisation appropriée des nouveaux médicaments en pratique clinique.

OBJECTIF: Estimer les effets des réunions d'audit de la pharmacothérapie (RAP) entre MG et pharmaciens d'officine sur la prescription par les MG de médicaments récemment mis sur le marché.

MÉTHODES: Etude observationnelle de la prescription de nouveaux médicaments sur une cohorte de 103 MG, exerçant dans 59 cabinets, sur la période 1999–2003. Le critère d'évaluation principal était la décision de démarrer un traitement avec un nouveau médicament ou avec un médicament existant plus ancien de la même classe thérapeutique dans les 6 mois après la mise sur le marché. Une modélisation à plusieurs niveaux a été utilisée pour les analyses.

RÉSULTATS: Globalement, dans 6.1% des décisions d'initiation d'un traitement médicamenteux, le choix s'est porté sur le médicament le plus récemment introduit sur le marché. Les MG ayant participé à des RAP de faible qualité ont pris 1861 décisions d'initiation de traitement où 112 fois (6.0%) un nouveau médicament a été préféré à un ancien. Les MG ayant participé à des RAP de bonne qualité ont préféré un nouveau médicament dans seulement 3.4% des 3138 décisions prises. Par comparaison aux MG ayant participé à des RAP du plus haut niveau de qualité (niveau 4), les MG ayant assisté à des RAP de niveau 1 ou 2 étaient plus de 2 fois plus susceptibles d'initier un traitement avec de nouveaux médicaments qu'avec des médicaments plus anciens (OR = 2.24; IC 95% 1.04 à 4.81 et OR = 2.31; IC 95% 1.30 à 4.09, respectivement).

CONCLUSIONS: Les RAP sont susceptibles d'être un moyen efficace de maîtriser la prescription de nouveaux médicaments en pratique clinique. Pour que ces RAP soient efficaces, il est indispensable que les MG et les pharmaciens définissent ensemble des objectifs communs sur la manière d'optimiser la pharmacothérapie. Cette concordance devrait apparaître dans les RAP d'où sont issues des décisions concrètes avec évaluation des attitudes de prescription des MG. Les pharmaciens devraient prendre une part active dans l'organisation des RAP pour étendre leur influence sur la prescription médicamenteuse.

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