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Acceptance of a medication refill reminder service in German community pharmacy practice

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Medication refill reminder services (MRRS), having the potential to support the detection of non-adherence and to promote periodic medication refilling by addressing forgetfulness, are not generally available in community pharmacy practice. Based on a new software module, a MRRS was developed. The acceptance of this service was tested in community pharmacies in Germany. Patients were recruited by trained pharmacy staff. Supported by the software, the pharmacies reminded patients to refill their prescription. After 7 months, the service was evaluated by patients and pharmacy staff. The pharmacy owners/managers were interviewed. Ten pharmacies applied the service to 148 patients, with 806 refill reminders for 391 drugs. Seventy-five patients (50.7%) chose to be reminded by a phone call, followed by text message (n=25), and email (n=18). Of all patients, 75 (50.7%) completed the paper-based questionnaire. Sixty-eight (90.7%) rated the service as good or very good and 54 (72.0%) felt more satisfied with their pharmacy. Sixty-four patients (85.3%) considered the service as supportive and wanted to continue. Thirty-nine pharmacy staff members (61.9%) answered the online questionnaire. Twenty-four (61.5%) stated that they found it difficult to use and apply the MRRS; twenty-six (66.6%) experienced technical problems. The service was rated good by 16 (41.0%) pharmacy staff members. They regarded the service helpful for some patients and wanted to continue after the end of the study. The majority of the ten interviewed pharmacy owners/managers expressed the opinion that the service was not very suitable for increasing customer loyalty and not cost-effective. Nevertheless, six (60.0%) of them wanted to continue using the service. The MRRS seems to be feasible, apart from technical difficulties. Patients rated the service as supportive, and the personal contact seems to be of high importance; most patients would like to continue the service. However, offering the service to patients turned out to be challenging in daily German community pharmacy practice.

1. Introduction

According to the World Health Organization (WHO), adherence is defined to be the extent to which a person's behavior – taking medication, following a diet, and/or executing lifestyle changes – corresponds with agreed recommendations from a health care provider (Sabaté 2003). A collaboration funded by the EU Commission defined medication adherence as the process by which patients take their medications as prescribed. They divided the process into three phases: initiation, implementation, and discontinuation, of which initiation is defined as the moment at which the patient takes the first dose of a prescribed medication; the implementation of the dosing regimen, being the extent to which a patient's actual dosing corresponds to the prescribed dosing regimen from initiation until the last dose taken; and discontinuation, being the end of therapy, when the next dose to be taken is omitted and no more doses are taken thereafter (Vrijens et al. 2012, 2014).

Many factors are involved in patients' non-adherence of which most are determinants of implementation (Kardas et al. 2013). Examples are factors related to the characteristics of the disease, duration of treatment, frequency of medicine taking, and complexity of treatment (Schulz et al. 2016; Ahmed and Aslani 2014). Also patient related factors, such as behavior and attitudes, have an impact on adherence in terms of implementation (Kardas et al. 2013). For example, forgetfulness, fear of side effects, reservations toward drug taking, and insufficient understanding about drug therapy have been found to be related to medication non-adherence. For

example, up to 60% of individuals identify forgetfulness as their primary factor for non-adherence (Choudhry et al. 2017).

Non-adherence to pharmacotherapy is a widely prevalent problem and affects 20–50% of all patients with chronic diseases (Claxton et al. 2001; Ho et al. 2009; Blaschke et al. 2012). In patients with chronic diseases like chronic heart failure (CHF) reduced adherence correlates with morbidity and mortality (Chapman et al. 2010; Riegel and Knafel 2013; Granger et al. 2005; Fitzgerald et al. 2011). The costs for poor medication adherence in Germany were estimated to be at least EUR 4 billion (Laufs et al. 2011). Enhancement of medication adherence has the potential to improve public health more than developing new therapies (Nieuwlaet et al. 2014). Therefore, it is necessary to develop strategies to improve adherence to chronic medication (Sabaté 2003; Vrijens et al. 2012, 2014). The initial step is to recognize non-adherence followed by evaluating the reasons for such behavior and then intervene appropriately to build a routine of medication taking.

Community pharmacies regularly dispensing prescribed medicines are in a good position to help patients to be adherent. Reminder-services offered by pharmacies can help to recognize non-adherence and monitor possession of medication. This provides pharmacies with a tool to identify non-adherent patients and approach them for intervention. This kind of service was for example successfully implemented in community pharmacies e.g., in the Netherlands (van Boven et al. 2014).

The aim of our study was, therefore, to test the acceptance of a Medication Refill Reminder Service (MRRS), provided by community pharmacies in Germany.

2. Investigations and results

2.1. Investigations

2.1.1. The service

A reminder software module for one pharmacy software was developed and tested to support the service. The activated MRRS-module allows generating a reminder 10 days before a patient needs a new prescription, based on the information stored in the pharmacy software (including the dosage). Patients could choose whether they wanted to be reminded for all drugs or just selected ones. The patient received a reminder through their preferred reminding method i.e., either phone call, text message, email or letter, including to opt for a combination of these. This reminder is called the 'proactive reminder'. If the patient does not react to this initial reminder, the system generates a 'reactive reminder' 10 days later as it was likely that the patient did not refill his medication. In this case, a personal contact by a pharmacy team member (pharmacist or pharmacy technician) by telephone may have been initiated, asking about the (non-)use of the medicine and offering counselling concerning adherence. The software documented the date and type of the reminders. To cover at least two medication refill periods, we studied the reminder service for a period of 6 months, as chronic medications in Germany are mostly prescribed in a package size covering a period of 3 months.

2.1.2. Participants

The participating community pharmacies were approached and selected by the pharmacy software company. Within a 4-hours-seminar, pharmacies, which signed informed consent, were trained in communication skills like addressing patients for recruitment and approaching patients about adherence problems, and on the function of the MRRS. Pharmacies were supported by a telephone hotline for technical and content-related matters before and during the study. Recruitment of patients started no later than two weeks after the training seminar.

Potential participants were identified based on a list of prescription-only medicines for predefined indications and chronic use. This list of indicator medicines included diuretics, betablockers, calcium channel blockers, agents acting on the renin-angiotensin system, lipid modifying agents, and oral antidiabetics. The list was inserted into the software to notify the pharmacist when a patient filled a prescription with an indicator medicine.

Patients were recruited by the trained pharmacy staff and were free to decline the service. Patients' inclusion criteria were possession of a client card including a medication file in the pharmacy and a signed informed consent form including permission to provide data to the research team anonymously. Parents had to approve participation of minors. The software indicated potential candidates for the service based on these criteria plus the use of an indicator medicine automatically from the pharmacy software by a notification when patients showed their client card.

The pharmacies were free to include other medicines such as thyroid hormones or even OTC-drugs for chronic use in their software module e.g., vitamin D, *Ginkgo biloba*, or St. John's Wort preparations. They were free to include other patients with supposed forgetfulness or other needs of the service beside the indicator medicines as well. The aim was to recruit about 100 patients altogether to reach a certain routine in the pharmacies. Patients who lived in a nursing home were not eligible and patients hospitalized during the study were excluded.

2.1.3. Surveys

A) Patients

After 7 months, the patients (including participating children) rated the usefulness of the service by an anonymous paper based ques-

tionnaire. It contained three items regarding patients' characteristics (age, gender, medication) and six items regarding the reminding method and satisfaction with the service. Items were scored using closed questions with yes/no option or multiple responses allowed, and a 6-point Likert scale, ranging from 1 to 6 (very good – very poor). The questionnaire was developed and tested for comprehensibility in a convenience sample of four patients.

B) Pharmacy staff

After 7 months, we asked pharmacy team members to fill in an anonymous online survey. This questionnaire was divided into the following four main parts:

Addressing patients. This part included eight questions regarding (difficulties) recruiting patients, integration of inviting patients in daily practice, and main reason from patients' perspective for not participating.

Integration of the service. This part included four questions regarding duration of the reminder service, reaction of patients, and integration of the MRRS in daily practice.

Training and technical support. This part included seven questions regarding satisfaction of the seminar and support for content-related and technical problems.

Functionality of the software providing the MRRS. This block included five questions regarding technical problems and functionality of the software.

Finally, the staff was questioned about their overall satisfaction with the MRRS. Items were scored using yes/no option as well as single or multiple responses allowed, free text, and a 6-point Likert scale, ranging from 1 to 6 (very good – very poor).

C) Pharmacy owners/managers

Additionally, we conducted semi-structured telephone surveys with the pharmacy owners/managers. They were asked about their experiences, motivation of staff, selection of potential patients for the service, and whether they found the service economically attractive to continue after the study.

2.2. Results

2.2.1. Participants

Between July 2011 and February 2012, 10 community pharmacies invited 550 patients to participate. The time lag between the 4-hours-training seminar and start of patient recruitment was 1–2 weeks. Figure 1 shows the selection process of the patients. Of 550 patients invited, 226 (41.1%) accepted to participate. The following reasons for not addressing patients were mentioned: time restraints, reluctance in addressing patients, sickness, and rejection of the project by pharmacy staff.

Of 226 patients participating, 78 (34.5%) did not receive a reminder (Fig. 1). Reasons were time restraints and sickness. One pharmacy did not distribute a single reminder to their eight patients. Due to anonymity of patients and staff members regarding results of data provided in the questionnaire and survey, we were unable to analyse the data of this pharmacy separately.

Finally, nine pharmacies produced and distributed reminders at least once to 148 patients, with a range of one to 35 patients per pharmacy.

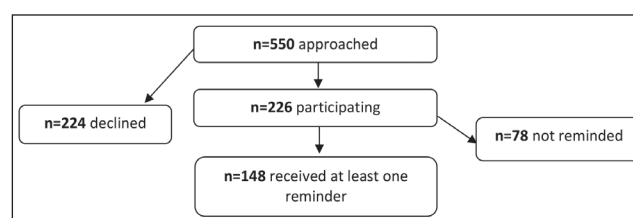


Fig. 1: Flow of recruited patients

Table 1 shows patients' characteristics. The median age was 68 years; 100 patients (64.9%) were female. The median number of chronic (indicator) medications was two. Seventy-five patients

(50.6%) preferred a reminder by a phone call and a few chose to receive two types of reminders. Forty-nine patients (33.0%) opted to receive reminders for a single drug and 99 (67.0%) for all their medicines. In total, the 148 patients received 458 proactive and 358 reactive reminders for 391 different medicines.

Table 1: Characteristics of patients (N=148)

Characteristic	Median (range) or n (%)
Age (years)	68 (9–91)
< 60 years	48 (32.4)
> 60 years	100 (67.6)
Female	96 (64.9)
Type of reminder requested	
• Phone call	75 (50.7)
• Text message	25 (16.9)
• Email	18 (12.2)
• Letter	12 (8.1)
• Personal contact in the pharmacy	11 (7.4)
• Two types of reminders	7 (4.7)

As shown in Table 2, the reminded 148 patients received refill reminders primarily for cardiovascular diseases including lipid-lowering drugs, followed by thyroid hormones and proton pump inhibitors (PPI). The latter two were not part of the list of indicator medicines but frequently present in the medication files and, therefore, included.

Table 2: Top five drug classes with number (%) of patients receiving reminders

Drug class	Patients with reminders [n (%)]
Beta blocking agents	37 (25.0)
Agents acting on the renin-angiotensin system	27 (18.2)
Lipid modifying agents, plain	25 (16.9)
Thyroid preparations	24 (16.2)
Drugs for peptic ulcer and gastro-oesophageal reflux disease	21 (14.1)

2.2.2. Patients' survey

Of 148 patients who received reminders, 75 (50.6%) fully completed the questionnaire (Table 3). The median age was 72 (range 9–91) years and 54 (72.0%) were female. The median number of chronic medications was five. Forty-nine patients (65.3%) preferred a reminder by phone call and 54 (72.0%) felt more satisfied with their pharmacy and rated the MRRS as very good or good.

2.2.3. Pharmacy staff survey

Of the 63 pharmacy staff members (including the owners/managers) from the 10 recruiting pharmacies, 39 (61.9%) answered the online questionnaire (75.0% pharmacists and 25.0% pharmacy technicians).

Addressing patients. According to answers of the pharmacy staff, nearly half of the invited patients declined to take part, because they could remember to request a new prescription without assistance. Nineteen staff members (48.7%) needed 6–10 minutes to recruit a patient and were easily able to integrate the process of inviting patients in their daily practice.

Integration of the service. Twenty-eight staff members (71.8%) needed 1–5 min to remind a patient. Difficulties to integrate and

Table 3: Results of patients' survey (N=75)

Characteristic / Result	Median (range) or n (%)
Age (years)	72 (9–91)
Female	54 (72.0)
Number of chronic medications	5 (1–15)
Rated the process of MRRS: - very good	38 (50.6)
- good	30 (40.0)
Chose to be reminded by a phone call	49 (65.3)
The MRRS was helpful regarding asking for a new prescription	52 (69.3)
Would have asked for a new prescription on time anyway	51 (68.0)
Considered the service as supportive and wanted to continue it	64 (85.3)
Found it convenient to be reminded of a follow-up prescription	52 (69.3)
Described it as "kind of irritating"	9 (12.0)
Felt more satisfied with their pharmacy and rated the MRRS overall with very good or good.	54 (72.0)

MRRS=Medication Refill Reminder Service

apply the MRRS in their daily practice was reported by 24 (61.5%) of the respondents.

Training and technical support. Training was rated good or very good by 33 of the staff members (84.6%). However, they asked for advanced technical support.

Functionality of the software. Twenty of the staff members (51.3%) assessed the functionality of the software as good (Fig. 2). Technical problems were experienced by 26 staff members (66.7%) e.g., duplicate phone calls and reminders, as well as difficulties to send emails and text messages due to software problems. The software company solved the majority of these problems. Overall, 16 of the pharmacy staff members (41.0%) rated the service as good (Fig. 2). They found the service helpful for particular patients, mainly for elderly patients with chronic diseases and poly-pharmacy. Twenty-five of the staff members (64.1%) wanted to continue the service.

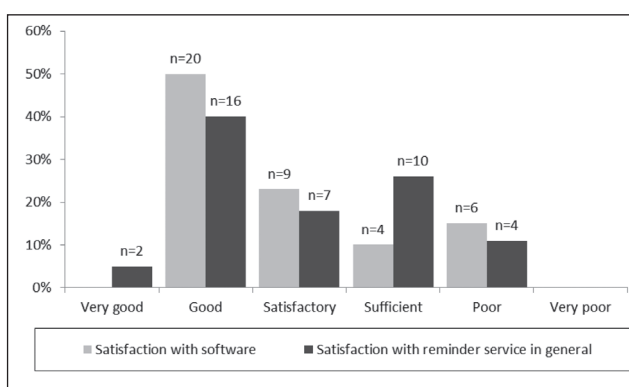


Fig. 2: Pharmacy staffs' (n=39) satisfaction with the medication refill reminder service (MRRS)

2.2.4. Telephone survey with the pharmacy owners/managers

The pharmacy owners/managers (n=10) had different attitudes about inviting patients to participate. Three of them (30.0%) selected potential patients based on a list that they had created utilizing their patients' file and used this list to invite participants. They recruited considerably more patients (n=30, 41, and 54, respectively) compared to the other seven who did not invite

patients in a systematic way. Eight of the owners/managers (80.0%) expressed the opinion that the service was not very suitable to increase customer loyalty and not cost-effective. Six (60.0%) wanted to continue the service after the study. One owner had not realised that his pharmacy never distributed a single reminder to the eight enrolled patients.

3. Discussion

A software-supported MRRS was developed and tested in ten selected community pharmacies in Germany. The majority of all involved participants (patients, staff, and owners/managers) wanted the service to be continued.

Most of the surveyed patients were satisfied with the service; additionally the service increased the satisfaction with the pharmacy. The majority still preferred a telephone reminder compared to more modern communication channels like text message and email. This could be related to the age of the patients; most were 60 years and older. Telephone reminders take more time for the staff but seem to be more effective, probably due to the direct, personal contact (Kooij 2015).

Overall, the pharmacy staff regarded the service as acceptable in daily practice. They considered it especially useful for the elderly with chronic diseases and polypharmacy. This assumption is supported by the results of the patients' survey. The 75 patients (50.7%) who filled in the questionnaire were of higher age (mean 72 vs. 68 years) and had a higher number of chronic medications (5 vs. 2) compared to the 148 enrolled. Additionally, the characteristics of the included patients show that PPI and thyroid hormones were relevant drugs to remind. The usage of PPI, frequently used in polypharmacy, also indicates that this kind of service should be preferentially offered to patients with polypharmacy.

As often in pharmacy practice research, it was challenging to recruit patients. As reasons, lack of time caused by high workload and sickness, reluctance to approach patients, technical problems and rejection of the project by pharmacy staff were mentioned. Lack of time is the argument most mentioned when discussing the implementation of pharmacy services, together with lack of financial resources or sufficient reimbursement. The pharmacies were not paid for the service and provided the service in addition to their daily practice. Additionally, poor motivation of staff, lack of communication skills and doubts as well as reservations towards addressing patients with regard to a new service are known barriers (van Mil et al. 2001). Moreover, half of the 550 invited patients declined to participate, mainly asserting handling a new prescription on time by themselves. Pharmacies identifying and selecting patients proactively in line with the training were the most successful in recruiting patients.

A potential reason to continue the service might be an improved position of community pharmacists as a health care professional. According to several professional organizations, pharmacy services like the MRRS should be able to illustrate the counselling competence of the community pharmacy 'around the corner/at the high street', increase patients' loyalty and improve the pharmacy image in general (Lyssy 2005). Two-thirds of the owners wanted to continue the service after the project even though it was, in their opinion, not economically attractive. However, studies showed that comparable interventions in community pharmacies were financially rewarding on the long term and have been broadly implemented in countries such as the Netherlands and Australia (van Boven et al. 2014; Ortiz et al. 2011).

Our primary aim was to study the acceptance of the MRRS by both pharmacies and patients but the numbers participating were small. Moreover, pharmacies preferred to invite patients who were willing to participate and were familiar with the pharmacy already. However, this type of potential selection bias is very difficult to address in uncontrolled pharmacy practice research studies. In addition, we did not differentiate between the different phases of medication use (e.g. initiation, implementation). However, the aim of this study was to analyse the acceptance of the MRRS as a tool. Further research is needed to elucidate which patients might profit most. Finally, we cannot exclude a social desirability bias

in responses, although anonymity was guaranteed (van de Mortel 2008). But the responses of the pharmacy owners in particular suggest a low risk of this bias.

In general, the MRRS seems to be acceptable by pharmacies although approximately 66% of the pharmacy staff perceived technical difficulties. Pharmacy staff and owners rated the service not entirely positively, but wanted to continue. Patients rated the service as supportive, and the personal contact with their pharmacy seems to be of high importance. Mostly, the patients would like to continue the service. For these patients the pharmacies obtain the medication history and refill rate of their prescribed medicines and are able to identify gaps in medication supply.

Therefore, the MRRS may be particularly useful for elderly patients with chronic diseases, polypharmacy, and refill gaps in the past. Whether the MRRS is an effective tool to improve the implementation phase of medication adherence, however, remains to be elucidated in further studies. Complex interventions with multiple components have, however, a better impact on medication adherence when compared to a single tool (Nieuwlaat et al. 2014; Conn et al. 2015; Stewart et al. 2014).

We, therefore, assume that the MRRS might be better suited as part of a toolbox within a more complex approach of continuous care e.g., a medication management service.

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References

- Ahmed R, Aslani P (2014) What is patient adherence? A terminology overview. *Int J Clin Pharm.* 36: 4–7.
- Blaschke TF, Osterberg L, Vrijens B, Urquhart J (2012) Adherence to medications: insights arising from studies on the unreliable link between prescribed and actual drug dosing histories. *Ann. Rev. Pharmacol Toxicol.* 52: 275–301.
- Chapman RH, Ferrufino CP, Kowal SL, Classi P, Roberts CS (2010) The cost and effectiveness of adherence-improving interventions for antihypertensive and lipid-lowering drugs. *Int J Clin Pract.* 64: 169–181.
- Choudhry NK, Krumme AA, Ercole PM, Girdish C, Tong AY, Khan NF, Brennan TA, Matlin OS, Shrank WH, Franklin JM (2017) Effect of reminder devices on medication adherence. The REMIND Randomized Clinical Trial. *JAMA Intern Med.* 177: 624–631.
- Claxton AJ, Cramer J, Pierce C (2001) A systematic review of the associations between dose regimens and medication compliance. *Clin Ther* 23: 1296–1310.
- Conn VS, Ruppert TM, Enriquez M, Cooper PS, Chan KC (2015) Healthcare provider targeted interventions to improve medication adherence: systematic review and meta-analysis. *Int J Clin Pract* 69: 889–899.
- Fitzgerald AA, Powers JD, Ho PM, Maddox TM, Peterson PN, Allen LA, Masoudi FA, Magid DJ, Havranek EP (2011) Impact of medication nonadherence on hospitalizations and mortality in heart failure. *J Card Fail* 17: 664–669.
- Granger BB, Swedberg K, Ekman I, Granger CB, Olofsson B, McMurray, John J. V., Yusuf S, Michelson EL, Pfeffer MA (2005) Adherence to candesartan and placebo and outcomes in chronic heart failure in the CHARM programme: double-blind, randomised, controlled clinical trial. *Lancet* 366: 2005–2011.
- Ho PM, Bryson CL, Rumsfeld JS (2009) Medication adherence: its importance in cardiovascular outcomes. *Circulation* 119: 3028–3035.
- Kardas P, Lewek P, Matyjaszczyk M (2013) Determinants of patient adherence. A review of systematic reviews. *Front Pharmacol* 4: 91.
- Kooij MJ (2015) Supporting patients: pharmacy based interventions to improve medication adherence. Dissertation. University of Utrecht, Utrecht.
- Laufs U, Böhm M, Kroemer HK, Schüssel K, Griese N, Schulz M (2011) Strategien zur Verbesserung der Einnahmetreue von Medikamenten [Strategies to improve medication adherence]. *Dtsch Med Wochenschr* 136: 1616–1621.
- Lyssy AE (2005) Analyse und Bewertung eines Risikoscreenings und der Pharmazeutischen Betreuung von Patienten mit Osteoporose in der öffentlichen Apotheke [Analysis and assessment of risk screening and pharmaceutical care of patients with osteoporosis]. Dissertation. Humboldt-Universität, Berlin.
- Nieuwlaat R, Wilczynski N, Navarro T, Hobson N, Jeffery R, Keenanasseril A, Agoritsas T, Mistry N, Iorio A, Jack S, Sivaramalingam B, Iserman E, Mustafa RA, Jedraszewski D, Cotoi C, Haynes RB (2014) Interventions for enhancing medication adherence. *Cochrane Database Syst Rev.* 11: CD 000011.
- Ortiz M, Cecere R, Gallaher Ross (2011) Impact of the Mirixa Program on patient compliance to therapy. *Aust Pharm* 30: 244–248.
- Riegel B, Knafl GJ (2013) Electronically monitored medication adherence predicts hospitalization in heart failure patients. *Patient Prefer Adher* 8: 1–13.
- Sabaté E (2003) Adherence to long-term therapies. Evidence for action. World Health Organization, Geneva.

- Schulz M, Krueger K, Schuessel K, Friedland K, Laufs U, Mueller WE, Ude M (2016) Medication adherence and persistence according to different antihypertensive drug classes: A retrospective cohort study of 255,500 patients. *Int J Cardiol* 220: 668–676.
- Stewart K, George J, Mc Namara KP, Jackson SL, Peterson GM, Bereznicki LR, Gee PR, Hughes JD, Bailey MJ, Hsueh YA, McDowell JM, Bortoletto DA, Lau R (2014) A multifaceted pharmacist intervention to improve antihypertensive adherence: a cluster-randomized, controlled trial (HAPPY trial). *J Clin Pharm Ther* 39: 527–534.
- van Boven JFM, Stuurman-Bieze AGG, Hiddink EG, Postma MJ, Vegter S (2014) Medication monitoring and optimization: a targeted pharmacist program for effective and cost-effective improvement of chronic therapy adherence. *J Manag Care Pharm* 20: 786–792.
- van de Mortel TF (2008) Faking it: social desirability response bias in self-report research. *Aust J Adv Nurs*. 25: 40–48.
- van Mil JWF, Boer WO, Tromp TFJ (2001) European barriers to the implementation of pharmaceutical care. *Int J Pharm Pract* 9: 163–168.
- Vrijens B, Geest S de, Hughes DA, Przemyslaw K, Demonceau J, Ruppert T, Dobbels F, Fargher E, Morrison V, Lewek P, Matyjaszczyk M, Mshelia C, Clyne W, Aronson JK, Urquhart J (2012) A new taxonomy for describing and defining adherence to medications. *Br J Clin Pharmacol* 73: 691–705.
- Vrijens B, Urquhart J, White D (2014) Electronically monitored dosing histories can be used to develop a medication-taking habit and manage patient adherence. *Expert Rev Clin Pharmacol* 7: 633–644.