Quality Assessment of Long-Term Prescription Records: QMP Study

Avaliação da Qualidade dos Registos de Medicação Prolongada: Estudo QMP

Ana AZEVEDO[1], Brenda DOMINGUES[2], Raquel PIMENTA DA ROCHA[3], Rita EIRIZ[4], Vanessa XAVIER[2]

ABSTRACT

Introduction: The growing concern surrounding health safety issues makes it essential that everyone, in particular the elderly due to their commonly prescribed multiple drugs, has a complete and up to date list of prescriptions. We planned to assess the quality of the electronic records of prolonged medication.
Material and Methods: This is an observational, transversal and descriptive study, with an analytical component, in which we assessed the technical quality of prolonged medication records of elderly patients of four primary health care, before and after a guided intervention. The doctors received training in good practice recording methods and both professionals and patients were stimulated to use the prolonged medication guide.
Results: We evaluated 388 medical records of 33 physicians. The ideal category 'Appropriated medication with posology' improved from 23.5% to 48% ($p < 0,001$). The remaining categories 'Inappropriated Medication' and 'Appropriated medication but absent posology' decreased from 16.7% to 7% ($p = 0,006$) and from 59.8% to 46.0% ($p = 0,02$), respectively. The variables mentor's training skills, workplace, length of family practice and the percentage of elderly in the physician's list showed statistical significance differences at the beginning of the study which disappeared after the intervention, except for the latter.
Discussion: In this study, physicians accepted the proposed changes, regardless of age, gender, mentor's training skills, workplace or length of family practice. Longer duration appointments in the eldery group may be an obstacle in achieving the best results.
Conclusion: This original study reveals the necessity to implement periodic postgraduate training to encourage physicians to keep medical records up to date.
Keywords: Long-term Care; Electronic Prescribing; Drug Prescriptions; Family Practice; Aged.

RESUMO

Introdução: A preocupação com a segurança na saúde torna essencial que todos os utentes, em particular os idosos por serem maioritariamente polimedicados, possuam uma lista completa e atualizada da sua medicação. Assim, propusemo-nos avaliar a qualidade dos registos eletrónicos de medicação prolongada.
Material e Métodos: Estudo observacional, transversal e descritivo, com componente analítico, no qual avaliámos a qualidade técnica dos registos de medicação prolongada nos idosos de quatro unidades de cuidados de saúde primários da região norte, antes e após uma intervenção. Nesta, efetuámos formação de boas práticas de registo aos médicos e promovemos a utilização do guia de Medicação Prolongada aos profissionais e utentes.
Resultados: Avaliámos 388 registos de 33 médicos. A categoria ideal, 'Medicação apropriada e posologia presente', aumentou de 23,5% para 48% ($p < 0,001$). As restantes categorias 'Medicação inapropriada' e 'Medicação apropriada e posologia ausente' diminuíram de 16,7% para 7% ($p = 0,006$) e de 59,8% para 46,0% ($p = 0,02$), respetivamente. As variáveis condição de orientador de formação, local de trabalho, anos de Medicina Geral e Familiar e percentagem de idosos, apresentaram diferenças com significado estatístico no início do estudo, no entanto após a 'intervenção', apenas a percentagem de idosos continuou a apresentá-las.
Discussão: Neste estudo, os médicos aderiram à proposta de mudança, independentemente da idade, género, condição de orientador de formação, local de trabalho e anos de Medicina Geral e Familiar. Consultas mais prolongadas na população idosa poderão ter impedido alcançar a melhor categoria de registo.
Conclusão: Este trabalho original mostra que é necessário implementar medidas periódicas de formação pós-graduada para manutenção de registos médicos atualizados.
Palavras-chave: Cuidados de Longa Duração; Prescrição Electrónica; Prescrição de Medicamentos; Polimedicação.

INTRODUCTION

Portuguese National Health Service (*Serviço Nacional de Saúde [SNS]*) current procedures include free movement of patients and hence multiple prescribers. It allows for long-term prescription renewal to be requested online[1] and for the digital recording of clinical data in any SNS healthcare unit[2]. Keeping long-term prescription electronic record constantly updated seems crucial but we were unable to find any references to this issue in the literature and our personal experience suggests that it remains an unmet need.

A review of the available literature found several studies on polymedication, mainly in elderly patients, referring to the advantage of using electronic systems to support medical decisions.[3-10] However, no references on the quality of long-term prescription records were found.

Scientific advances that have allowed for an increase in average life expectancy are also associated to an increase in the prevalence of chronic diseases and in the number of polymedicated patients, with the greatest impact in the elderly population.[3-8, 11-18]

Therapeutic compliance is lower in patients with chronic diseases on long-term prescriptions[19] and in those with complex regimens involving multiple drugs or multiple daily dosages.[3,7,11] These also increase the risk of error, which becomes even higher when not adjusted for ageing physiological changes.[4-6,11-13,15,19]

Electronic information systems, therapeutic decision support systems and written information have all been shown to minimize prescription errors, improve compliance and health outcomes, contributing to cost reductions.[3-10], as such justifying the analysis of the Portuguese reality regarding long-term prescription records.

Our study aimed to assess, ensure and improve the technical quality of electronic long-term prescription medical records, henceforth designated as 'Long-term Prescription' ('Medicação Prolongada'), in a group of elderly patients attending their General Practitioner (GPs) in four healthcare units located in the Northern region of Portugal. In addition, we have succeeded in establishing a relationship between the results obtained in this study and the characteristics of the participating physicians.

MATERIAL AND METHODS

This was an observational, cross-sectional and descriptive study, with an analytical component, in which 'Long-term Prescription' ('Medicação Prolongada') was assessed in a representative and randomly selected group of elderly patients attending their physician practice in four primary healthcare units in the Northern region of Portugal (n = 33): Unidade de Cuidados de Saúde Personalizados (UCSP) Vale Formoso, Unidade de Saúde Familiar (USF) Faria Guimarães, USF São João do Porto and USF Sete Caminhos. This study was carried out between March 2012 and June 2013 and involved three stages: assessment, intervention and re-assessment.

The Módulo de Informação e Monitorização das Unidades Funcionais® (Information and Monitoring Module of a Functional Unit) provided data on the physician's list of patients and the Sistema de Apoio ao Médico® (SAM®) (Medical Support System) software provided patient's clinical data. Physician's characteristics were obtained by interview, using a questionnaire specifically designed for this study.

The evaluation stage allowed for a characterisation of the physicians involved in the study, according to Age, Gender, Years of General Practice (GP - Medicina Geral e Familiar [MGF]), Workplace, Percentage (%) of Elderly Patients in physician's list and Training Supervisor status (independent variables).

A proportional and randomized sample of patients registered in the physicians' lists aged 65 or above was established in order to allow for the assessment of Long-term Prescription (Medicação Prolongada) records (dependent variable) in the assessment and re-assessment stages of our study. A 95% confidence interval was used and 50% prevalence was assumed due to the lack of references, with a maximum error of 5%; the final group was composed of 388 elderly patients. .

Due to the lack of agreement in literature, Long-term Prescription has been defined in our study as the presence of at least one 'Long-term therapy' ('Tratamento prolongado') prescription renewal or the presence of at least three 'Short or Medium-term therapy' ('Tratamento de curta ou de média duração') prescriptions over the last 12 months, as documented in the SAM ® software.[20,21]

The Long-term Prescription record has been classified as:

Rank 0 – Inappropriate prescription ('Medicação inapropriada'): no drugs prescribed in the 'Long-term prescription' ('Medicação prolongada') item from SAM® software, in the presence of a prescription history according to the abovementioned criteria.

Rank 1 – Appropriate prescription and absent dosage ('Medicação apropriada e posologia ausente'): presence of one or more prescribed drugs in the 'long-term prescription' ('medicação prolongada') item and no reference to the number of doses and/or dosage frequency of at least one of the drugs.

Rank 2 – Appropriate prescription and existing dosage ('Medicação apropriada e posologia presente'): presence of one of more prescribed drugs in the 'long-term prescription' ('medicação prolongada') item and reference to the number of doses and dosage frequency in all the drugs, or absence of prescribed drugs in the 'long-term prescription' ('medicação prolongada') item in patients without any prescription meeting the abovementioned criteria.

The exclusion criteria included: lack of physician's consent to participate in the study; physician's leave during the intervention stage and inability to complete individual interventions; physician's long-term leave (one month or above) between intervention and re-evaluation stages; deceased patient or patient in the process of-transfer to another healthcare unit. In case of exclusion, the next patient in the study list was selected.

During the intervention stage, the results obtained in the assessment stage were presented in the regular multidisciplinary meeting of each healthcare unit. Training was provided to physicians in order to improve the quality of data recording using an audio-visual presentation exemplifying good practice when completing a 'Long-term Prescription' ('Medicação Prolongada') record. Nurses and clinical assistants were asked to indicate patients without a completed long-term prescription form, re-enforcing the need for completion at the time of prescription renewal. Patients were made aware of

the importance to have their long-term prescription form updated through the use of flyers and billposting at each healthcare unit.

In re-assessment stage, which took place ten months after the intervention stage, only the 'Long-term Prescription' ('*Medicação Prolongada')* results were evaluated and compared, after defining a new sample of patients according to the abovementioned criteria.

Our study was approved by the Health's Ethic Committee at the *Administração Regional de Saúde do Norte.*

Statistical analysis used the Statistical Package for the Social Sciences version 18.0 for Windows® software and included a description of categorical variables using absolute and relative frequencies and of continuous variables using average and standard deviation, median and percentile, according to the distribution symmetry. Mann-Whitney and Kruskall-Wallis non-parametric tests were used to test hypothesis regarding continuous variables with a non-normal distribution and Chi-square test, Fisher's exact test and Spearman correlation test were used as appropriate. A *p* value greater than 0.05 was considered to be statistically significant.

RESULTS

From the 33 physicians included in the study, 55% were male, aged between 37 and 61 (mean age 53), with an average of 23 years of medical practice. Only 33% of physicians were training supervisors. The mean frequency of elderly patients per doctor's list was 19% (Table 1).

During the assessment stage, values of 16.8% (*n* = 65, median = 1), 59.8% (*n* = 232, median = 7) and 23.5% (*n* = 91, median = 3) were found for rank 0, 1 and 2 records, respectively. In re-assessment, these were 7.0% (*n* = 26, median = 0), 46.0% (*n* = 177, median = 5) and 48.0% (*n* = 185, median = 8), respectively (Fig. 1). When the assessment and re-assessment records were compared, we found an increase in rank 2 records, associated to a decrease in the other two ranks; this improvement was statistically significant (*p* < 0.001) (Fig. 1).

The influence of physician's characteristics in the Long-term Prescription records during the assessment and re-assessment stages were compared (Table 2 and 3). We did not find any significant differences in Gender, Age and 'Years of GP practice' variables; in other words, these results seem to be independent of these variables in both stages. As regards the Workplace, Training Supervisor status and Elderly Patients Percentage variables, we found statistical significant differences. In the Workplace variable, we found that in the assessment stage UCSP physicians presented more rank 0 records (*p* = 0.008); however, this difference ceased to exist in the re-assessment stage (Table 2).

We found that Training Supervisors presented better initial records, with less rank 0 records (*p* = 0.011). Upon

Table 1 - Description of the independent variables

Gender	
Female	15 (45%)
Male	18 (55%)
Training Supervisor status	
No	22 (67%)
Yes	11 (33%)
Workplace	
USF	26 (79%)
UCSP	7 (21%)
Age (years)	
Average	53 ± 6 (37 - 61)
P25	51
Median	56
P75	57
Years of GP practice	
Average	23 ± 9 (2 - 35)
P25	17
Median	26
P75	29
Percentage of Elderly Patients in the list	
Average	18.8 ± 3.63 (11.9% - 25.4%)
P25	16.25
Median	18.31
P75	21.32

the intervention, this difference also ceased to exist, showing an improved record for all physicians, including non-supervisor physicians, in all rank records (Table 2).

As regards the 'Percentage of Elderly Patients' variable, there was a positive correlation for rank 0 in the assessment stage. In other words, the higher the percentage, the higher the number of rank 0 records (*p* = 0.043). In the re-assessment stage, this positive correlation was observed for the rank 1 records (*p* = 0.007) (Table 3).

A two-stage physician-by-physician comparative analysis was carried out, in order to assess the tendency of the medical records and was ranked as 'maintained/improved' or 'worsened' (Table 4).

Globally, the rank 0 records were maintained/improved due to a reduction in incorrect records (Table 4). An increase in the number of rank 1 records was found (Table 4), showing an improvement related to a transfer of rank 0 records to the following rank. However, the fact that some totally correct records in the assessment stage could subsequently get worse cannot be excluded
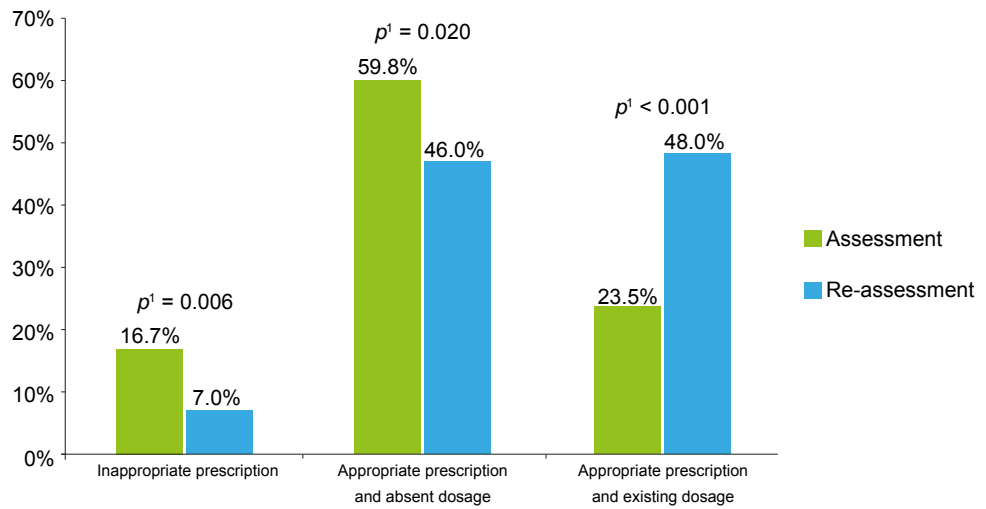
Figure 1 - Comparison of medical records before and upon the intervention
p^1: Wilcoxon test.

Table 2 - Comparison of medical records per dichotomous independent variable, before and upon the intervention

			Record´s Rank					
			Assessment			Re-assessment		
			0	1	2	0	1	2
Gender	Female	P25	0	5	1	0	3	4
		Median	1	7	1	0	4	5
		P75	1	10	3	0	9	8
	Male	P25	0	4	1	0	3	2
		Median	0	7	2	0	6	6
		P75	4	10	5	2	8	9
	p^1		0.701	0.689	0.915	0.115	0.957	0.870
Workplace	USF	P25	0	6	1	0	3	3
		Median	0	7	2	0	5	6
		P75	1	10	3	1	8	8
	UCSP	P25	1	3	1	0	0	4
		Median	3	5	1	0	4	5
		P75	7	7	5	3	7	8
	p^1		**0.008**	0.06	0.839	0.445	0.465	0.929
Training Supervisor status	No	P25	0	3	1	0	3	3
		Median	1	6	2	0	5	6
		P75	6	7	5	2	8	8
	Yes	P25	0	7	0	0	3	3
		Median	0	10	2	0	6	5
		P75	1	11	3	0	9	9
	p^1		**0.011**	**0.004**	0.696	0.126	0.539	0.687

0 - Inappropriate prescription; 1 - Appropriate prescription and absent dosage; 2 - Appropriate prescription and existing dosage; p^1 – Mann-Whitney test.

Table 3 - Comparison of medical records, per continuous independent variable, before and upon the intervention

| | | Record´s Rank | | | | | |
| | | Assessment | | | Re-assessment | | |
		0	1	2	0	1	2
Age	Correlation coefficient	0.210	0.042	-0.080	0.255	0.009	-0.032
	p^1	0.241	0.815	0.659	0.152	0.961	0.859
Years of GP practice	Correlation coefficient	0.261	0.099	-0.092	0.172	-0.062	0.142
	p^1	0.142	0.582	0.611	0.339	0.732	0.431
% Elderly Patients in the list	Correlation coefficient	0.355	-0.043	0.268	0.284	0.046	-0.051
	p^1	**0.043**	0.812	0.132	0.109	**0.007**	0.779

0 - Inappropriate prescription; 1 - Appropriate prescription and absent dosage; 2 - Appropriate prescription and existing dosage; p^1 - Spearman correlation.

Table 4 - Global effect of the intervention per record's rank

Effect of the intervention per rank					
0		1		2	
Maintained/improved	Worsened	Maintained/improved	Worsened	Maintained/improved	Worsened
19 (58%)	14 (42%)	12 (36%)	21 (64%)	29 (88%)	4 (12%)

0 - Inappropriate prescription; 1 - Appropriate prescription and absent dosage; 2 - Appropriate prescription and existing dosage.

in the present study. We nevertheless found that 88% of the physicians maintained/improved their records in rank 2 (Table 4).

DISCUSSION

We were expecting that older physicians, with less ability to deal with electronic records, would have worse results; however, this was not the case in the present study, revealing physician's capacity to comply with new technologies. We also did not find any significant difference in records regarding the 'Gender' variable.

As regards Training Supervisor physicians, our expectation that they would present better records due to their educational skills was confirmed. In the re-assessment stage, unexpectedly and despite the inclusion of Internal Medicine physicians, no improved awareness of medical records was observed. As a limitation to the study, we wish to emphasize that the active participation of Internal Medicine physicians (including ourselves) on behalf of the training supervisors may have biased the records, even when statistically significant differences were not found.

Regarding the 'Workplace', we had expected improved performances in USF-type healthcare units, as physicians working in these units are more experienced in meeting indicators and become more receptive to changes in their daily practice. Despite an initial worse assessment in the UCSP-type healthcare unit, the differences were corrected upon the intervention stage,

showing that the 'Workplace' did not influence the physician's attitude towards change.

Concerning the 'Years of GP practice', we expected that it would be easier for less experienced physicians to correctly fill out the medical records, especially for those that completed their internship after the introduction of electronic records. In the assessment stage, the most recent specialists showed better global rank 0 records. Differences decreased after the intervention stage, showing that the 'Years of GP practice´ did not influence physician's attitudes to change.

We found that the 'Percentage of Elderly Patients' was directly proportional to the number of completely incorrect records during the assessment stage, possibly explained by the multiple pathologies affecting the elderly population, extending the time of medical examination and leaving less time for record updating. In re-assessment stage, we found an improvement in records and correlation changed to positive in rank 1 records. In addition, such an improvement is not explained by longer medical appointments in this age group. The optimal 'Percentage of Elderly Patients' in a GP's patients list adequate for optimization of costs as well as health gains remains an open question..

Although the elderly do not usually represent the majority age group in a physician's list, we elected to study this population because it is usually polymedicated and requires more frequent GP appointments. These characteristics create the opportunity for 'Long-term

Prescription' records to be updated in a shorter time, explaining why we expected that a high 'Percentage of Elderly Patients' in the physician´s list would show a better record upon the intervention. However, we found that this is not always true, possibly explained by the fact that this population demands far more comprehensive work.

An important limitation is the size of the study, involving only four healthcare units from a specific region of the country. In addition, the small group of physicians involved in the study (n=33) and the effect of the other professional groups and patients on the results was not analysed, introducing s potential bias in some of the results and preventing their generalisation.

The Continuous Quality Improvement typology with an associated research component was an innovative aspect of our study, considering the current relevance of this issue, as healthcare units have been increasingly targeted for audit or validity processes. This was also innovative as it addresses a very important area in healthcare and not yet configured by indicators or auditing, as it applies to Long-term Prescription records, with estimated gains in health and better management of the existing economic resources. The participation of all the physicians in the health units involved in the study, with no withdrawals, as well as the primary care setting in which the studied was carried out (usually with less visibility in the scientific community) are added values. Finally, we wish to emphasize the inclusion of different professional groups and patients in the study.

In addition, the inclusion of all physicians in the four healthcare units shows physician's availability to improve their records with added health and economic gains.

CONCLUSION

We found that the 'Long-term Prescription' records were sometimes absent or incomplete. This may be due to the fact that until now there are no indicators or auditing regarding this parameter. However, we found that these may be improved by raising physician and patient's awareness to the need to change, with possible healthcare gains.

However, more studies are needed to allow for the generalisation of results, the definition of a quality pattern and the understanding of the optimum percentage of elderly patients in a GP's list of patients, in order to reach an adequate Long-term Medication (*Medicação Prolongada*) record.

In addition, further research confirming our results would help implementing regular post-graduate update training aimed to improve physician's awareness to keep a comprehensive and updated Long-term Medication record throughout their medical career.

CONFLICTS OF INTEREST

The authors declare there were no conflicts of interest when writing this manuscript.

FINANCIAL SOURCES

The authors declare there was no financial support for writing this manuscript.

Part of study's results was presented at the *18º Congresso Nacional de Medicina Geral e Familiar* held in Covilhã on the 29th September 2013 and received the best communication award in the 'Continuous Improvement in Quality' category.

REFERENCES

1. Ministério da Saúde. Manual do eAgenda. Administração Central do Sistema de Saúde. [Internet]. [acedido em 2011 Abr 14]. Disponível em http://www.acss.min-saude.pt/Portals/0/Circulares/eAgendamanual.pdf.
2. Serviços Partilhados do Ministério da Saúde, EPE. PDS-Plataforma de Dados da Saúde. [Internet]. [Consultado 2013 Nov 6]. Disponível em http://spms.min-saude.pt/2013/11/pds-plataforma-de-dados-da-saude/.
3. Cima CF, Freitas RS, Lamas MC, Mendes CA, Neves AC, Fonseca C. Consumo de medicação crónica: avaliação da prevalência no norte de Portugal. Rev Port Clin Geral. 2011;27:20-7.
4. Sousa S, Pires A, Conceição C, Nascimento T, Grenha A, Braz L. Polimedicação em doentes idosos: adesão à terapêutica. Rev Port Clin Geral. 2011;27:176-82.
5. Tamblyn R, Huang A, Perreault R, Jacques A, Roy D, Hanley J, et al. The medical office of the 21st century (MOXXI): effectiveness of computerized decision-making support in reducing inappropriate prescribing in primary care. CMAJ. 2003;169:549-56.
6. Pham CB, Dickman RL. Minimizing adverse drug events in older patients. Am Fam Physician. 2007;76:1837-44.
7. Ghandi TK, Weingart SN, Seger AC, Borus J, Burdick E, Poon EG, et al. Outpatient prescribing errors and the impact of computerized prescribing. J Gen Intern Med. 2005;20:837-41.
8. Sanguansak T, Morley MG, Yospaiboon Y, Lorch A, Hedt B, Morley K. The impact of preprinted prescription forms on medication prescribing errors in an ophthalmology clinic in northeast Thailand: a non-randomised interventional study. BMJ Open. 2012;2:e000539.
9. van Doormaal, van den Bemt PM, Zaal RJ, Egberts AC, Lenderink BW, Kosterink JG, et al. The influence that electronic prescribing has on medication errors and preventable adverse drug events: an interrupted time-series study. J Am Med Inform Assoc. 2009;16:816-25.
10. Devine EB, Hansen RN, Wilson-Norton JL, Lawless NM, Fisk AW, Blough DK, et al. The impact of computerized provider order entry on medication errors in a multispecialty group practice. J Am Med Inform Assoc. 2010;17:78-84.
11. Rocha CH, de Oliveira AP, Ferreira C, Faggiani FT, Schroeter G, de Sousa AC, et al . Adesão à terapêutica médica em idosos de Porto Alegre, RS. Cien Saude Colet. 2008;13:703-10.
12. Brekke M, Rognstad S, Straand J, Furu K, Gjelstad S, Bjørner T, et al. Pharmacologically inappropriate prescriptions for elderly patients in general practice: How common? Baseline data from The Prescription Peer Academic Detailing (Rx-PAD) study. Scand J Prim Health Care. 2008;26:80-5.
13. Bregnhøj L, Thirstrup S, Kristensen MB, Bjerrum L, Sonne J. Combined intervention programme reduces inappropriate prescribing in elderly patients exposed to polypharmacy in primary care. Eur J Clin Pharmacol. 2009;65:199-207.
14. Nóbrega OT, Karnikowski M. A terapia medicamentosa no idoso: cuidados na medicação. Cien Saude Colet. 2005;10:309-13.
15. Hanlon JT, Weinberger M, Samsa GP, Schmader KE, Uttech KM, Lewis IK, et al. A randomized, controlled trial of a clinical pharmacist intervention to improve inappropriate prescribing in elderly outpatients with poly-

pharmacy. Am J Med. 1996;100:428-37.
16. Ferner RE. An agenda for UK clinical pharmacology: medication errors. Br J Clin Pharmacol. 2012;73:912-6.
17. Fialová D, Onder G. Medication errors in elderly people: contributing factors and future perspectives. Br J Clin Pharmacol. 2009;67:641-5.
18. Ryan C, O'Mahony D, Kennedy J, Weedle P, Byrne S. Potentially inappropriate prescribing in an Irish elderly population in primary care. Br J Clin Pharmacol. 2009;68:936-47.
19. Osterberg L, Blaschke T. Adherence to medication. N Engl J Med. 2005;353:487-97.
20. Diário da República Eletrónico. Portaria n.º 1471/2004, de 21 de Dezembro. Diário da República-1ª Série B. [Internet]. [Consultado 2012 Abr 20]. Disponível em http://dre.pt/pdf1s/2004/12/297B00/72407243.pdf.
21. Autoridade Nacional do Medicamento e Produtos de Saúde, IP. Deliberação 173/CD/2011. Infarmed. [Internet]. [Consultado 2012 Abr 20]. Disponível em http://www.infarmed.pt/portal/page/portal/INFARMED/ LEGISLACAO/ACTOS_SUJEITOS_A_PUBLICACAO_NO_SITE_DO_ INFARMED/173_CD_2011.pdf.

Ana AZEVEDO, Brenda DOMINGUES, Raquel PIMENTA DA ROCHA, Rita EIRIZ, Vanessa XAVIER

Quality Assessment of Long-Term Prescription Records: QMP Study