

Records of antimicrobial use in Long Term Care Facilities for the Elderly



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Abstract

Objective: To assess records of the prescribing and use of antimicrobials in Long Term Care Facilities (LTCFs) for the elderly in towns in the midwest of Minas Gerais. **Method:** A retrospective cohort study was conducted in six non-profit LTCFs. A printed questionnaire containing variables related to socio-demographic and health data and antimicrobial records were used. Pearson's Chi-squared or Fisher's exact tests were employed to evaluate the association between variables. **Results:** The records of 250 elderly persons were evaluated. Of these, 110 individuals made use of antimicrobials. There was an association between length of stay in the institution, the use of antimicrobial drugs and the diagnosis of infection ($p < 0.05$). **Conclusion:** The lack of and/or inadequacies in antimicrobial records/prescriptions and infection records is a problem for the health of the elderly and could also affect the care provided by other professionals.

Key words: Aged; Drug Prescriptions; Medical Records; Anti-Bacterial Agents.

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INTRODUCTION

Since the middle of the twentieth century, Brazil has undergone transformations in its population structure and its patterns of morbidity and mortality, due to the progressive decline in birth and death rates, which have caused the country's population to age. This process occurred initially within developed countries, but its onset and evolution have been strongly detected in developing countries as well.¹

The elderly constitute a heterogeneous group with peculiar characteristics, and tend to be more demanding of health care services since they are more prone to suffering from chronic and infectious diseases. In terms of medication, it is common for elderly people to make use of various drugs or use a larger number of medications than have been prescribed for them, which is characteristic of a polypharmaceutical lifestyle.² Antimicrobial medications are the most widely used. However, the use of these medications indiscriminately over long periods of time can be a threat to public health, as it can give rise to more resistant microorganisms, and may compromise the treatment of infections by raising health care costs and the mortality rate.³

Within the area of municipal health, health care professionals are responsible for mitigating the proliferation of microbes. One example of this is the pharmacist, who employs pharmaceutical and therapeutic best practices to analyze individual needs and provide access to and distribute medications carefully within the community in liaison with local teams of health care professionals. Diretoria Colegiada da Agência Nacional de Vigilância Sanitária (Collegiate Board of the National Health and Sanitation Agency) (RDC-ANVISA) Resolution No. 20, dated May 5, 2011,⁴ established criteria for the prescription, distribution, control, packaging and labeling of medications based on substances classified as antimicrobial, which can only be used under prescription, isolated or in conjunction with other medications. As such, the sale of these medications came to be regulated in an attempt to control their indiscriminate usage. In the hospital environment,

this supervision is performed by the Comissão de Controle de Infecção Hospitalar (the Hospital Infection Control Commission) (CCIH), in partnership with the pharmaceutical sector, and begins with an evaluation of the rate of infection, the microbial profile of the institution and the cost of the medication.

Despite these efforts, with respect to Long Term Care Facilities for the Elderly (LTCFs), the control of infection and the supervision of antimicrobial medication is not common and generally no health care professionals are designated to perform this role. In Brazil, the LTCFs are not considered to be part of a health care service per se, but are construed to be part of a "social welfare" service that is provided to the elderly person as part of "hospice care". In this sense, the fact that these institutions are not classified as a health care service could favor the non-disclosure of threats to public health and reduced control over the administration of medicines, especially antimicrobial medication.⁵

Errors in the application of medications can cause serious complications not only for patients, but also in terms of public health as a whole. Errors occur in drug preparation and administration; verification and registration; distribution and inventory; and transcription. There is also a lack of knowledge regarding drugs and their correct prescription. In many cases prescriptions are written with insufficient information and in handwriting that is illegible and contains mistakes and deletions.⁶

Often, prescriptions provided by doctors and nurses do not contain the information that is necessary to aid the health care institution and nursing department. The entries contained in the patient records, or in any other type of annotation, are essential, and their absence often hinders the recovery of elderly patients. This also represents a risk to the health care of the professionals themselves, as these entries that must be presented as proof in situations where ethical and legal proceedings are undertaken.⁷

From possible errors in the records of when antimicrobials were administered in the LTCFs, the following study was developed, based on the research

question: are records made of the prescription and use of antimicrobials in the LCTFs?

This research study was justified by the increasing concern regarding the indiscriminate use of antimicrobials and its effects on the artificial selection of resistant microorganisms within the community.

This study, therefore, aimed to verify the records of the prescription and use of antimicrobials in Long Term Care Facilities for the Elderly in municipalities in the midwest of the state of Minas Gerais.

METHODOLOGY

A cohort study was performed in six non-profit LCTFs, in the municipalities of Arcos, Bambuí, Formiga, Lagoa da Prata, Pains and Piumhi. These are all neighboring municipalities, with an average distance between each other of 50 km, located in the midwestern region of the state of Minas Gerais. The municipalities are all approximately 280 km away from the state capital of Belo Horizonte.

Each LCTF was assigned a code in order to maintain the anonymity of the institution. Initial contact was made through a verbal invitation that informed the institutions of the objectives and methodology of the study. The legal representative of each LCTF provided his or her consent to their participation in the study via a signed acceptance letter and Informed Consent Form. The voluntary nature of participating in the study was made expressly clear to each LCTF, and the study was approved by the Commission for Ethics in Research of the Pontifícia Universidade Católica de Minas Gerais (the Pontifical Catholic University of Minas Gerais) (CAAE: 0267.0.213.000-10).

All of the LCTFs offer inpatient services, medical care and multidisciplinary supervision, in addition to receiving volunteer help in the overall care of the elderly patients. No data was collected from private LCTFs, since this type of service did not exist in the towns that participated in this study.

Field visits to the LCTFs were conducted between December 2010 and February 2011,

and the data regarding the elderly patients was obtained from the health records that were logged by the employees of each institution between the months of January 2010 and January 2011. The study population consisted of all the elderly residents that resided in the LCTFs. For a patient to be included in the study, the institution was required to have one of the following documents on file for him or her: medical records, printed or handwritten documents, medical prescriptions and hospitalization reports of any kind for the year 2010. No contact was made with the elderly patients and their identities, obtained from the records of each institution, were kept secret.

Data was collected using a questionnaire prepared for the study, which contained three sections: I- sociodemographic data and data regarding the health of the elderly patients, which included the following variables: age, academic background, time of residence at the LCTF and whether he or she had any chronic disease(s); II- the use of antimicrobials during the last year (period/length of use and route of administration, justification and medical prescription), infections that occurred over the last year, relapse of the infection, request for complementary exams for the diagnosis of infections; III- LCTF information regarding the following variables: support from the Estratégia de Saúde da Família (the Family Health Strategy), number of doctors, nurses, nursing technicians and assistants, care providers and elderly residents at each institution. ANVISA classification criteria were used to classify the antimicrobials in accordance with the document "Antimicrobials - theoretical foundations and clinical use".⁸

Chronic diseases were referred to according to the International Statistical Classification of Diseases and Health Related Issues (CID-10).

The data collected was entered and subsequently descriptively analyzed through the use of the statistical software package known as Statistical Package for the Social Sciences (SPSS/PC), version 13.0. Pearson's Chi-squared test or Fisher's Exact test were used to evaluate the correlations between the variables.

RESULTS

The medical records of 250 elderly patients from six LCTFs were evaluated, representing 100% of the population; no patient records were excluded from the study. Each of the LCTFs had a professional health care staff that consisted of a doctor, nurse, physical therapist, nutritionist,

psychologist, director/manager, cleaning staff, nursing technicians, nursing assistants and caretakers.

The data collected from the LCTFs is shown in table 1. It should be noted that, at each of the institutions, medical exams occurred weekly and/or when requested.

Table 1. Data from LCTFs in mid-western region of Minas Gerais, 2010-2011.

LCTF (code)	Support - Family Health Strategy	No. of doctors	Nursing staff			No. of elderly	No. of caretakers
			Nurses	Technicians	Assistants		
1	Yes	1	1	4	0	32	6
2	No	1	1	3	0	42	5
3	No	1	1	4	4	36	2
4	No	1	3	3	0	22	0
5	No	1	1	5	0	66	12
6	Yes	1	2	5	0	52	10

The population of elderly residents at the LCTFs consisted mainly of women (57.6%), whose ages ranged between 60 and 106 years (mean age was 74 years). Two of the LCTFs had no records of the academic background of their patients, whereas at the other institutions, most patients (43.6%) could not read or write. The distribution of maximum residence time at the LCTFs was as follows: up to five years (70.4%), from six to 10 years (16.4%) and above 11 years (12.8%).

Of the 250 elderly patients, 165 (66.0%) suffered from chronic diseases, and some of them had more than one. Hypertension and diabetes were the most prevalent of the chronic diseases that were identified (table 2).

The use of antimicrobials was identified in the medical records of 44.0% (110 participants) of the elderly population. Of these 110 individuals, prescriptions of antimicrobials of the β -lactam group were logged, as well as anti-fungal drugs from the azoles group and anti-viral medication,

each representing 43.9%, 7.8% and 0.7% of the population, respectively. For the other 140 elderly patients, no entries were found regarding the use of any kind of antimicrobial drugs. Other information regarding the types of antimicrobials are presented in table 3. Some elderly patients needed to use antimicrobials more than once, and/or make use of combined treatments, accounting for the total of 141 antimicrobials, which included combinations of: Benzylpenicillin and Amoxicillin; Fluconazol and Ciprofloxacin; Fluconazol and Cetoconazol; Azitromycin and Norfloxacin; Amoxicilin, Cefalexin, Azitromycin and Cefadroxil; Ciprofloxacin, Ceftriaxone, Levofloxacin and Cefalexin.

In order to prescribe antimicrobials to 110 elderly patients, nine microbiological exams were requested (8.2%). Among the 110 elderly patients that were found to use these drugs (table 4), medical justification for prescribing antimicrobials was found in five (4.5%) of the medical records, and the duration of treatment in 21 (19.1%) of the records.

In terms of logging the occurrence of infections, such entries were found in 12 medical records (10.9%). The principal infections amongst the elderly patients were found in the urinary tract, respiratory tract and skin. A recurrence of these

infections was noted in ten (9.1%) patient medical records. Regarding the duration of treatment with antimicrobials, 21 entries (19.1%) were found for the 12 elderly patients mentioned above.

Table 2. Data regarding the health of the elderly that reside in the LCTFs in the midwestern region of Minas Gerais, 2010-2011.

CID-10 Classification	Demographic variable	n	%
	<i>Chronic diseases</i>		
I 10	Hypertension	112	44.8
E14	Diabetes <i>mellitus</i> not specified	61	24.4
G 30	Alzheimer's disease	11	4.4
F 20	Schizophrenia	10	4.0
J 42; J 43	COPD: non-specific chronic bronchitis and emphysema	9	3.6
G 20	Parkinson's disease	9	3.6
G 40	Epilepsy	8	3.2
L 93	Lupus erythematosus	7	2.8
G 35	Multiple sclerosis	4	1.6
M 81	Osteoporosis without pathological fracture	4	1.6
L 40	Psoriasis	2	0.8
M 10	Gout	2	0.8
N 18	Chronic kidney insufficiency	2	0.8
K 29	Gastritis	2	0.8

Table 3. Antimicrobials whose use was restricted among the elderly LCTF residents. Midwestern region of Minas Gerais, 2010-2011.

Class	Name	n= 141	%
β -Lactam	Amoxicillin; Sigma-clav; Cefalexin Ceftriaxone; Cefadroxil	62	43.9
Penicillin	Benzetacil (Benzylpenicillin); Despacilina	21	14.8
Fluoroquinolones	Ciprofloxacin Levofloxacin; Norfloxacin	20	14.2
Macrolide	Azitromycin; Clarithromycin	11	7.8
Azoles	Fluconazol; Cetoconazol; Miconazole	11	7.8
Quinupristin	Metronidazole	4	2.8
Imidazoles	Clotrimazole	3	2.1
Folic acid inhibitor	Bactrim	3	2.1
Aminoglycoside	Neomycin	3	2.1
Polyenes	Mycostatin	1	0.7
Nitrofurans	Macrofantina	1	0.7
Antivirals	Acyclovir	1	0.7

Table 4. Records of infections, duration of treatment and justification for the use of the antimicrobial, microbiological exams and recurrence of infections. Midwestern region of Minas Gerais, 2010-2011.

Records held at the LCTFs	Elderly patients (n=110)	%
Infection		
No	98	89.1
Yes	12	10.9
Duration of treatment		
No	89	80.9
Yes	21	19.1
Justification for the use of antimicrobials		
No	69	62.7
Yes	41	37.3
Microbiological exam		
No	101	91.8
Yes	9	8.2
<i>Recurrence of infection</i>		
No	100	90.9
Yes	10	9.1

Within the statistical analysis, a significant correlation existed between the time of residence in the institution, the use of antimicrobials and the diagnosis of infection ($p < 0.05$). Records were found regarding the diagnosis of infection for those

that had resided in the LCTFs for the least amount of time, and there was a lack of infection, or of a record of infection, for 98 of the antimicrobials prescribed ($p < 0.05$) (table 5).

Table 5. Correlations between duration of residence, use of antimicrobials and diagnosis of infection. Midwestern region of Minas Gerais, 2010-2011.

Diagnosis of infection						
Variables	Not available or no record exists (n=233)	Record exists (n = 17)	Total (N = 250)	Chi- squared	<i>p</i>	CI 95%
Duration of residence						
Up to 5 years	168	8	176	8.11	0.04	0.244-0.849
From 6 to 10 years	35	6	41			0.253-0.821
From 11 to 15 years	18	3	21			0.138-0.924
More than 16 years	12	0	12			0.067-0.606
Use of antimicrobials						
No	135	5	140	5.23	0.02	0.958-6.038
Yes	98	12	110			1.181-7.744

DISCUSSION

In this study the majority of the elderly patients were female, could not read or write, had been in the LCTFs for five years or less. Overall, the population had a mean age of 74 years. Epidemiological studies have identified 3.9 million more women than men.⁹ Poor schooling and illiteracy are the consequence of an era within developing countries when schooling was not a priority. High levels of illiteracy can act to reduce comprehension of one's surroundings, a reduction in access to information and an inability to read and write.¹⁰ The mean age of 74 years among the elderly patients corroborates the demographic transition, within which the life expectancy of Brazilians has increased from 74 years in 2011 to 74.6 years in 2012.¹¹

Populational aging engenders social and family problems, considering that a portion of the elderly do not possess the minimum physical or psychosocial capabilities required to live on their own. Retaining the services of a caretaker to help with elderly care within the home is difficult, and there may be a lack of family support or lack of training in the provision of care among the elderly family members. In this regard, studies show a progressive increase in the institutionalization of the elderly.^{12, 13}

In evaluating the principal threats to the health of the elderly in the LCTFs that participated in this study, chronic diseases were found in 165 patients (66.0%), which shows that the process of aging generates a significant change in the patterns of morbimortality.¹⁴ However, sequelae arising from chronic diseases or those which have degenerative characteristics, in addition to the alterations brought about by senescence itself and the context of coexisting with other elderly patients and sharing physical spaces (rooms, bathrooms, cafeterias) in LCTFs, increases the risk of infection.¹⁵

A significant correlation between time of residence in the institution, the use of antimicrobials and the diagnosis of infection was detected in this study. An absence of infection, or of a record of infection, was noted for 98 of the

antimicrobials that were administered ($p < 0.05$). Although records of the use of antimicrobials were noted for 110 elderly residents, it would have been ideal if there had also been written diagnoses for the rest of the elderly residents that justified the use of antimicrobials, such as log entries regarding the recurrence of infections, the duration of antimicrobial treatment, clinical justifications and complementary exam requests. However, such records were lacking. Only 10.9% of records noted the occurrence of infection and 9.1% noted the recurrence of infection. A total of 19.1% stated clearly the duration of antimicrobial treatment; 4.5% provided justification for the use of antimicrobials, and only 8.2% made requests for microbiological exams.

The only microbiological exams that were requested before the prescription of antimicrobials was urine type I; no requests were made for taking urine cultures. The absence of a laboratory or x-ray facilities at the LCTFs, or others in the vicinity that could provide tests more quickly, predispose these institutions to implement empirical treatments and engage in the indiscriminate use of antimicrobials. It would be better if the prescription of antimicrobials was preceded by exams in order to identify the microorganism that is the cause of infection, or at least directly after the start of treatment, in order to confirm the cause, thereby maintaining the prescribed treatment or adjusting it.¹⁶

The use of an antimicrobial should depend on choosing which is the best medication, proper dosage, route of administration, frequency or interaction of the drugs and on identifying the microorganism. However, such factors seem to be undervalued when dealing with institutionalized elderly individuals. There are factors that interfere in the correct use of antimicrobials and other medications within LCTFs, especially in non-profit organizations, such as a lack of doctors, which results in a shortage of time for detailed clinical evaluations and the recording of the behavior and progress of the elderly patients.⁷ As a result, the progress of treatment deteriorates and the protocols regarding the unnecessary exposure of patients to treatment that may not be the most appropriate are followed less closely, which can cause increased

individual and collective costs. The lack of this information compromises the evaluation of and treatment of patients in subsequent consultations.¹⁷

The number of caregivers and nursing staff noted by this study was sufficient in terms of the human resources necessary to look after the elderly patients, according to the provisions set forth in ANVISA Resolution No 283/2005.^{18,19} However, these human resources, as well as the services provided, vary in accordance with the financial situation and the management of the LCTFs, and, as such non-profit organizations, especially, may suffer from a lack of such resources, compromising the care of their elderly patients. Challenges involve only the small number of health care professionals, but also their lack of training with respect to the peculiarities of care involving senescence and senility. The consequences include a decline in the physical functioning of elderly patients and the physical and mental abuse of these patients, culminating in reductions in quality of life and, finally, death.¹⁹

With regard to the prevention and treatment of infectious diseases within the LCTFs, numerous problems were identified, such as: a lack of knowledge about infectious diseases and the microorganisms that cause them; infrequent or nonexistent adherence to infection control protocols; insufficient clinical information; and difficulties in accessing laboratory diagnostic services (microbiological and serological). These issues may encourage the administration of antimicrobial treatments that are exclusively empirical, which favor the excessive and inappropriate use of antimicrobials, the implementation of procedures inherent to inadequate therapeutic prescriptions, as well as the hasty selection of microorganisms within a community that are resistant to such medication.²⁰

Various mistakes were also found within the records of the health care professionals: illegible handwriting, deletions, and an absence of entries regarding the administration of drugs

and the execution of procedures. Difficulty in the understanding of treatment records interrupts the process of communication with a multidisciplinary staff, which can be detrimental to the patient and to health care professionals in cases where they need to defend themselves from legal action, as the records do not provide sufficient information regarding the treatment that was given.²¹

Of the 110 records of the use of antimicrobials that this study inventoried, the most prescribed were antimicrobials of the Cephalosporin group, fungicides of the Azoles group, and antiviral medication. The principal fungi that cause infection in the elderly are of the *Candida* and *Malassezia* genera, and those included in the Dermatophytes group.²⁰ Viral respiratory infections are recognized as important causes of death in the elderly, due to physiological and immunological alterations and the presence of chronic diseases.²²

Records were found of the combination of antimicrobials at two of the LCTFs that participated in this study. In order to use two or more antimicrobials at once, which is only recommended in specific circumstances, one must be aware of the potential for drug interaction in these cases in order to avoid a reduction in antimicrobial effectiveness, as well as the possibility for intoxication, a common outcome among the elderly.²³ In addition, the use of two or more antimicrobials can promote the rise of resistant microorganisms. Resistant microorganisms are a growing reality, and this situation is currently being monitored not only in hospital settings, but also at every level of health care and in the community as a whole. The LCTFs show potential for being repositories of resistant microorganisms due to their frequent use of antimicrobials among the elderly and the need for hospitalization involving the colonization of certain specific anatomical host sites.²⁴

The limitations of this study include the use of retrospective data, due to the lack of records or errors in the existing records and/or prescriptions of antimicrobials that contain incomplete or illegible data.

CONCLUSIONS

In this study, medical records, prescriptions for antimicrobials, medical exams and data regarding infections were insufficient in number or inadequate in terms of quality. Researchers noted incomplete medical records, or their complete absence, in relation to the administration of antimicrobials. A lack of diagnoses of infections or of the recurrence of infections that could justify the use of antimicrobials was also noted, while information regarding the duration of antimicrobial treatment, clinical justifications and complementary exam requests was also insufficient.

When medical records are kept properly, they contribute to the work procedures of the health care

staff and can infuse the health care environment with quality treatment practices. As such, researchers noted a need for further studies at these institutions. Furthermore, studies on a national scale should be outlined, in addition to programs that aim to raise awareness among health care professionals of the issues identified herein, as well as the ethical and legal aspects involved, most notably the artificial selection of resistant microorganisms.

In conclusion, within the disciplines of geriatrics and gerontology, it must be understood that care must be taken in the logging of information regarding the patient and/or hospice resident. This needs to be an integral part of operational protocol, so that hospice management or public health agencies can monitor this information.

REFERENCES

1. Küchemann BA. Envelhecimento populacional, cuidado e cidadania: velhos dilemas e novos desafios. *Soc estado* 2012;27(1):165-80.
2. Secoli SR. Polifarmácia: interações e reações polifarmácia: interações e reações adversas no uso de medicamentos por idosos. *Rev Bras Enferm* 2010;63(1):136-40.
3. Blix HS, Bergman JS, Schjtt J. How are antibacterials used in nursing homes?: Results from a point-prevalence prescription study in 44 Norwegian nursing homes. *Pharmacoepidemiol drug saf* [Internet] 2010 [acesso em 20 jan. 2015];19(10):1025-30. Disponível em: <http://www.ncbi.nlm.nih.gov/pubmed/20712026>
4. Brasil. Agência Nacional de Vigilância Sanitária. Resolução-RDC Nº 20, de 5 de maio de 2011. Dispõe sobre o controle de medicamentos à base de substâncias classificadas como antimicrobianos, de uso sob prescrição, isoladas ou em associação. Brasília, DF: Diário Oficial da União, nº 87 Seção 1, pág. 39-41; 9 de maio de 2011.
5. Camarano AA, Kanso S. As instituições de longa permanência para idosos no Brasil. *Rev Bras Estud Popul* 2010;27(1):233-5.
6. Lemes OM, Bronzatto LCH, Martins FFAMV. Revisão bibliográfica: erros em medicação e abordagem dos enfermeiros. *Ciênc Saúde Coletiva* 2010;7(37):20-3.
7. Setz VG, D'Innocenzo M. Avaliação da qualidade dos registros de enfermagem no prontuário por meio da auditoria. *Acta Paul Enferm* [Internet] 2009 [acesso em 20 jan 2015];22(3):313-17. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0103-21002009000300012&lng=en&nrm=iso.
8. Brasil. Agência Nacional de Vigilância Sanitária. Antimicrobianos: bases teóricas e uso clínico. Brasília, DF: Agência Nacional de Vigilância Sanitária; 2007.
9. Instituto Brasileiro de Geografia e Estatística. Característica das Instituições de Longa permanência para idosos, Região Sudeste. Rio de Janeiro: IBGE; 2010.
10. Peres MAC. Velhice e analfabetismo, uma relação paradoxal: a exclusão educacional em contextos rurais da região Nordeste. *Soc Estado* [Internet] 2011 [acesso em 20 jan 2015];26(3):631-62. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-69922011000300011&lng=en&nrm=iso
11. Instituto Brasileiro de Geografia e Estatística. Aumento da expectativa de vida do brasileiro. Rio de Janeiro: IBGE; 2013.
12. Polaro SHI, Fideralino JCT, Nunes PAO, Feitosa ES, Gonçalves LHT. Idosos residentes em instituições de longa permanência para idosos da região metropolitana de Belém-PA. *Rev Bras Geriatr Gerontol* 2012;15(4):777-84.

13. Lisboa CR, Chianca TCM. Perfil epidemiológico, clínico e de independência funcional de uma população idosa institucionalizada. *Rev Bras Enferm* [Internet] 2012 [acesso em 20 jan 2015];65(3):482-88. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0034-71672012000300013&lng=en&nrm=iso
14. Oliveira PB, Tavares DMS. Condições de saúde de idosos residentes em Instituição de Longa Permanência segundo necessidades humanas básicas. *Rev Bras Enferm* 2014;67(2):241-6.
15. Pakyz AL, Dwyer LL. Prevalence of Antimicrobial use among United States Nursing Home Residents: results from a National Survey. *Infect Control Hosp Epidemiol* 2010;31(6):661-2.
16. Pimenta FAP, Bicalho MAC, Romano-Silva MA, Moraes EN, Rezende NA. Doenças crônicas, cognição, declínio funcional e Índice de Charlson em idosos com demência. *Rev Assoc Med Bras* 2013;59(4):326-34.
17. Tavares IVB, Sá AB. Perfil de prescrição de antimicrobianos para as infecções do trato urinário nos cuidados de saúde primários. *Rev Port Med Geral Fam* [Internet] 2014 [acesso em 20 jan. 2015];30(2):85-100. Disponível em: http://www.scielo.gpeari.mctes.pt/scielo.php?script=sci_arttext&pid=S2182-51732014000200004&lng=pt.
18. Abrantes PM, Magalhães SMS, Acúrcio FA, Sakurai E. A qualidade da prescrição de antimicrobianos em ambulatórios públicos da Secretaria Municipal de Saúde de Belo Horizonte, MG. *Rev Ciênc Saúde Coletiva*. 2008;13(Suppl):711-20.
19. Brasil. Agência Nacional de Vigilância Sanitária. Resolução - RDC nº 283, de 26 de setembro de 2005. Estabelece padrão mínimo de o funcionamento das instituições de longa permanência para idosos Brasília, DF: Agência Nacional de Vigilância Sanitária; 2005.
20. Silva BT, Santos SSC. Cuidados aos idosos institucionalizado: opiniões do sujeito coletivo enfermeiro para 2026. *Acta Paul Enferm* 2010;23(6):775-81.
21. Mcclean P, Hughes C, Tunney M, Goossens H, Jans B. Antimicrobial prescribing in European nursing homes. *J Antimicrob Chemother* [Internet] 2011 [acesso em 20 jan. 2015];66(7):1609-16. Disponível em: <http://www.ncbi.nlm.nih.gov/pubmed/21596722>
22. Shemer A, Trau H, Davidocivi B, Amichai B, Grunwald MH. Onychomycosis: rationalization of topical treatment. *Isr Med Assoc J* 2008;10(6):415-6.
23. Xu YF, Shen HY, Zhao MQ, Chen LJ, Li YG, Liao M, et al. Adenovirus vectored shRNAs targeted to the highly conserved regions of VP1 and 2B in tandem inhibits replication of foot-and-mouth disease virus both in vitro and in vivo. *J virol Methods* 2012;181(1),51-8.
24. Araújo PL, Galato D. Risco de fragilização e uso de medicamentos em idosos residentes em uma localidade do sul de Santa Catarina. *Rev Bras Geriatr Gerontol* 2012;15(1):119-26.

Received: March 3, 2015

Revised: December 3, 2015

Approved: December 17, 2015