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Article

Impact of a medication therapy management service offered to patients in treatment of breast cancer

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Cancer has high morbidity and mortality rates related to medication use and produce a costly impact in health care. Thus, patients require constant monitoring and proper coordination of care between different professionals. This study aimed to evaluate the impact generated by a Medication Therapy Management service (MTM) offered to patients with breast cancer in use of polypharmacy. Observational, exploratory, descriptive and retrospective study of a MTM service that included 93 patients. Sociodemographic and clinical data related to pharmacotherapy and the processes associated with the systematization of the service were collected and analyzed. Patients were followed-up by the MTM service on average for 18 months (±4.31) and 185 drug-related problems (DRP) were identified, an average of two DRP per patient. Of these DRP, 48.11% were resolved and 49.73% were in the resolution process. The most common DRP were in the categories of Indication (37.84%), followed by Safety (23.78%). The safety category showed the highest resolution rate (59.09%). The study revealed an increased risk of DRP for patients with three or more comorbidities and using 5 or more medications. The process of systematization of a MTM service in oncology was associated with positive outcomes.

Keywords: Medication therapy management services. Outcomes Pharmaceutical care. Oncology. Breast Cancer.

INTRODUCTION

The so-called non-communicable diseases (NCD) are currently the subject of actions and planning by the Ministry of Health, through the Health Care Networks (HCN). These diseases are associated with increased morbidity and mortality leading to negative impact on the patient and the healthcare system. Due to its long course and the possibility of development of long-term complications, chronic diseases require constant monitoring of clinical parameters, both by professionals and by patients themselves, as well as greater coordination of care between different professionals and different levels of care. Cancer is among these diseases (Brasil, 2011; Malta, Merhy, 2010).

Worldwide, breast cancer is what most affects women, accounting for about 25% of new cases of cancer diagnosed in 2012 (Ferlay *et al*., 2013). In Brazil, according to the National Cancer Institute (INCA), 57,960 new cases per year will be diagnosed in the biennium 2016/2017, accounting for 56.20 cases per 100,000 women. On the other hand, the five-year survival rate has increased in most developing countries, with an average of 85% for this type of cancer (Allemani *et al*., 2015; Brasil, 2015a). The improvement in survival is due in part to early diagnosis, consolidation of adjuvant treatments as well as the improvement of symptoms and the prognosis of the

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disease, which are essential in most cases (Leal, Cubero, Del Giglio, 2010; Liedke, 2006). Hormonal therapy becomes important among these adjuvant treatments because of its variety of treatment options, good toxicity profile and high effectiveness (Leal, Cubero, Del Giglio, 2010). The anti-estrogens are the basis of this treatment for hormone receptor-positive patients, among them stand out selective modulators of estrogen receptors, tamoxifen and aromatase inhibitors, anastrozole and letrozole (Chabner, Longo, 2015).

Along with adjuvant treatments for breast cancer, many patients use drugs for associated comorbidities, such as hypertension, diabetes mellitus, dyslipidemia and obesity (Bonita *et al*., 2013; Malta *et al*., 2014). These diseases have implications for the survival of patients, since the most common cause of deaths is not related to breast cancer. It is well known that improved glycemic control, cholesterol, blood pressure, among other parameters, rely on social, economic, emotional, cultural and therapeutic factors, which cannot be understood and managed by only one type of professional. Additionally, the prevalence of multiple comorbidities leads to a quite common event in cancer patients, polypharmacy. This is characterized by the use of several drugs for various health conditions (in general the use of 5 drugs or more), or to treat symptoms generated by the use of other medications after adverse reactions, called "prescription cascading", which is common in oncology (Balducci, Goetz-Parten, Steinman, 2013). Polypharmacy is often the result of prescriptions of medications by different doctors for the same patient, often without proper communication between them (Ramalho de Oliveira, 2011).

The study of Prithviraj *et al*. (2012) showed an incidence of 80% of polypharmacy among elderly cancer patients of an oncology clinic from an US academic center, and 41% were associated with inadequate medical prescriptions. The use of various prescription drugs or self-medication favors the appearance of drug-related problems (DRP) (Moreira, Boechat, 2009).

DRP are undesirable events experienced by the patient that involves, or is suspected to involve, medications and that interferes with achieving the desired therapeutic goals (Cipolle, Strand, Morley, 2012). Johnson and Bootman (1995) in a large outpatient study in the United States showed that about 28% of hospital admissions were due to morbidity and mortality related to drug use. In the context of cancer, Chan *et al*. (2014) showed that 12.4% of hospital admissions of cancer patients were due to DRP, half of them preventable.

The provision of medication therapy management services (MTM) aims to prevent, identify and resolve DRP, reducing morbidity and mortality related to drugs, helping patients to achieve positive results with their pharmacotherapy and to experience improved clinical outcomes (Cipolle, Strand, Morley, 2012; Isetts, 2008; Mendonça *et al.*, 2016). MTM is offered when the professional applies the theoretical, philosophical and methodological framework of Pharmaceutical Care Practice in their daily work with patients (Cipolle, Strand, Morley, 2012; Ramalho de Oliveira, 2011). This service allows the pharmacist to assess the pharmacotherapeutic needs of the patient and to make a unique contribution towards a more rational use of medications in this individual's everyday life. This is realized using a rational, systematic and reproducible decision-making process. Thus, the drug therapy is assessed according to its appropriateness, effectiveness, safety and convenience for each patient (Cipolle, Strand, Morley, 2012). After an assessment of all of a patient's medications and the identification of DRP, care plans for each medical condition being treated are developed to prevent or resolve DRP, and, finally, the patient returns for follow-up evaluations when the real outcomes are assessed (Ramalho de Oliveira, 2011). Recent studies involving cancer patients revealed clinical benefits and patients' satisfaction with MTM services. Yeoh, Si and Chew (2013) and Yeoh *et al.* (2015) showed the identification and resolution of a large number of DRP in elderly cancer patients, and Lam and Cheung (2016) presented an improvement in adherence to oral therapy for patients with chronic myelogenous leukemia.

Based on the discussed susceptibility of cancer patients to the occurrence of DRP, the deleterious effects of these on the health of patients, and the scarcity of publications that discuss the impact of MTM services in patients with breast cancer, this study aims to elucidate the results of a systematization process of a MTM service provided to patients in treatment of breast cancer.

MATERIAL AND METHODS

Study design and participants

This is an observational, exploratory, descriptive and retrospective study on a MTM service provided in an oncology ambulatory clinic of a tertiary hospital in the region of Triângulo Mineiro, Minas Gerais. It is a public and university-based hospital considered an important reference for patients of medium to high complexity utilizing the Sistema Único de Saúde (SUS). It provides services to three million people in eighty-six districts of Triângulo Mineiro and Alto Paranaíba, in various health specialties (Brasil, 2015b).

Clinical pharmacy services started been provided to outpatients in January 2011. Since then, 650 visits of patients in adjuvant therapy for breast cancer with hormonal therapy have been documented. In May 2014, it began the process of systematization of the practice of clinical pharmacists using the framework of pharmaceutical care practice as a theoretical reference (Cipolle, Strand, Morley, 2012). This practice was then operationalized as the offering of MTM services. As a result, clinical pharmacists followed the logical decision-making process to assess patients' pharmacotherapeutic needs known as *Pharmacotherapy Workup* (PW). All DRP identified by MTM providers were documented and categorized into seven categories namely: unnecessary drug therapy, need for additional drug therapy, ineffective drug, dosage too low, adverse drug reaction, dosage too high and noncompliance.

Since then, a pharmacist and four residents have offered MTM consultations to 505 patients of the clinic. For inclusion in this study, the following criteria were met: patients on concomitant use of hormones (anastrozole, letrozole or tamoxifen) and medications for associated comorbidities, which were cared for by MTM pharmacists for more than 10 months, with at least one follow-up consultation. The sample consisted of 55 individuals, the minimum number according to sample calculation, in addition to other 38 obtained by simple random sampling to increase the strength of the results, totaling 93 records of patients with breast cancer in adjuvant treatment of hormonal therapy. The study design, inclusion criteria, exclusion and sampling are shown in Figure 1.

Data collection

Data were collected from paper and electronic medical records for the period of May 2014 to December 2015 (20 months).

The instrument for data collection was developed and completed by the researchers and was divided into two parts. The first, with socio-demographic data of patients (age, race/color and marital status, habits and substance use like smoking and drinking), and clinical data related to the MTM service (number of MTM consultations, medications in use and duration of treatment, comorbidities, review of systems, referrals to members of the multidisciplinary team or other services, and DRP identified, prevented and solved with implemented interventions). This data allowed the evaluation of the outcomes generated with the implementation of the MTM service. The second part was made with a checklist (supplementary information) related to the patient care process, ensuring that the service met the necessary requirements to provide adequate care,

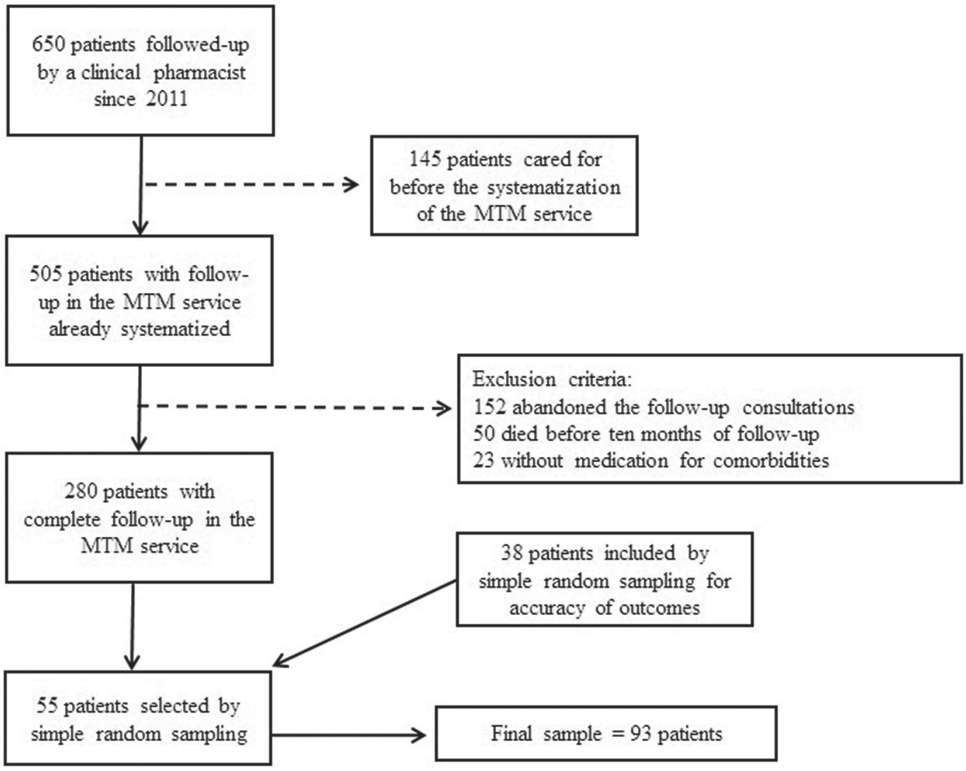

FIGURE 1 - Sample Selection Flowchart

as recommended by the Resolution nº 585 of August 29, 2013 by the Brazilian Federal Council of Pharmacy (CFF, 2013a).

Organization and analysis of data

Descriptive analysis was performed using frequency distribution for categorical variables and measures of central tendency (average and median) and dispersion (standard deviation) for quantitative variables. These data were consolidated and explored in the Microsoft Office Excel® 2013 program. For analysis of the factors related to the patient (age and comorbidities) and drug therapy (number of medications) in the presence and absence of DRP, the data were organized in Microsoft Office Excel®2013 and analysis was carried out in the software Freeware R for the Fisher exact test. The study was conducted under a confidence level of 95% and statistical significance was set at $p \leq 0.05$.

The results of the practice management system is presented through a comparative analysis between the options contained in the supplementary information, constructed in accordance to the articles of the resolution nº 585 of August 29, 2013 by the Brazilian Federal Council of Pharmacy, and what was offered by the MTM service under study. Each topic of the checklist was categorized as present or absent, and the results were shown descriptively.

Ethical considerations

This study was approved by the Ethics Committee of the Federal University of Uberlândia in accordance with the attributions defined in Resolution CNS 466/2012, (CEP / UFU - CAAE: 40616414.1.0000.5152) and advice under no. 1084730. The use of consent forms was waived due to the retrospective design of the study.

RESULTS AND DISCUSSION

Sample characterization

The median age of the patients was 61 years old (± 11.92), ranging from 36 to 95 years, predominantly white and married, as described in Table I.

The vast majority of patients, 67.74%, was in adjuvant treatment for breast cancer with tamoxifen, as illustrated in Table I. This is due to the large number of patients who started treatment in premenopausal age (36 to 55 years) and maintained the drug during menopause. For tamoxifen, the initial adjuvant treatment time is five years, with the possibility of extension to ten years with clinical benefits and increase in life expectancy in young patients tolerant to the drug (Davies *et al.*, 2013). The median duration of treatment with hormone was 49 months (± 18.38).

TABLE I - Frequency of sociodemographic characteristics of patients assisted by MTM service in an oncology clinic of a university hospital from May 2014 to December 2015, Uberlândia, MG, 2016

Characteristics	N=93	%
Age, years		
Median (SD)	61 (±12.23)	-
36 - 45	9	9.68
46 - 55	22	23.65
56 - 65	30	32.26
66 - 75	19	20.43
≥ 76	13	13.98
Race		
White	55	59.14
Black	6	6.45
Mixed	32	34.41
Marital Status		
Single	18	19.35
Married	46	49.46
Divorced	9	9.68
Widow	14	15.06
Cohabiting	1	1.08
Uninformed*	5	5.37
Hormonal Therapy		
Anastrozole	22	23.66
Letrozole	8	8.60
Tamoxifen	63	67.74
Smoking Status		
Current	7	7.54
Past	17	18.27
Never	61	65.59
Uninformed*	8	8.60
Alcohol Consumption		
Alcoholic	1	1.08
Social drinker	18	19.35
Past	3	3.22
Never	60	64.52
Uninformed*	11	11.83

SD = standard deviation. *Uninformed: lack of such a characteristic record in databases and searchable documents.

The analysis of the use of medications for chronic comorbidities or other acute health conditions showed a median of 6 (± 3.20) medications per patient, which shows the high polypharmacy rate in the sample, considered here as the use of more than five drugs for various conditions.

The most prevalent comorbidities in the sample are shown in Table II. A median of 2 (± 1.35) comorbidities per patient was found, and hypertension was the most prevalent condition, affecting 61.3% of patients, followed by dyslipidemias, hypothyroidism, diabetes mellitus and depression.

TABLE II - Prevalence of comorbid conditions associated with breast cancer in patients in adjuvant treatment with hormonal therapy assisted by MTM service from May 2014 to December 2015, Uberlândia, MG, 2016

Comorbidities	N (%)
Hypertension	57 (61.3)
Dyslipidemia	30 (32.3)
Hypothyroidism	23 (24.7)
Diabetes *Mellitus*	19 (20.4)
Depression	16 (17.2)
Osteopenia	6 (6.4)
Osteoporosis	4 (4.3)
Osteoarthritis	3 (3.2)
Alzheimer	2 (2.2)
Others*	9 (9.9)

*Comorbidities found: asthma, epilepsy, chronic myelogenous leukemia, heart failure, senile tremor, Parkinson's disease, gout, psoriasis and bipolar disorder.

The results of this study are similar to those obtained by Yeoh *et al.* (2015) that identified DRP in elderly patients undergoing outpatient chemotherapy for cancer in which breast cancer was the most prevalent in the sample. These researchers also identified a median of 6 drugs utilized and 3 comorbidities per patient, and the most prevalent conditions were hypertension, dyslipidemia and diabetes mellitus. This study calls attention to the associated comorbidities of these patients, especially the high prevalence of hypothyroidism. This can be attributed to the fact that only women were analyzed in the sample, mostly elderly, for whom the incidence of hypothyroidism is high (Sgarbi *et al*., 2013).

The symptoms presented by patients relate to the most prevalent associated conditions and the effects of adjuvant treatment of cancer. General symptoms were experienced by most patients, comprising 23.9% of the total, followed by symptoms associated with the cardiovascular system, 18.2%; nervous system, 11.7%; gastrointestinal, 11.5%; and endocrine, 11%.

Drug-related problems

A total of 185 DRP have been identified, which corresponds to a median of 2 (± 1.35) DRP per patient, similar to that found by Yeoh *et al.* (2015) that found a median of 3 DRP per patient. This result suggests a good response in DRP identification by the studied MTM service, given that the data approximate to a study of a sample size three times larger (294 patients).

The most common categories of DRP identified were indication (37.84%), followed by safety (23.78%), as described in Table III.

TABLE III – Drug-related problems identified in patients assisted by MTM service from May 2014 to December 2015, Uberlândia, MG, 2016

Categories of Drug-Related Problems*	N (%)
INDICATION	***70 (37.84)***
1. Unnecessary drug therapy	15 (21.43)
2. Requires additional drug therapy	55 (78.57)
EFFECTIVENESS	***33 (14.84)***
3. Requires different drug product	10 (30.30)
4. Dosage too low	23 (69.70)
SAFETY	***44 (23.78)***
5. Adverse drug reaction	40 (90.90)
6. Dosage too high	4 (9.10)
ADHERENCE	***38 (20.54)***
7. Non-adherence	38 (100)
Total	**185 (100)**

*Based on Cipolle, Strand, Morley, 2012.

The need for additional drug therapy for prevention and/or prophylaxis was the main cause of the DRP in the category "Indication", which can be explained by the absence of preventive drug therapy for decreased bone mineral density and bone fractures in aromatase inhibitors users, especially anastrozole. These adverse reactions can reach 15% of patients leading to osteoporosis in 11% of cases (Micromedex, 2016). Moreover, other needed prophylaxis was absent, such as acetylsalicylic acid (ASA), which shows benefits in the prevention of cardiovascular events in patients with diabetes mellitus (Baigent *et al*., 2009; Silva *et al*., 2013).

Patients with osteopenia/osteoporosis confirmed by bone densitometry were also missing medications

that control these conditions, ranging from non-pharmacological measures to supplementation of calcium and vitamin D and bisphosphonate use, according to the Osteoporosis Clinical Protocol and Therapeutic Guidelines of the Brazilian Ministry of Health (Brasil, 2014). These results are similar to those found by Strand *et al*. (2004), which reviewed the clinical and economic outcomes from 25 years of experience with the practice of pharmaceutical care, showing that the need for additional preventive drug therapy for osteoporosis, acute myocardial infarction and stroke were the most prevalent DRP.

The main cause of DRP in the category "Effectiveness" was 'dosage too low' resulting from drug and food interactions (69.7%). This DRP was the result of a classic interaction between the selective serotonin reuptake inhibitors fluoxetine and duloxetine with tamoxifen.

Among the DRP in the category "Safety", adverse drug reactions (ADRs) were the most common problems, mainly caused by adjuvant treatment with tamoxifen and anastrozole, respectively. Tamoxifen was responsible for the thickening endometrium and vascular events; while anastrozole was associated with bone decalcification. Both drugs also led to menopausal symptoms. In relation to the DRP in the category "Nonadherence", forgetting medication doses were the most frequent ones.

Of the identified DRP, 48.11% were resolved and 49.73% were in the process of resolution at the end of the study period, as shown in Figure 2. In the analysis by the category of DRP, the resolution index were greater than 50% for three of the four categories, of which safety and adherence stood out with 59.09% and 57.89%, respectively. This can be explained by the fact that the pharmacists were able to solve a large number of problems directly with the patient; without the need to make recommendations to other professionals. In the study by Yeoh *et al.* (2015), in 68.2% of cases the main action for the resolution of ADRs was patient education. Similarly, in Cipolle, Strand and Morley (2012), 80% of interventions to address DRP occurred directly between the patient and the MTM provider/ pharmacist.

Considering the DRP resolution process, the category related to "Indication" had the lowest resolution rate (32.86%). One possible explanation for this result may be the need to establish institutional agreements that support collaborative practice between physicians and pharmacists and other healthcare professionals. The drug therapy problems in the category "Indication" are types of DRP which often requires the involvement of other professionals. However, this problem might be minimized in the near future due to the resolution nº 586 of August 29, 2013 by the Federal Council of Pharmacy, which regulates pharmacists' prescribing. This resolution addresses the situations in which pharmacists could prescribe under collaborative practice agreement with physicians such as in following protocols or guidelines for the prevention and treatment of osteoporosis (CFF, 2013b).

Unresolved DRP (2.16%) were due to two deaths in the last five months of the study. Data of these patients were considered as they received MTM services for 15 months and added relevant information to the study.

The study has listed a total of 174 interventions to resolve the identified DRP. The most frequent resolutions were: patient education (27.01%), followed by initiation of new drug therapy (23.56%), discontinuing (18.39%) and/ or modification of pharmacotherapy (17.82%) followed by monitoring of laboratory, clinical and image parameters (13.22%).

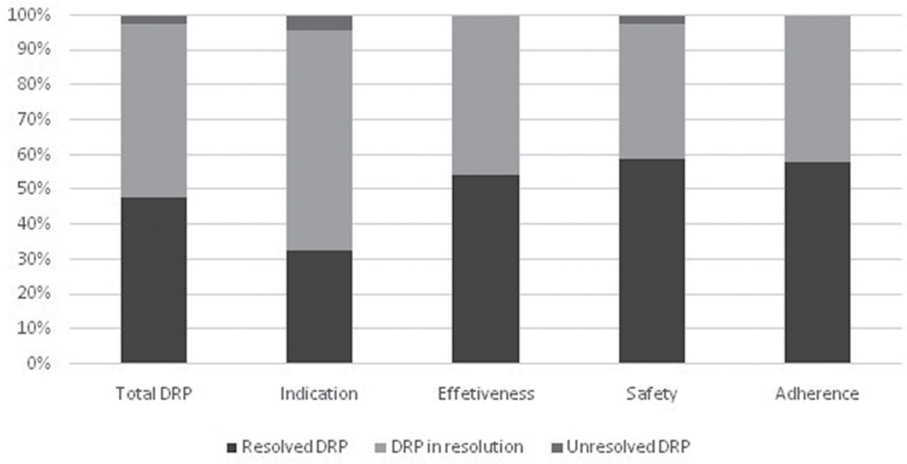

FIGURE 2 - Total and category of DRP resolution index of DRP identified in patients served by the MTM service. Uberlândia, MG, 2016. DRP: Drug-related problems. Classification of categories based on Cipolle, Strand, Morley, 2012.

Figure 3 shows a variation in the identification and resolution of DRP per consultation during MTM follow-up visits, highlighting the importance of continuous monitoring of the patient by the pharmacist. A total of 369 consultations were carried out, with a median of 5 visits (±2.42) per patient.

By observing the trend throughout the encounters, it is clear that a large number of DRP were identified at the first encounters, a period when the MTM pharmacist and the patient are building their relationship and trust. It is believed that a strong therapeutic relationship favors the identification of DRP and, more importantly, the resolution of these problems (Cipolle, Strand, Morley, 2012).

As we observed the timing for the resolution of DRP, the trend indicates that a certain time is required for the service to reach its goals, given that the greatest amount of DRP was resolved between the third and fifth consultation. This suggests that a certain period of time is necessary for the pharmacist to make a proper assessment of the patient as a whole and define the therapeutic goals for that specific patient with subsequent well-informed and successful interventions (Cipolle, Strand, Morley, 2012). This may be associated with the clinical training and expertise of professionals, which was being developed during the systematization of the clinical practice through a clinical training program.

A period of stability was evidenced between the identification and resolution of DRP after the seventh consultation, when these were equivalent, indicating the time required for the delivery of an effective service, or a service in which MTM providers identify and effectively resolve DRP. With a median of five visits, the MTM service in this study had an insufficient number of follow-up visits to reach the equivalency between identifying and resolving DRP, which was evidenced by the large number of DRP in the process of resolution.

In this sense, managing the practice is essential to have a consistent and effective service. The practice management system includes the monitoring of the entire service, the processes involved and the physical, human and financial resources necessary for such (Freitas, Ramalho de Oliveira, Perini, 2006). However, it requires the employment of a cycle of improvements that suggests processes of optimization to be performed continuously aiming to improve the quality of the service offered and its results (Brasil, 2006).

The association between the presence of DRP and age, comorbidities and the number of medications used by the patients is shown in Table IV.

Univariate analysis showed that patients with more than three comorbidities ($p = 0.0141$) or using five or more drugs ($p = 0.0008$) were significantly associated with a higher risk of developing DRP. This corroborates with the findings by Yeoh *et al*. (2015), who also showed statistical significance and an increased risk of developing DRP up to nine times for patients who have a greater number of comorbidities and medications in use. In this analysis, age was not significantly associated with the presence of DRP.

These results demonstrate the complexity associated with the treatment of breast cancer as showed by the high number of medications, comorbidities and DRP identified. They also suggest the importance of MTM services for these patients as well as the critical role that a robust practice management system can have to deliver a high-quality service (Cipolle, Strand, Morley, 2012).

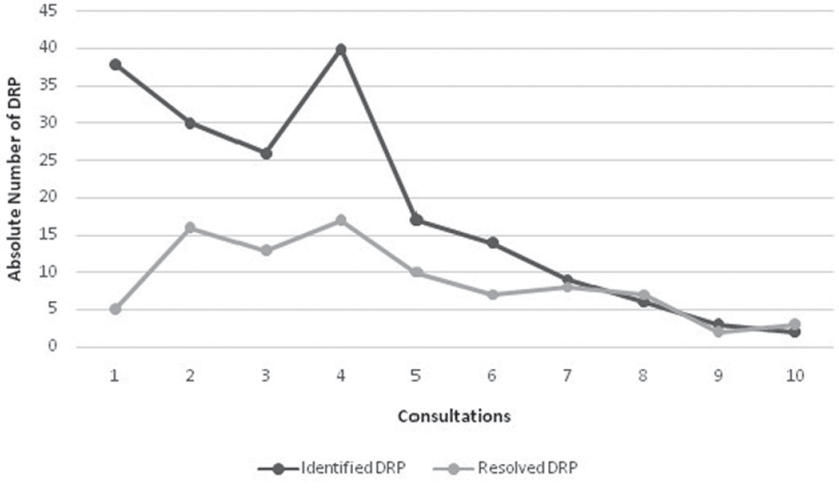

FIGURE 3 - Identification and resolution of DRP according to the frequency of MTM consultations. Uberlândia, MG, 2016. DRP: Drug-related problems.

TABLE IV - Univariate analysis of the association between patient-related factors and the presence of drug-related problems (DRP). Uberlândia, MG, 2016

Patient-related factors	DRP present (n=69)	DRP absent (n=24)	*p* value
Age			
≤ 60 years	31	12	0.8127
> 60 years	38	12	
Associated comorbidities			
< 3 comorbidities	37	20	0.0141*
≥ 3 comorbidities	32	4	
Medications in use			
≤ 5 medications	30	20	0.0008*
> 5 medications	39	4	

Fisher's exact test was used for the univariate analysis. Values of $p \leq 0.05$ were considered statistically significant.

Practice management

Minimum standards for a MTM service

The delivery of a MTM service has to follow a path that allows for an effective and ethical patient care process and an efficient practice management system. This path has to agree with the theory that supports the service (Caring paradigm, patient-centeredness, and Pharmacotherapy work up) and to facilitate the dialogue between the theory and the practice in the real world. All these must lead to improved clinical outcomes and enhanced patient experience (Cipolle, Strand, Morley, 2012; APhA, 2008). Figure 4 shows how each step of this path can be essential for the success of the MTM service.

The studied MTM service is delivered in an adequate physical space that ensures the privacy of the patient (furniture, telephone line and computer connected to the internet). The space is used exclusively for the service during days and times scheduled specifically for the delivery of the MTM service.

The recruitment of patients for the MTM service usually occurs through referral by other health professionals, physicians or multidisciplinary team, as set out in Figure 4. In the present study, however, it was observed the predominance of active search by the pharmacist and sometimes spontaneous demand. This form of insertion of patients in the service may, however, hinder access and imposes difficulties in the consolidation of the service as well as lead to a deficit in the number of consultations, impairing the expected results.

Sorensen *et al.* (2016) conducted a study on the factors that led to the success of MTM in health systems of Minnesota, USA. The results revealed that an open and welcoming culture for innovation that privilege patient care within the organization, as well as understanding that the pharmacist is an available resource that can be involved in delivering care to improve clinical outcomes are crucial for the establishment and sustainability of an MTM service. In the present study, despite the availability of an adequate physical structure, understanding the importance of the pharmacist in the context of care and a welcoming environment for this professional in the oncology sector are still a major obstacle. This may have impacted and contributed to the difficulty in recruiting patients to the service, requiring enrollment by direct means, such as active search and spontaneous demand.

Patient care process

The application of the propaedeutic *Pharmacotherapy Workup* (PW) was done effectively by professionals of the MTM service during the study period, since this systematic process was not a limiting factor for the resolution of DRP. However, a complicating factor was the documentation of the data collected as the electronic record of the Hospital, the University Hospitals Management Application (AGHU), did not have the appropriate fields for the documentation of the pharmaceutical care processes. As a result, an appropriate documentation system was implemented by mid-year 2014.

For the implementation of the MTM service and for sustaining the employed changes, it is necessary a model that supports the care provided, including documentation standards that facilitate data collection and analysis and a collaborative practice. This is critical for patients to reach therapeutic success (Sorensen *et al*., 2016). In the oncology outpatient clinic studied, the pharmacists managed to overcome this obstacle through the development of a new pharmacist documentation template in partnership with the *Centro de Estudos em Atenção Farmacêutica* (Center for Pharmaceutical Care Studies) at the Federal University of Minas Gerais (CEAF/UFMG). This tool made possible the systematic record of the practice as well as the insertion of the necessary fields into the general patient record, contributing to the dissemination of the information generated by the MTM service to other members of the healthcare team.

Consultation flow at MTM and collaborative practice

As mentioned above, the vast majority of DRP were resolved between the pharmacist and the patient (61.86%).

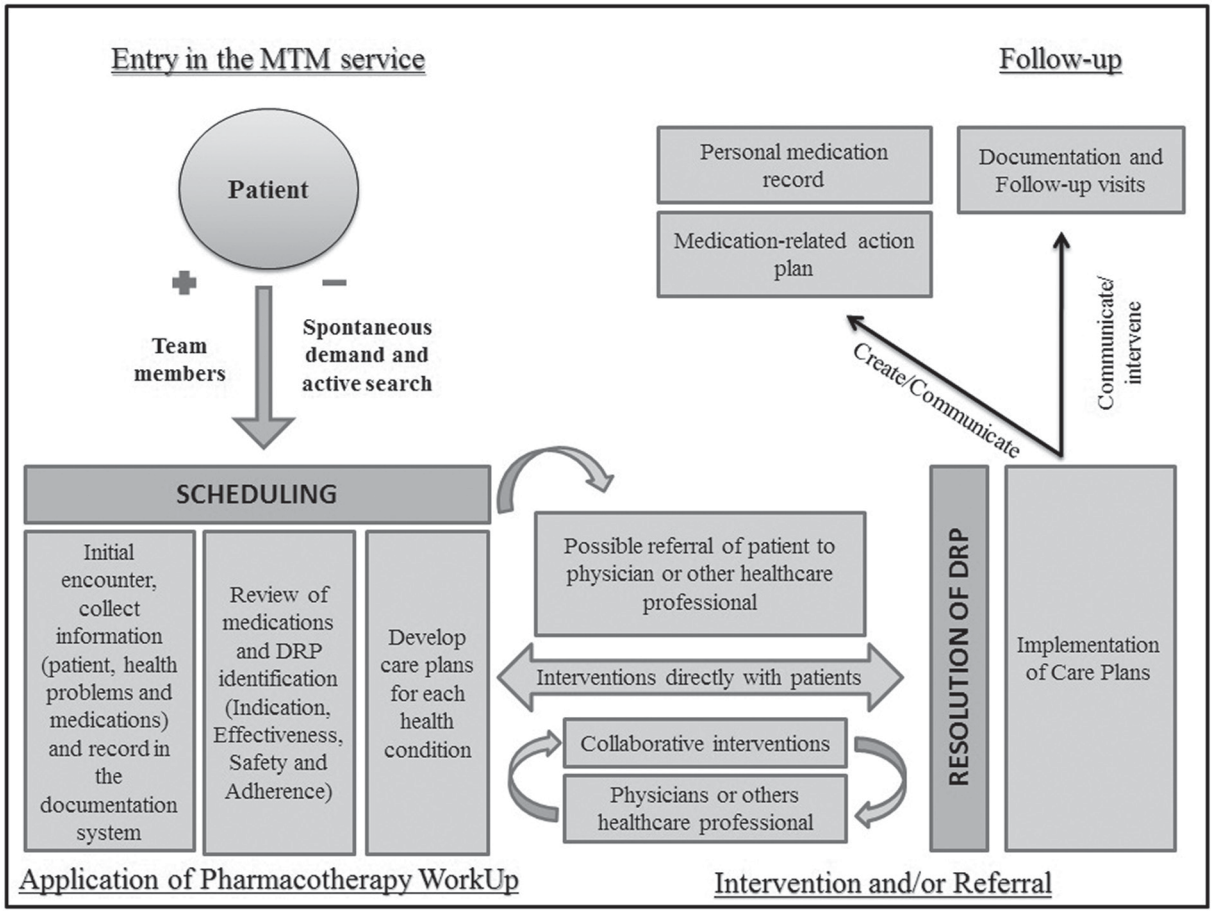

FIGURE 4 - Flow Diagram of the MTM service* at an oncology clinic. *Adapted diagram of a MTM service described by APhA, NACDS (2008). The diagram shows the optimal functioning of the MTM service within an oncology clinic, with all steps of pharmaceutical care practice. The symbols + and - represent the appropriate scheduling flow, which should be higher for the members of the health team and lower for spontaneous demand and active search. MTM: Medication Therapy Management.

The absence of a collaborative and interdisciplinary practice agreement between different professions, as shown in Figure 4, impacted the results, given the large number of DRP still in process of resolution by the end of this study. Interdisciplinary work presupposes collaborative work and the establishment of common goals between those caring for the same patient. Thus, one of the biggest challenges of this practice is intrinsically linked to a Cartesian way of preparing health care professionals, which prevents this experience (Sousa, Bastos, 2016).

Despite all the challenges encountered in the provision of the MTM service, pharmacists made 68 referrals to other professionals for the resolution of DRP or to meet patients' needs of a different nature. The main referrals were made to the following professionals: general practitioner (39.71%), medical specialist (23.53%), nutritionist (20.59%) and psychologist (7.35%), as well as dentists, nurses, social workers and the clinic that was the geographic reference for a specific patient.

The average time of follow-up in the MTM service during the study period was 18 months (± 4.31). Despite the good contact time with the service, the number of five visits per patient, or one follow-up visit every three months, it can still be considered low considering the complexity of the patients. This could be another factor that prevented a higher rate of resolution of DRP.

It should be emphasized that the follow-up visits and the monitoring of the care plans implemented/ interventions are crucial for the consolidation of the service. The patient has to experience the continuity of care and be certain that all DRP will be monitored and resolved in a timely manner and that their treatment will be effectively optimized. Cipolle, Strand and Morley (2012) stress that pharmaceutical care will only be a patient care practice when there is appropriate assessment of the patient's needs, development and implementation of care plans and follow-up evaluations to guarantee optimal outcomes. This is what differentiates pharmaceutical care

practice from other interventions such as health education. This full process indicates the professional is taking responsibility for the results of what he or she does.

CONCLUSIONS

It was clear the positive impact of the MTM service within 20 months of study, when the service has been in the process of systematization. Patient care was being delivered in a suitable environment and using effective techniques/processes that led to the resolution of a high number of DRP. Regarding the limitations, the results show the need for a scheduling system that are shared between all members of the team, with awareness of a multidisciplinary and interdisciplinary practice of care, establishing collaborative actions for the benefit of the patient, which could lead to better results.

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SUPPLEMENTARY INFORMATION

Practice Management (Check list)

- Based on Resolution nº 585 of August 29, 2013 the Brazilian Federal Council of Pharmacy, mark with "X" the characteristics presented by the MTM service.

( ) Caring relationship centered on the patient.
( ) Collaborate with other members of the health team, actions for the promotion, protection and recovery of health and the prevention of diseases and other health problems.
( ) Participate in care planning for the patient to safely use the necessary medications, in doses, frequency, times, routes of administration and adequate duration, contributing to the patient's ability to use the drug therapy and to achieve the therapeutic goals.
( ) Perform pharmacist interventions and develop reports to communicate with other members of the health team, with the purpose of assisting in the selection, addition, replacement, adjustment or interruption of the patient's pharmacotherapy.
( ) Participate and promote clinical case discussions in an integrated way with the other members of the health team.
( ) Deliver pharmacy consultation in a consultation office that guarantees patient's privacy.
( ) Receive patients referred by medical staff.
( ) Receive patients referred by the multiprofessional team.
( ) Receive patients referred by spontaneous demand and active search.
( ) Performs pharmacist anamnesis as well as verifies signs and symptoms, in order to provide care to the patient.
( ) Assess and understand the information in the patient's chart.
( ) Organize, interpret and, when necessary, summarize the patient's data in order to perform the pharmacist's assessment.
( ) Request laboratory tests, within the scope of its professional competence, in order to monitor the results of pharmacotherapy.
( ) Evaluate the results of clinical and laboratory tests of the patient, as an instrument for the individualization of pharmacotherapy.
( ) Monitor therapeutic drug levels by means of clinical pharmacokinetic data.
( ) Determine the patient's biochemical and physiological parameters, for the purposes of monitoring pharmacotherapy and health screening.
( ) Prevent, identify, evaluate and intervenes in drug-related events and other problems related to pharmacotherapy.
( ) Identify, evaluate and intervene in the undesirable and clinically significant drug interactions.
( ) Elaborate the pharmacist's care plan for the patient.
( ) Agree with the patient and, when necessary, with other health professionals, the actions of the care plan.
( ) Perform and register the pharmacist's interventions with the patient, family, caregivers and society.
( ) Periodically evaluate the results of the implemented pharmacist's interventions, constructing quality indicators of the clinical services provided.
( ) Follow up with the patient and document in the patient's chart.
( ) Prepare an updated and reconciled list of medications in use by the patient during the admission, transfer and discharge processes between services and health care levels.
( ) Prescribe, according to specific legislation, within the scope of its professional competence.
( ) Evaluate and monitor patients' adherence to treatment, and carry out actions for their promotion.
( ) Inform, guide and educate patients, families, caregivers and society about health issues, the rational use of medicines and other health technologies.
( ) Develop educational materials for the promotion, protection and recovery of health and prevention of diseases and other related problems.
( ) Act in the process of training and professional development of pharmacists.
( ) Develop and participate in training programs and continuing education of human resources in the health area.
( ) Participate in the coordination, supervision, auditing, accreditation and certification of actions and services within the scope of the pharmacist's clinical activities.
( ) Perform the management of processes and projects, through tools and quality indicators of clinical services rendered.
( ) Search, select, organize, interpret and disseminate information that guides the decision making based on evidence, in the process of patient care.
( ) Interpret and integrate data obtained from different sources of information in the process of evaluation of health technologies.
( ) Document the entire work process.

Other observations: _____
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