Use of Telepharmacy To Support Patients Using Oral Antineoplastic Agents: A Pilot Study

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Research Article

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Abstract

Purpose This study aims to use teleconsultation to perform pharmaceutical consultations with patients using oral antineoplastic agents, to identify their profile, and carry out activities to support the correct treatment.

Methods The telepharmacy flowchart was designed considering the steps of a pharmaceutical consultation. A pilot study was carried out with 66 patients from a military hospital, who had been using oral antineoplastic agents for at least 3 months. Adherence was measured using a self-report semi-structured survey, medication possession ratio (MPR), and the proportion of days covered (PDC). The interventions were carried out through structured phone calls.

Results Sixty-seven percent were male, and 33% were aged 65 to 75 years. According to the survey, 16 patients adhered to the oral antineoplastic agent. Based on MPR and PDC, 53 and 52 patients showed good persistence, respectively. When all methods were applied together, 9 patients were adherent. On average, each patient regularly uses 4.73 medicines. Most patients (83 %) reported adverse effects during treatment. Five hundred eighty-one pharmaceutical interventions were carried out, most of them corrective (29%) and related to the correct drug administration technique (29 %).

Conclusions The proposed tool helped establish good communication with patients, obtain desired data, and carry out relevant interventions. However, it is necessary to carry out further consultations to verify whether the patients were able to apply the suggested recommendations in practice.

Introduction

Cancer is a major public health problem around the world. Although the therapeutic arsenal used consists basically of intravenous drugs, the scenario has changed significantly in recent decades with the advent of several oral antineoplastic agents [1], [2]. However, despite its benefits, the outpatient use of these drugs also offers risks, such as non-adherence and improper use [3]–[5]. Considering the complexity of cancer patients and the chronic nature of oral therapy, health professionals should provide oral antineoplastic agents, monitor patients over time, assess treatment adherence, manage adverse reactions, and identify signs of therapeutic ineffectiveness [3]–[8].

Data from literature suggest that the rates of oral antineoplastic adherence vary from 16 to 100%, depending on the medication and the method used for analysis [1], [9], [10]. It is noteworthy that failure to adhere to the treatment can have serious consequences, such as lack of therapeutic efficacy, toxicity, and higher costs resulting from the increased use of the health system, including more rates visits to care units and prolongation of hospital stay [10], [11].

Besides face-to-face communication is the ideal model for patient care, it must be considered the availability of technologies capable of virtually supporting a large part of the work performed by health professionals, if necessary [7]. Thus, telemedicine applications can facilitate patient access to specialized medical care remotely and, therefore, can be ideally suited to the medical oncology environment [12].

Considering the growing trend of telemedicine use, including within the scope of Oncology Pharmacy for outpatients [13]–[15], the use of structured phone calls seems to be a tool to provide pharmaceutical support to cancer patients. So the objective of this work is to present a proposal for a pharmaceutical teleconsultation and conduct a pilot study with patients using oral antineoplastic agents, aiming to identify their characteristics, measure medication adherence and carry out pharmaceutical interventions to support the treatment.

Methods

Telepharmacy planning

The project was outlined with the necessary steps for the realization of remote consultations. A pilot study was carried out through pharmacist telephone calls to patients. Finally, a flowchart with the pharmacist teleconsultation proposal was elaborated using Bizagi Modeler® program version 3.1.0.011 (2016).

Study design and Patient selection

It is a retrospective/prospective, cross-sectional, observational and quantitative study between January and November 2020. at Hospital of high complexity. Patients over 18 years old using Abiraterone, Bicalutamide, Capecitabine, Exemestane, or Imatinib were recruited at the Outpatient Pharmacy Service (OPS) for at least three months regardless of the beginning of the treatment. The exclusion criteria were: patients with cognitive disorders, illiterate, or insufficient command of the Portuguese language.

Data collection and management

When patients came to the OPS to obtain their medications, they received a brief explanation from pharmacy technicians about the project and were invited to participate in the research. Those who accepted the invitation received the Informed Consent and the adherence survey being asked to bring them filled out and signed on next dispensation.

The first part of the survey contained questions about the patients' sociodemographic data. The second part was adapted from the method of Kimura and colleagues [7], consisting of 17 phrases that approach several aspects of the patient's behavior towards the oral antineoplastic agent, with 6 of them about medication adherence. The answer options were graded on a 5-point Likert scale, with 5 being "yes", 4 being "I think so", 3 being "I cannot say either way", 2 being "I don't think so" and 1 being "no".

Based on the responses to the survey, the participants were divided into two groups: Good Adherence (GA) Group, consisting of patients who adhered to their medication regimens (score ≥ 4 in the 6 sentences about adherence); and Insufficient Adherence (IA) Group, made up of patients who did not (score < 4 in at least one of the 6 sentences about adherence).

In parallel, medication dispensing records were collected during the survey months, using the OPS dispensing control registers. These data were used to calculate the MPR and PDC, using the following formulas [16]:

$$\text{MPR} = \frac{\text{Total days' supply}}{\text{Number of days from the first refill up to last refill} + \text{Days' supply obtained at the last refill}} \times 100$$

$$\text{PDC} = \frac{\text{Total days' supply}}{\text{Number of days of study participation}} \times 100$$

Patients with rates below 90% in at least one of the parameters or above 110% in the MPR were classified in the insufficient persistence (IP) group. The other patients were considered to be of good persistence (GP). Based on the results, patients who are simultaneously part of the GA and GP groups were classified as "adherent", while the others were classified as "non-adherent".

After those steps, the pharmacist contacted all patients by phone calls and conducted pre-structured interviews, according to the script defined by the author. Questions were asked about the use of oral antineoplastic agents, other medicines, the practice of self-medication, and adverse reactions.

Results

Telepharmacy proposal

Figure 1 presents the proposed telepharmacy attendance flowchart, contemplating the planning actions and the steps of the remote consultation. The flowchart suggests that the project's design phase is necessary to clearly define the purpose of the teleconsultation and the resources available for its realization to assess its feasibility. In this stage, team members who have clinical skills, the workload allocated to the telepharmacy service, and selecting patients criteria have been defined. These definitions must take into account the local reality. For this work, the objective was not only to assess medication adherence but also to take the opportunity to know patients better, identify other relevant issues to treatment and make interventions whenever necessary. At the study phase, the pharmacist carried out a previous study on cancer, medication adherence, literature reports about pharmacotherapeutic follow-up experiences, whether in person or at a distance, and clinical skills.

Participants

Of the 86 patients eligible to participate in the study, 12 not accept, 6 died, and 2 had to be excluded due to suspension of treatment. So it was remaining 66 participants in the study. It was observed that 67% of the patients were male, and 33% were between 65 and 75 years old. Most of them were married (73%) and had completed high school (65 %). The most prevalent types of cancer were prostate cancer (35%) and digestive tract cancer (33%). On average, the duration of treatment is 15,71 months (Table 1).

Medication adherence

Based on the adherence survey, it was observed that 16 patients were in GA group. Fifty-three patients had MPR ranging between 90 and 110%, and 52 had PDC greater than or equal to 90%, but the GP group consisted of 47 patients when the indicators were evaluated together. When all methods were applied together, it was found that only 9 patients were adherent to drug therapy (Table 2).

Pharmacotherapy

When assessing patients' answers about pharmacotherapy, each patient uses a daily 4.73 medication on average. The most frequent pharmacological groups used by the patients were: antihypertensive, analgesics, and vitamins/supplements.

Little medication regular use was observed to treat adverse reactions to oral antineoplastic agents, with an overall average of 0,44 drug/patient. The practice of self-medication was even less frequent, as 77% of patients reported not using any medication in this way. The group average was 0,19 medicine/patient (Table 3).

Adverse reactions

Eight-three percent of patients reported the occurrence of an adverse drug reaction (ADR) with the use of oral antineoplastic agents. When analyzing the 158 reported ADRs, the most common reactions were hand-foot syndrome (31), skin and attachments disorders (23), sex hormones-related disorders (17), and nausea/vomiting (15). Even though adverse effects are frequent reactions, only 8% of the patients came to interrupt the cancer treatment because they could not tolerate them (Table 4).

Pharmacist interventions

From the 581 interventions performed by the pharmacist during the remote consultation, 29% were corrective (that is, referring to the patient's behavior considered inappropriate/incorrect that requires some change), and 31% applied to all medications. On average, 8.80 interventions were performed per patient, the most common type being those referring to the correct technique for using oral antineoplastic agents (29%) (Table 5).

Discussion

This study demonstrated how a phone call is a viable option of pharmacist teleconsultation care for patients using oral antineoplastic agents. Although the methods used to measure adherence have allowed the classification of patients into adherent and non-adherent, other relevant issues have been identified that help this classification during the teleconsultation. It is more effective to use different methodologies to have a complete approach to the problem [17]. In parallel, as in another study, during the remote consultation, patients were instructed on medication use, symptom management, the importance of adherence, and safe handling of oral antineoplastic agents [4]. Besides, interventions by telephone were feasible for patients and had good acceptance, being a more economical and comfortable alternative to face-to-face visits [18].

As most of the patients in the present study were elderly, we opted for telephone consultation because it is easily accessible to everyone. However, with the widespread use of the Internet in developing countries, it is believed that patients will tend to prefer video calls over other methods [19]. However, health professionals must evaluate issues such as internet access [6] and the patient's familiarity with the use of this technology.

The tool suggested in this work can be applied in different scenarios of pharmaceutical care. Among possibilities of pharmacist teleconsultation's applications, we can mention the identification of inappropriate medication use [20], ADR identification [4], [20], [21], the detection of drug-related problems [4], [20], and improved adherence [4]; often with positive feedbacks from patients and professionals about the telemedicine use [12], including phone calls [22].

When designing the tool, one of the critical elements is pharmacists who will perform the remote consultation. Thus, it is essential to remember that the technical medication knowledge needed to provide care is not enough, but also the profile to do so. Therefore, it is believed that professionals who have clinical skills are a strategy to increase the chances of success in implementing the project.

Another relevant aspect in the design of this telepharmacy tool was the study phase. Continuing education on oral antineoplastic therapy is necessary for pharmacists to ensure the proper and safe use of these drugs [21]. This phase was considered essential so that the pharmacist could prepare and acquire the necessary technical knowledge related to the project's objective. It is worth noting that, as important as technical knowledge, the pharmacist also should study the desirable clinical skills to perform patient care, such as active listening, individualization, and empowerment, among others.

The medication adherence rates described in the literature are diverse, varying according to the methods for measurement and the analyzed oral antineoplastic agent [1], [2], [7], [10], [23], [24]. The results obtained in this study of low adherence to Bicalutamide and Exemestane are compatible with the work of Marques and Pierin (2008). On the other hand, the high adherence to Imatinib is noteworthy in all the assessed methods. Literature reviews also suggest that patients using this antineoplastic agent are those who most adhere to treatment [3], [25], despite the chronic nature of use and the high prevalence of adverse reactions.

Although the sample size was small in the present study, it was possible to observe that the chronic use of medications may lead to decreased adherence [2], since most of the participants who used antineoplastic drugs for more than 1

year were non-adherent. In the case of Capecitabine, despite the short treatment time and good persistence calculated by MPR, the survey showed low adherence, such as the 31% in another study [23], and the use of this drug was found to be inadequate. In this case, the posologic complexity of the treatment may have influenced it [2].

The present study demonstrated the importance of the complementarity of the adherence methods [17], since patients considered to be of good adherence by one method were classified as non-adherent by another. The use of different indirect methods is recommended to minimize the impact of the limitations of each strategy [17]. We decided to use a questionnaire survey due to its ease of application and low cost. For dispensing indicators, besides these advantages, the easy availability of data needed to calculate the indicators at OPS is added. Another aspect of being highlighted is that this work aimed to measure adherence at one only point, that is, at a specific time, and successfully achieved this goal in both methods. However, it is emphasized that monitoring adherence over time is ideal for verifying if it is improving and following the patient's clinical evolution [3], [4], [25].

Interestingly, it was possible to observe that, on some occasions, the patient's report over the phone did not correspond to the answers to the survey, reinforcing that the self-report cannot be interpreted literally or as the only source of information. However, even so, it is a method that has been used [1], [2], [7]. On the other hand, although Hematology/Oncology Pharmacist Association points out that dispensing indicators can be helpful tools to identify non-adherence [25], it must be remembered that such indicators are predictors of persistence and not of adherence properly said [17].

It is worth mentioning that most of the indirect methods described in the literature to assess adherence are based on the patients' self-report, usually saying high levels of compliance with medical prescription [24] or an apparent facility for managing pharmacotherapy [23]. However, few are the ones who assess the technique of using effectively practiced by patients, comparing their reports about the drug used to the medical prescription. As noted in this study, many patients believe they are using the medication correctly when adopting inappropriate procedures, such as taking fasted Capecitabine, for example. Thus, this is an excellent opportunity for the pharmacist to act, counsel patients about the form of use, clarify doubts, and provide other information about the treatment and the disease.

It is also essential to consider the patient's perceptions to identify possible causes of non-adherence. Contrary to some reports [4], the patients in this study frequently mentioned that they faithfully followed the prescribed treatment and that they have never stopped taking a dose since the beginning of the therapy. However, it should be considered that many patients who believe in having good adherence may not adopt this behavior in practice, as observed with the proper technique of using the oral antineoplastic agent.

In the present study, almost all patients described the dosage of use precisely according to the medical prescription. However, when asked about the form of use, some inadequate reports were identified, as in another study [20], although patients believed they were adopting the correct procedure. This fact indirectly demonstrates the importance of the multi-professional team in providing patient care. Thus, the pharmacist [8], for having a focused look, usually provides information related to how to use the drugs [20] and their incompatibilities [5], among other points. This study corroborates this view since most of the interventions carried out referred to medication use. Another aspect that draws attention is that practically one-third of the interventions performed were corrective, a result similar to another study (25 %) [20].

According to World Health Organization, polypharmacy is "the routine and concomitant use of four or more medications, with or without a medical prescription, by a patient" [26]. This characteristic was observed in this study, with some patients reporting the daily use of 10 drugs. As it is a predominantly elderly population, it was expected that polypharmacy would be present. Like other reports [2], [24], the results show a high number of drugs in addition to oral

antineoplastic agents, most of them for the treatment of comorbidities. Polypharmacy is associated with lower adherence, especially in chronic treatments [1] and oral antineoplastic treatments [2]. Although it was not possible to demonstrate the relationship between low adherence and polypharmacy in the present study statistically, this may have been one of the critical points for adherence to drug therapy.

Based on the age group of the patients, it was expected that antihypertensive drugs would be the most used pharmacological group, as also observed in the study by Suzuki et al. (2020). Similarly, as pain is one of the most striking cancer symptoms [27], frequent analgesic use was also expected in this study. However, it is noteworthy that reports of use for muscle pain and neuropathies were common.

As this study's patients use antineoplastic agents, adverse reactions to these drugs were expected to manifest [3]–[5], [21], [23]. The 80% incidence of ADR reported by patients was higher than in other studies [4], [5], [20]. However, it should be borne in mind that the reactions described in this work come from the patients' self-report, and not from the pharmacist's objective identification, which can mean over-notification. The occurrence of hand-foot syndrome is characteristic of Capecitabine, but literature also describes other ADR's [28] and negative related-drug results [29]. Yokoyama and colleagues (2018) observed similar incidences of ADR for Capecitabine and Imatinib, but not for Bicalutamide and Exemestane, since they did not identify any adverse effects in these groups. Despite the expressive report of ADRs by most patients, the incidence of the use of drugs intended for their management was small. In this way, ADRs did not contribute to polypharmacy or self-medication. These results were different from those observed by another study [20], in which 52.0% used supportive drugs for adverse reactions to lenvatinib.

Among the pharmacist interventions performed, the incidence of 15% in the range above 16 interventions per patient stands out. As for the type of medication related to intervention, only 25% of these were related to the study's antineoplastic agent. This result is consistent with one in which 86.3% of the pharmacist's interventions were not associated with cancer drugs [30], but lower than that of others studies [4], [20].

Mostly, interventions referred to the technique of medication use, including practical details, such as administration time. These reports are compatible with the study, which showed that 17.9% of the patients were unaware of the drug-food interactions of the antineoplastics they were taking [5]. Other topics were also addressed in the population studied, such as adherence (14%) and empowerment (13%), among others. Other studies describe other themes of the interventions performed, such as the need for additional drug therapy, non-adherence, inappropriate use of the drug [20], ADR, medication adherence, drug interactions, medication errors, and symptom management [4]. Contrary to other reports in the literature [4-5], not many interventions have been performed on adverse effects. This fact can be explained by the fact that most patients in this study tolerate such reactions well, to the point of not reporting them to the doctor or taking medications to manage them.

One of the limitations of this study was the small number of participants, which made it impossible to make a robust comparison of antineoplastic agents with each other. Regarding the adherence survey, there were misinterpretations in some cases. Since there were situations where the same question had more than one answer, patients indicated two options, and others did not have any alternative checked.

So we can conclude that the proposed tool was useful to establish a first contact and good communication with patients since it was possible to obtain the desired data and carry out the relevant interventions. However, it is necessary to carry out further consultations to verify whether the patient could apply the recommendations suggested in practice.

Declarations

Funding: The authors did not receive support from any organization for the submitted work.

Conflicts of interest: The authors have no conflicts of interest to declare that are relevant to the content of this article.

Availability of data and material: Data were obtained through interviews with patients and were tabulated.

Code availability: The only software used in this work was for statistical analysis, which is free.

Authors' contribution statements: All authors contributed to the study conception and design. All authors read and approved the final manuscript. Dr. Sabrina Calil Elias performed the original design. Cristiane Soares Cardozo Wergles performed material preparation and data collection. All the authors performed analysis. Cristiane Soares Cardozo Wergles wrote the first draft of the manuscript and all authors commented on previous versions of the manuscript.

Ethics approval: This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of Universidade Federal Fluminense and of Hospital Naval Marcílio Dias (approval reports numbers 3.693.630 and 3.760.672, respectively).

Consent to participate: Written informed consent was obtained from all individual participants included in the study.

Consent for publication: The patients' data were inserted in the present study in a grouped way without any type of data that can identify the participants.

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Tables

Table 1
– Sociodemographic and clinical data of the patients (n = 66)

Variable	Abiraterone	Bicalutamide	Capecitabine	Exemestane	Imatinib	Total
	N	N	N	N	N	N (%)
Gender						
Male	12	11	14	0	7	44 (67)
Female	0	0	10	9	3	22 (33)
Age (years)						
Average	68,50	78,09	64,54	62,78	57,30	66,18 (N/A)
≤ 60	2	0	8	4	5	19 (29)
61–65	2	0	2	2	3	9 (14)
66–75	6	4	9	1	2	22 (33)
≥ 76	2	7	5	2	0	16 (24)
Marital status						
Single	0	0	2	0	2	4 (6)
Married/Stable union	11	7	17	7	6	48 (73)
Widowed	1	1	5	2	1	10 (15)
Divorced	0	1	0	0	1	2 (3)
No answers	0	2	0	0	0	2 (3)
Education						
Less than high school	1	4	7	2	1	15 (23)
High school	8	7	14	5	9	43 (65)
College	2	0	2	1	0	5 (8)
Advanced degree	1	0	1	1	0	3 (5)
Monthly income (in minimum wages)						
1–5	4	3	9	5	6	27 (41)
6–10	7	6	9	2	4	28 (42)
11 or more	1	2	2	0	0	5 (8)
No answers	0	0	4	2	0	6 (9)
Primary cancer site						
Prostate	12	11	0	0	0	23 (35)
Gastrointestinal Tract	0	0	18	0	4	22 (33)

Variable	Abiraterone	Bicalutamide	Capecitabine	Exemestane	Imatinib	Total
	N	N	N	N	N	N (%)
Breast	0	0	6	9	0	15 (23)
Hematology	0	0	0	0	6	6 (9)
Treatment time						
Average (months)	16,23	27,05	5,72	12,12	29,82	15,71 (N/A)
3–6 months	2	2	17	1	1	23 (35)
7–12 months	2	2	6	3	1	14 (21)
1–3 years	8	4	1	5	5	23 (35)
4 years or more	0	3	0	0	3	6 (9)
Number of tablets per dose						
1	0	10	0	9	7	26 (39,4)
2	0	1	3	0	3	7 (10,6)
3	0	0	7	0	0	7 (10,6)
4	12	0	3	0	0	15 (22,7)
2 and 1	0	0	1	0	0	1 (1,5)
2 and 3	0	0	1	0	0	1 (1,5)
3 and 2	0	0	5	0	0	5 (7,6)
3 and 4	0	0	3	0	0	3 (4,6)
4 and 3	0	0	1	0	0	1 (1,5)
Interval between doses (hours)						
12/12	0	4	24	0	0	28 (42)
24/24	12	7	0	9	10	38 (58)
Frequency of Use						
Daily	12	11	0	9	10	42 (64)
Intermittent (Cycles)	0	0	24	0	0	24 (36)

N: Number of patients; N/A: Not applicable

Table 2
– Oral antineoplastic agent adherence classification

Variable	Abiraterone	Bicalutamide	Capecitabine	Exemestane	Imatinib	Total
	(N = 12)	(N = 11)	(N = 24)	(N = 9)	(N = 10)	N (%)
Survey score (6 questions about adherence)						
GA Group (score ≥ 4)	4	6	2	0	4	16 (24)
IA Group (score < 4)	8	5	22	9	6	50 (76)
MPR value						
$0,9 \leq \text{MPR} \leq 1,1$	9	7	20	7	10	53 (80)
$\text{MPR} < 0,9$ or $> 1,1$	3	4	4	2	0	13 (20)
PDC value						
$\text{PDC} \geq 0,9$	8	8	19	8	9	52 (79)
$\text{PDC} < 0,9$	4	3	5	1	1	14 (21)
MPR and PDC combined evaluation						
GP Group	6	6	19	7	9	47 (71)
IP Group	6	5	5	2	1	19 (29)
Survey and MPR/PDC Classification						
Adherent	1	2	2	0	4	9 (14)
Not- Adherent	11	9	22	9	6	57 (86)

GA: Good adherence group; GP: Good Persistence group; IA: Insufficient Adherence group; IP: Insufficient Persistence group; MPR: *Medication possession ratio*; N: Number of patients; PDC: Proportion of days covered.

Table 3
– Pharmacotherapy reported by patients

Variable	Abiraterone	Bicalutamide	Capecitabine	Exemestane	Imatinib	Total
	N	N	N	N	N	N (%)
Number of medicines in regular use						
Average number of medicines/patient	5,50	5,00	3,96	6,67	3,60	4,73 (N/A)
1–3	6	5	11	3	5	30 (45)
4–6	0	3	10	2	5	20 (30)
7–9	5	2	1	1	0	9 (14)
10 or more	1	1	2	3	0	7 (11)
Indication of drugs for regular use (Number of reports)						
Oncologic	29	12	26	14	10	91 (24,1)
Antihypertensive	9	14	19	13	10	65 (17,2)
Analgesic	6	4	17	10	3	40 (10,6)
Vitamins/Supplements	6	4	7	7	3	27 (7,2)
Antidiabetic	7	6	3	2	4	22 (5,8)
Hypolipidemic	4	5	4	4	2	19 (5,0)
Antiulcerous	1	1	6	5	4	17 (4,5)
Bone metabolism	2	2	4	6	3	17 (4,5)
CNS	1	2	6	3	2	14 (3,7)
Prokinectics/náusea	1	0	6	0	4	11 (2,9)
Antithrombotic	1	4	2	2	0	9 (2,4)
Constipants/antidiarrheals	1	1	5	1	0	8 (2,1)
Others	8	8	19	1	1	37 (9,8)

Variable	Abiraterone	Bicalutamide	Capecitabine	Exemestane	Imatinib	Total
	N	N	N	N	N	N (%)
Number of medicines for treating ADR						
Average number of medicines/patient	0,08	0,09	0,46	1,00	0,70	0,44 (N/A)
0	11	10	16	4	6	47 (71)
1	1	1	5	3	2	12 (18)
2	0	0	3	1	1	5 (8)
3 or 4	0	0	0	1	1	2 (3)
Medicines for automedication						
Average number of medicines/patient	0,10	0,30	0,21	0,11	0,20	0,19 (N/A)

ADR: Adverse drug reaction; CNS: Central Nervous System; N: Number of patients; N/A: Not applicable

Table 4
– Adverse drug reactions reported by patients

Variable	Abiraterone	Bicalutamide	Capecitabine	Exemestane	Imatinib	Total
	N	N	N	N	N	N (%)
Have you ever had ADR with OAA?						
Yes	9	6	23	8	9	55 (83)
No	3	5	1	1	1	11 (17)
Number of ADR						
Média de ADR/patient	1,66	0,91	3,38	1,56	2,90	2,33 (N/A)
0	3	5	1	1	1	11 (17)
1	4	3	6	4	2	19 (29)
2	1	2	2	3	2	10 (15)
3	2	1	4	0	1	8 (12)
4	2	0	11	1	4	18 (27)
Number of reported ADR						
Hand-foot syndrome	0	0	31	0	0	31 (19,62)
Skin and attachments disorders	2	0	11	5	5	23 (14,56)
Sexual hormones-related disorders	8	2	0	7	0	17 (10,76)
Nausea/vomiting	0	1	7	0	7	15 (9,49)
Sensorial disorders/neuropathies	2	0	7	2	0	11 (6,96)
Breast changes	3	7	0	0	0	10 (6,33)
Tiredness/malaise	2	0	5	0	3	10 (6,33)
Gastrointestinal disorders	0	0	5	0	4	9 (5,70)
Neurological symptoms	0	1	4	0	1	6 (3,80)

Variable	Abiraterone	Bicalutamide	Capecitabine	Exemestane	Imatinib	Total
	N	N	N	N	N	N (%)
Edema	0	0	4	0	2	6 (3,80)
Endocrine disorders	2	0	3	0	0	5 (3,16)
Others	0	0	8	0	7	15 (9,48)
Have you even interrupted OAA due to ADR?						
Yes	1	0	3	0	1	5 (8)
No	8	6	20	8	8	50 (75)
N/A (no reports of ADR)	3	5	1	1	1	11 (17)

ADR: Adverse drug reaction; CNS: Central Nervous System; N: Number of patients; N/A: Not applicable; OAA: Oral Antineoplastic Agent.

Table 5
– Pharmacist interventions

Variable	Abiraterone	Bicalutamide	Capecitabine	Exemestane	Imatinib	Total
	N	N	N	N	N	N (%)
Types of Interventions						
Corrections	34	34	47	27	24	166 (29)
Explanations	31	44	65	18	25	183 (31)
Recommendations	38	57	72	22	43	232 (40)
Drug related to intervention						
Oral antineoplastic agent	19	29	56	22	22	148 (25)
Other drug	40	42	39	20	23	164 (28)
Every drugs	33	41	64	19	26	183 (31)
Not-drug related	11	23	25	6	21	86 (15)
Number of Interventions						
Average number of intervention/patient	8,58	12,27	7,67	7,44	9,20	8,80 (N/A)
1–3	2	1	6	1	3	13 (19,7)
4–6	3	3	5	3	1	15 (22,7)
7–9	3	0	6	3	1	13 (19,7)
10–12	1	1	4	0	1	7 (10,6)
13–15	2	3	0	1	2	8 (12,1)
16 or more	1	3	3	1	2	10 (15,2)
Nature of interventions						
Correct technique	29	38	55	25	23	170 (29)
Specific drugs	18	25	36	11	9	99 (17)

Variable	Abiraterone	Bicalutamide	Capecitabine	Exemestane	Imatinib	Total
	N	N	N	N	N	N (%)
Medication adherence	25	16	23	6	14	84 (14)
Empowerment	13	12	31	10	7	73 (13)
General care	3	18	9	3	12	45 (8)
Others	6	6	14	4	9	39 (7)
OAA care	1	13	7	4	8	33 (6)
Pharmacist recommendations	5	4	7	4	4	24 (4)
Rational drugs use	3	3	2	0	6	14 (2)

N: Number of patients; N/A: Not applicable; OAA: Oral Antineoplastic Agent

Figures

Figure 1

Flowchart proposed for the realization of the remote consultation of patients using oral antineoplastic agents ADR: Adverse drug reaction; GA: Good adherence group; GP: Good Persistence group; IA: Insufficient Adherence group; IP:

Insufficient Persistence group; MPR: Medication possession ratio; PDC: Proportion of days covered; OAA: Oral Antineoplastic Agent.