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**Patient satisfaction in an outpatient parenteral antimicrobial  
therapy (OPAT) unit practising predominantly self-  
administration of antibiotics with elastomeric pumps.**

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**Running title :** Satisfaction of OPAT patients

**Abstract :**

*Background:* Self-administration of antibiotics using elastomeric pumps has become the most frequently used treatment modality at the OPAT unit of the University Hospital of Lausanne. It remains however unknown how comfortable patients feel using this mode of treatment.

*Methods:* A questionnaire was proposed to all patients treated at the OPAT unit between June 2014 and December 2015.

*Results:* The questionnaire was distributed to 188 patients and 112 questionnaires were returned. Seventy-one patients were treated by self-administration, 21 patients attended the OPAT unit on a daily basis, and 20 patients received their antibiotics by home based nurses. 83 - 97% of the patients gave the highest possible scores to the 4 items evaluating overall satisfaction. The most important benefits of OPAT were considered the possibility to stay at home and the regained autonomy. Support by the health care professionals was highlighted as a positive point in many comments. Subjects treated by self-administration gave to 6 of the 17 semi-quantitative questions a significantly better rating than the patients treated at the OPAT unit or by home care nurses.

*Conclusions:* Satisfaction was high in all patients treated by OPAT. The particularly high satisfaction of patients treated by self-administration of antibiotics with elastomeric pumps, suggests that a significant number of patients are happy to take over some responsibility of their treatment and are not scared to manage their treatment themselves. Patients' capacity to appropriate themselves their care is often underestimated by health care professionals.

**Introduction:**

For some difficult to treat infections intravenous antibiotics are unavoidable. Traditionally, intravenous antibiotics have been administered at the hospital, but outpatient parenteral antibiotics therapy (OPAT) is an option for patients who do not require hospital admission for other reasons. OPAT units have existed in countries like the USA, the UK and several other countries for many years.<sup>i,ii</sup> In Switzerland and other European countries this approach has taken more time to establish itself for various reasons.

In 2014 an OPAT unit was established at the University Hospital of Lausanne, and 3 treatment options are offered: antibiotics administered by home care nurses, treatment administered at the OPAT unit, and self-administration of antibiotics using elastomeric pumps.<sup>iii</sup> Within a couple of months self-administration of antibiotics has become the most frequently used approach and now over 60% of the OPAT patients are discharged from hospital with this solution. Self-administration of antibiotics is often proposed as a first-line solution, because discharge from hospital is easier to organise and because of its probable cost-effectiveness.

The objective of this study was to evaluate the satisfaction of the patients treated by this new OPAT unit. It aimed in particular to investigate if there is a difference in satisfaction between the patients taken care of by home care nurses or at the OPAT unit and patients self-administering the antibiotics.

**Methods:**

A questionnaire was proposed to all patients taken care of by the OPAT unit of the University Hospital of Lausanne, Switzerland, between June 2014 and December 2015. After informed consent was obtained, the questionnaire was handed out to the patients on their last follow-up visit at the OPAT unit. Alternatively, the questionnaire was sent by postal mail to the patients after the end of the antibiotic treatment. A prepaid envelop was joined to the questionnaire. If the questionnaire was not returned within 10 days, patients were called once by phone to remind them about the study.

The questionnaire consisted of 7 open questions (table 1), 1 dichotomous question and 17 semi-quantitative questions (table 2). For the semi-quantitative questions there were four possible answers, using a Likert-type scale. The questions aimed to evaluate the organisation and planning of care, the professionalism and competence of the medical and nursing staff and the setting of the OPAT unit. There were 4 questions about the overall satisfaction.

The questionnaire was proposed to all adults 18 years or older who were taken care of by the OPAT unit for at least five days. Exclusion criteria were the refusal of patients to participate the study or the incapacity to complete the questionnaire, either for cognitive reasons or lack of proficiency in French.

The qualitative questions were analysed using the method of qualitative content analysis.<sup>iv</sup> This technique consists in treating text answers in a systematic and objective manner, with an aim of quantifying the phenomenons.

Means were compared using the T-test. Proportions were analysed by univariate and multivariate analysis adjusted for age, sex and duration of treatment.

## **Results :**

During the study period, 232 patients were taken care of by the OPAT unit. Forty-four patients did not meet the inclusion criteria for the reasons outlined in figure 1. One hundred and eighty eight patients received the questionnaire and 112 patients (60%) returned a completed questionnaire. Patients who responded and who didn't respond to the questionnaire, didn't show any difference in regard of age and sex distribution. However duration of treatment was 8.5 days (SD 7.3 days) in non-responders versus 19.1 days (SD 16.6 days) in responders ( $p < 0.001$ ), and only 29% of non-responders were treated by auto-administration versus 63% of the responders ( $p < 0.001$ ). In the non-responder group there were more patients with urinary tract infections (37% vs 21%,  $p = 0.02$ ) and slightly less osteoarticular infections (18% vs 29%,  $p = 0.086$ ).

Median age of the responders was 59 years with a range from 18 to 91 years. 71 patients (65%) were men. Demographic details according to treatment group are detailed in table 3. The type of infections treated and the number of cases were as follows: osteoarticular infections: 33 (30%), urinary tract infections: 23 (21%), endocarditis or endovascular infections: 15 (14%), infections of the central nervous system: 11 (10%), intra-abdominal infections: 8 (7%), skin and soft tissue infections: 7 (6%), other infections: 6 (6%). Mean duration of treatment was 19.2 days (SD = 16.7 days). Elastomeric pumps were used for 81 patients (74%). Seventy-one patients (63%) were treated by self-administration using elastomeric pumps, 21 patients (19%) were taken care of at the OPAT unit and 20 patients (18%) benefited of home care nurses.

Eleven patients (9.8%) had a complication or had an unplanned readmission during the treatment. Five patients (4.5%) had catheter related complications, 4 patients (3.6%) suffered

from side-effects of the antibiotics, 1 patient was considered a treatment failure and 1 patient had a non-specified complication.

Patients' expectations before discharge from hospital were mainly to be able to return home more rapidly (31%), to receive adequate treatment (20%), to be treated by a competent team (18%) and to enjoy improved quality of life (11%). Forty percent expressed some fears about the outpatient treatment. The most frequently reported fear (28% of patients) was about the risk of PICC-line obstruction or infection. 20% of patients treated by self-administration feared a problem with the elastomeric pumps.

Regarding the questions addressing the treatment received, the vast majority of patients were very satisfied of the care given. Ninety per cent of the patients asked about their global satisfaction gave the highest possible rating and 83% of the patients reported that their expectations had been completely fulfilled. Eighty-five per cent would recommend the services of the OPAT unit to other patients and 97% would recourse again to this type of care. The most important benefit of the outpatient treatment was considered the fact to be able to stay at home instead of the hospital. Another important element was the possibility to be autonomous and to regain its liberty. The support by the health care professionals was highlighted in many positive comments. The patients were reassured to have the impression to be taken care of by health care professionals who are competent and listening to their fears. At the end of the treatment only 1 patient, treated by self-administration, said that the treatment was finally more complicated than expected. This patient experienced a problem with the PICC-line.

Patients were also asked if anything could be improved by the OPAT unit and their answers differed according to treatment group. 18% of the patients treated by self-administration

complained about the quality of the materials used, 16% of the patients treated at the OPAT unit would have liked that the rooms of the unit would be better adapted, and 15% of patients treated by the home-based nurses complained of insufficient information about their treatment.

Looking specifically at patients treated by self-administration, 31/71 patients (44%) expressed that they had concerns before starting treatment, while 14/44 patients (34%) treated at the OPAT unit or by home based nurses expressed any fears ( $p = 0.30$ ). To the question how the treatment went, almost all patients using self-administration said that the use of elastomeric pumps was finally easier than expected. Furthermore, self-administering patients gave for 6 of the 17 semi-quantitative and dichotomous questions better ratings than the patients treated at the OPAT unit or by home health care nurses (table 3). Particularly high scores were attributed to the quality of explanations received, the professionalism of the nurses and doctors, the availability of the health care professionals and the clarity of the answers to their questions. Overall satisfaction was statistically higher in patients treated by self-administration in comparison to patients treated at the OPAT unit or by home-based nurses.

### **Discussion:**

Satisfaction of patients is an essential point in any health care system and has to be especially carefully evaluated when proposing a new type of treatment. This study investigated the satisfaction of patients treated by an OPAT unit in Switzerland established in 2014. This OPAT unit has the particularity of treating over 60% of patients by self-administration of antibiotics. Self-administration has several advantages as it requires very little human resources and discharge from hospital is easy and fast to organise. This approach is probably also less costly than home based nursing care services or treatment administered at the OPAT unit. Self-administration can be done using antibiotic-prefilled vacoliters, syringes or elastomeric pumps.



The option of self-administration using elastomeric pumps has proven to be particularly practical, because the manipulations required to connect the pump to the iv-line are quite easy to instruct to the patients. Self-administration of intravenous antibiotics is an option mentioned in several guidelines.<sup>1,2</sup> There are however only few centers reporting extensive use of this approach and none describes their experience with elastomeric pumps.<sup>v,vi,vii</sup>

Looking at the whole OPAT population taken care of by our OPAT unit, patients' level of apprehension was relatively low before discharge of hospital. This can be explained by two factors: first, the patients were carefully evaluated and chosen for outpatient treatment. Patients who were anxious or expressed too many concerns about outpatient treatment were probably not offered OPAT. Second, patients were probably reassured by the pre-discharge evaluation and explanations given by the OPAT team. It is our policy that patients are first evaluated by the OPAT physician for eligibility for outpatient treatment. Thereafter an OPAT nurse spends about 1 hour to explain all the details of the planned care. This time spent with the patient before discharge is probably crucial to reassure the patients and to ensure the success of the outpatient treatment.

One of the hypotheses before conducting the study was that patients practicing self-administration of antibiotics would express a higher degree of concerns and fears before being discharged. Self-administration can indeed raise many questions for patients, as administration of intravenous drugs has traditionally been considered a potentially risky intervention which always needs to be done by health care providers. Giving detailed oral and written information to the patients could obviously dissipate most of their concerns.

Overall satisfaction of all 3 treatment groups was very high. Indeed a large majority of the patients answered with the highest possible scores to most questions. This was possibly influenced by the low rate of treatment failures and complications needing readmission. 10% of complications and readmissions is indeed relatively low in comparison with the literature.<sup>viii</sup> Death occurred in 2 patients which were not included in the study, but these deaths were expected and not related to OPAT.

Patients who did self-administration of antibiotics, answered to several questions with higher satisfaction scores than the two other groups. This could be because these patients received particularly detailed explanations before discharge. The OPAT team was particularly attentive to all details to ensure the security of the patient, as self-administration of treatment is not done anywhere else in Switzerland and is not very widespread even in most other countries. The fact of receiving a lot of attention did probably influence the satisfaction of these patients

A point which emerged in several answers was the fact that patients appreciated to be given the responsibility over their treatment. Health care workers have often the tendency to consider that they have to ensure all aspects of the treatment, but actually patients, who have preserved mental and physical capacities, appreciate to take over some responsibility of their care.

All studies evaluating the satisfaction of patients treated by OPAT have been overwhelmingly positive. Goodfellow et al conducted a health-related quality-of-life assessment (HRQoL) in 74 patients treated at an OPAT unit in Canada using a Short Form-36, which is used to assess health status over a 4- week period.<sup>ix</sup> This study showed that there was a significant improvement in 3 domains (physical functioning, bodily pains, role limitations due to emotional problems) and in the mental health score after discharge from hospital. Montalto

conducted a telephonic survey of 67 patients treated by an OPAT in Melbourne.<sup>x</sup> The study included 11 questions and 65 patients (97.0%) would choose OPAT again if the occasion arose.

Regarding self-administration, our results concord with a small study by Kieran et al who evaluated satisfaction of patients self-administering antibiotics in an OPAT unit in Ireland.<sup>6</sup> This telephonic survey which included 12 patients, looked at patient satisfaction, their willingness to be treated by OPAT again if needed, and the number of visits at the OPAT unit. All subjects were satisfied with the treatment and all patients would choose again care through an OPAT service in the future if needed. Patients would have preferred less visits at the OPAT center.

Some limitations of this study have to be mentioned. First, the questionnaire was not validated in any other study. This was unavoidable, as we didn't find any appropriate questionnaire used in other studies. Second, the characteristics of the patients who didn't respond to this survey were different from the ones who answered and this can therefore limit the generalisability of the results. Third, the patients completed the questionnaire after the end of the treatment. The positive treatment outcome may have influenced their opinion about their outpatient treatment.

In conclusion this study shows that patients treated at an OPAT unit in Switzerland were very satisfied about the care received. Patients treated by self-administration of antibiotics using elastomeric pumps were even more positive about their treatment and were particularly satisfied to be given the responsibility of their care.

### **Conflict of interest**

The authors have no conflict of interest to declare.

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Table 1. Open questions of the questionnaire

What were your expectations regarding OPAT ?  
Before starting the treatment did you have any fears or worries?  
Taking into account what you were thinking before starting the treatment, how well did your treatment finally go ?  
Were there any particular problems during the treatment ?  
What have been for you the advantages of OPAT ?  
Are there elements which could be improved according to you ?  
Any other comment ?

Figure 1. Flowchart of the patient recruitment.

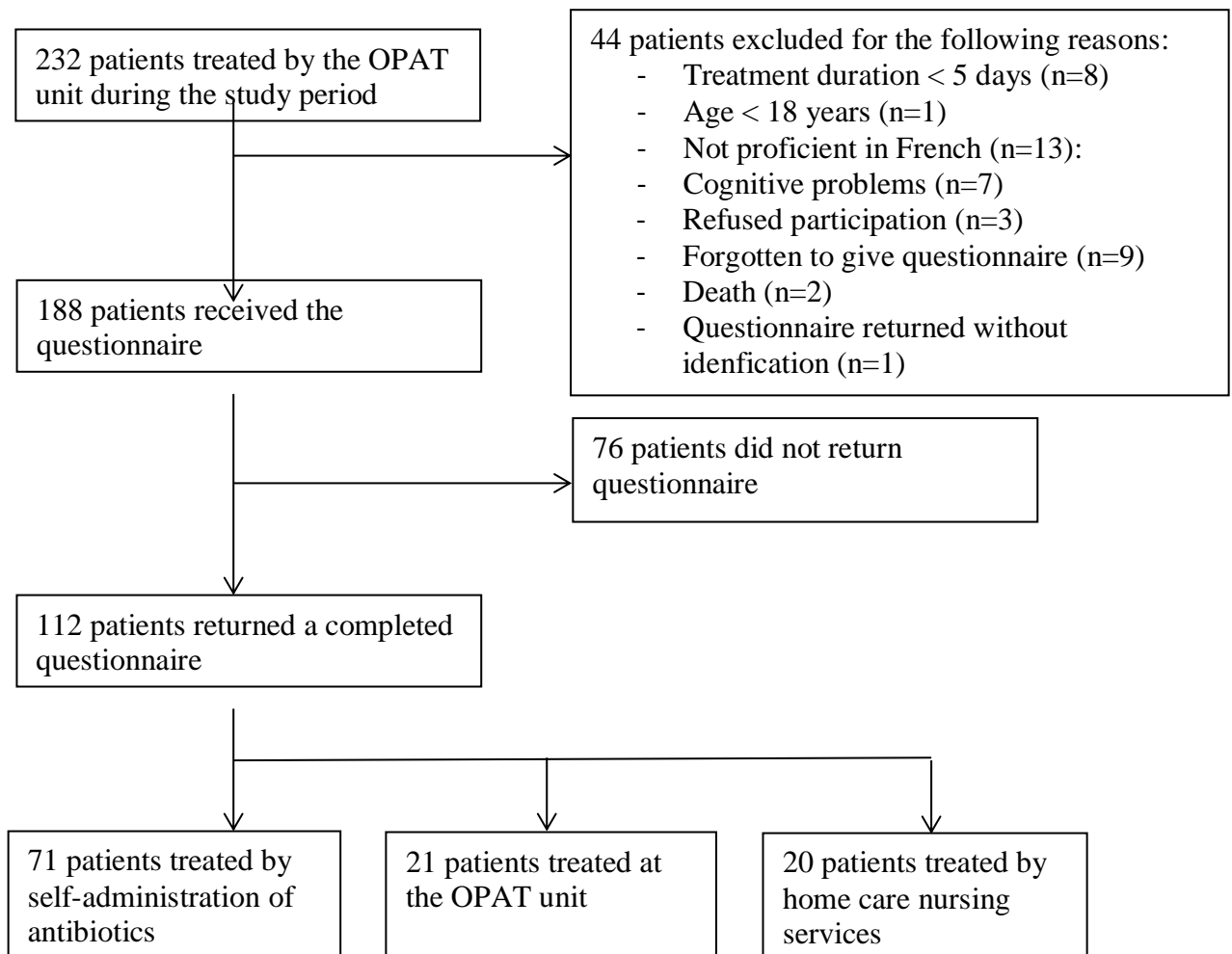


Table 2 : Proportions of patients responding with the best possible score to the semi-quantitative and the dichotomous questions.

Question	Patients treated by self-administration (n=71)	Patients treated at the OPAT unit or by home care nurses (n=41)	OR (95%CI) Unadjusted	OR (95%CI) Adjusted*
<b>Semi-quantitative questions :</b>				
Quality of explanations received	90% (61/68)	68% (27/40)	4.20 (1.51-11.69)	4.18 (1.41-12.40)
Quality of documents received	66% (44/67)	54% (19/35)	1.21 (0.49-3.00)	
Quality of instructions for use of elastomeric pumps	95% (61/64)	57% (8/14)	20.33 (3.73-111.00)	19.38 (2.98-125.96)
Professionalism of physicians	90% (62/69)	69% (27/39)	3.61 (1.26-10.31)	3.72 (1.24-11.16)
Professionalism of nurses at home	79% (11/14)	67% (14/21)	1.83 (0.38-8.78)	
Professionalism of nurses at the hospital	91% (62/68)	79% (31/39)	3.2 (0.97-10.60)	
Availability of health care professionals to answer questions	90% (64/71)	74% (28/38)	3.27 (1.13-9.45)	2.82 (0.94-8.43)
Clarity of answers	87% (61/70)	65% (24/37)	3.39 (1.27-9.07)	3.05 (1.08-8.64)
Adequacy of the frequency of consultations at hospital	80% (57/71)	72% (28/39)	1.72 (0.69-4.33)	
Adequacy of the frequency of visits of home care nurses	26% (7/27)	48% (16/33)	0.73 (0.14-3.93)	
Waiting time for medical visits	81% (57/70)	67% (24/36)	2.19 (0.88-5.49)	
Tranquility of the consultation rooms	61% (40/66)	68% (23/34)	0.74 (0.31-1.76)	
Comfort of consultation rooms	54% (35/65)	56% (19/34)	0.92 (0.40-2.12)	
Would you recommend OPAT to other patients	87% (61/70)	82% (31/38)	1.53 (0.52-4.50)	

Expectations fulfilled	83% (59/71)	83% (34/41)	1.01 (0.36-2.82)	
Overall satisfaction	96% (68/71)	80% (32/40)	5.67 (1.41-22.79)	5.0 (1.19-20.0)
<b>Dichotomous question:</b>				
Would you choose again this type of treatment	97% (66/69)	97% (38/39)	1.13 (0.1-12.93)	

\* Adjusted for age, sex and treatment duration



1 Table 3. Characteristics of patients included in the study

	Patients treated by self-administration using elastomeric pumps n=71	Patients treated at OPAT unit n=21	Patients treated by home care nurses n=20
Mean age $\pm$ SD (in years)	56 $\pm$ 15	55 $\pm$ 15	66 $\pm$ 16
Male patients	47 (66%)	16 (76%)	10 (50%)
Duration of intravenous treatment $\pm$ SD (in days)	19.2 $\pm$ 16.6	19.1 $\pm$ 16.4	19.1 $\pm$ 16.4

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