



# Costs and use of resources in an mHealth intervention in patients with treatment-resistant schizophrenia in three European centres (m-RESIST project)

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## Background and objectives

In the European Union, patients with schizophrenia constitute the largest group within the approximately 5 million people who suffer from psychotic disorders. Between 30 and 50% of patients can be considered treatment-resistant, while 10 to 20% are ultra-resistant (1). To date, standard treatment is not enough to achieve remission in patients with treatment-resistant schizophrenia (TRS) (2).

mHealth interventions serve to support and promote health care strategies based on self-management (3). m-RESIST European project (N-643552 "Mobile Therapeutic Attention for Patients with Treatment-Resistant Schizophrenia") has developed an mHealth solution conceived to empower individuals suffering from TRS. The solution aims patients to actively participate in the therapeutic process and enable them to self-manage their condition. Objective: perform a cost-comparison of m-RESIST program vs traditional healthcare services.

## Methods

The use and cost of resources during 3 months of intervention (post) were compared against those occurring over the 3 previous months to intervention (pre). Participating institutions: Gertner Institute (Tel Aviv), Semmelweis University (Budapest) and St Pau Hospital (Barcelona). Data gathered: different type of ambulatory visits to psychiatrist, psychologist and specialist nurse; hospitalizations; emergency department visits and administrative time (Fig 1). Data was collected with an "ad hoc" template (09-12/2017). Costs estimates were derived from the number and duration of visits (minutes) and hospital stays (days). Centres provided their unitary costs. Only direct costs were calculated. The National Health Service perspective was adopted.

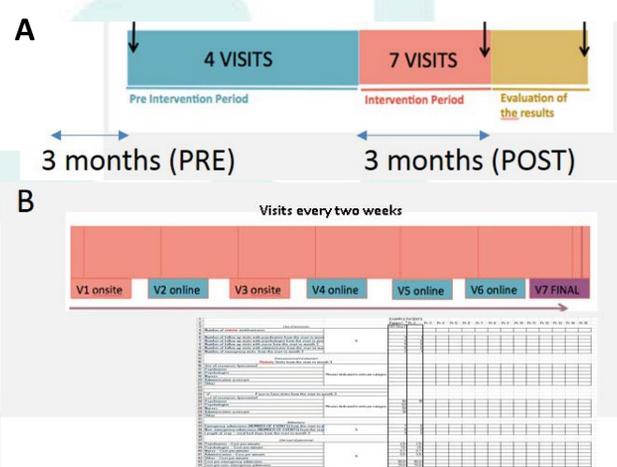


Figure 1. (A) Overall visits plan throughout the m-RESIST Project. (B) Distribution of planned online (remote) and onsite follow up visits throughout the m-RESIST project and template to collect data

## Results

Use of resources is shown in tables 1 to 3 for the 3 centres. Main differences in the use of resources between the pre- and post- intervention periods corresponded to face-to-face visits to the psychologist at the Semmelweis University (average 45.0 vs 34.3 mins), to administrative time at Gertner Institute (5.5 vs 33.3 mins) and to the number of psychiatrist visits at Sant Pau Hospital (2.7 vs 2.4).

Table 1. Number and duration of visits (Semmelweis University, Budapest).

Resource (PRE)	Average (SD) number of visits	Average (SD) duration (min) per visit
<b>Face-to-face visits</b>		
Psychiatrist (n=12)	2.3 (1.1)	20.4 (7.2)
Psychologist (n=2)	0.8 (1.9)	52.5 (10.6)
Nurse (n=6)	2.1 (2.6)	13.0 (9.2)
Administrative assistant (n=3)	0.6 (1.2)	5.0 (0.0)
<b>Resource (POST)</b>		
Additional Remote Visits (n=12)	3 (-)	20 (-)
<b>Face-to-face visits</b>		
Psychiatrist (n=12)	10.1 (1.5)	17.4 (1.7)
Psychologist (n=1)	0.3 (0.9)	60.0 (-)
Nurse (n=12)	4.5 (3.1)	24.3 (7.4)
Administrative assistant (n=6)	1.2 (1.4)	5.8 (2.0)

SD=standard deviation

Table 2. Number and duration of visits (Gertner Institute, Tel Aviv)

Resource (PRE)	Average (SD) number of visits	Average (SD) duration (min) per visit
<b>Face-to-face visits</b>		
Psychiatrist (n=11)	2.8 (1.8)	19.1 (2.0)
Psychologist (n=4)	3.3 (5.2)	46.3 (2.5)
Nurse (n=0)	-	-
Administrative assistant (n=11)	2.8 (1.9)	5.5 (1.5)
<b>Resource (POST)</b>		
Additional Remote Visits (n=11)	3.1 (0.7)	21.8 (5.1)
<b>Face-to-face visits</b>		
Psychiatrist (n=11)	5.6 (0.8)	23.2 (5.1)
Psychologist (n=11)	7.0 (4.6)	45.9 (6.3)
Nurse (n=0)	-	-
Administrative assistant (n=11)	0.8 (0.9)	33.3 (5.2)

SD=standard deviation

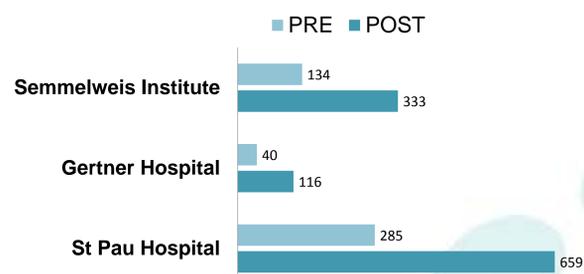
Table 3. Number and duration of visits (St Pau Hospital, Barcelona)

Resource (PRE)	Average (SD) number of visits	Average (SD) duration (min) per visit
<b>Face-to-face visits</b>		
Psychiatrist (n=9)	2.7 (1.7)	31.3 (5.1)
Psychologist (n=1)	0.2 (0.7)	45.0 (-)
Nurse (n=5)	1.6 (2.1)	21.0 (2.6)
Administrative assistant (n=9)	2.9 (1.8)	2.9 (1.2)
<b>Resource (POST)</b>		
Additional Remote Visits (n=9)	2.9 (0.3)	21.4 (4.8)
<b>Face-to-face visits</b>		
Psychiatrist (n=9)	2.4 (1.6)	35.0 (7.9)
Psychologist (n=9)	4.3 (0.7)	34.3 (5.1)
Nurse (n=9)	1.6 (0.9)	17.0 (2.4)
Administrative assistant (n=9)	1.0 (-)	2.6 (0.5)

SD=standard deviation

Other resources use was exceptional. Hospitalizations accounted for more than €10,000. Unitary costs differed among centres. Main pre and post intervention differences in the resource-use corresponded to face-to-face visits to the psychiatrist and psychologist, although the magnitude of the influence on the costs of scheduled visits mandatory per protocol is not known. Costs visits per patient were €40 (Semmelweis; n (not considering dropouts)=12), €134 (Gertner; n=11) and €285 (St.Pau; n=9) during the pre-intervention period. Costs visits per patient were €116, €333 and €659 during the post-intervention period respectively (Figure 2).

Figure 2. Differences between institutions' costs in the pre and post m-RESIST periods in euros.



Key findings are summarized in table 4.

Table 4. Summary of findings across the three participating centres.

ANALYSIS	RESULTS
<b>Average cost of management patients</b> (visits cost face to face / face to face + remote)	<b>Pre-m-RESIST:</b> €40 (Semmelweis), €134 (Gertner), €285 (St Pau) <b>Post-m-RESIST:</b> €116 (Semmelweis), €333 (Gertner), €659 (St Pau)
<b>Unitary cost</b> (cost per minute by professional profile)	In general, Semmelweis had the lowest unitary cost by professionals; St Pau, the highest.
<b>Cost emergency admissions &amp; hospitalization</b>	Their use was exceptional.
<b>Use of resources</b> (average number & duration of visits)	<b>St Pau:</b> decrease psychiatrist face-to-face visits <b>Gertner:</b> increase the length of administrative visits

## Conclusions

Costs analysis in mental health interventions based on mHealth are lacking in Europe. This study is one of the first of its kind. Costs differences between pre and post m-RESIST periods among centres were found. Although per-protocol visits may influence costs, unitary-costs and the intervention themselves may also explain costs variations. Further research in this topic is needed to achieve more conclusive results.

## References

- Rubinstein, K. (2016). Treatment-resistant schizophrenia during life span : Epidemiology, outcomes and innovative M-Health treatments within M-RESIST Project. *European Psychiatry*, 33, S35.
- Sinclair, D., & Adams, C. (2014). Treatment resistant schizophrenia: a comprehensive survey of randomised controlled trials. *BMC Psychiatry*, 14, 253
- Omboni, S., Caserini, M., & Coronetti, C. (2016). Telemedicine and M-Health in Hypertension Management: Technologies, Applications and Clinical Evidence. *High Blood Pressure & Cardiovascular Prevention*, 23(3), 187-196