

Psychotherapy Treatment Decisions Supported by SelectCare

Cilia Witteman

Psychological Laboratory
Faculty of Social Sciences
Utrecht University
P.O. Box 80.140
3508 TC Utrecht
The Netherlands
e-mail: C.Witteman@fss.uu.nl

Abstract

SelectCare is a computerized decision support system for psychotherapists who decide how to treat their depressed patients. This paper describes the decision making model that is implemented in SelectCare and the decision elements it uses to give advice to its users. The system itself is then presented, as well as data on the evaluation of its use.

Psychotherapy treatment decisions supported by SelectCare

SelectCare is a computer program that supports psychotherapists in their difficult task of deciding which treatment method is most suitable for their depressed patients. The program addresses treatment planning, not the preceding process of diagnosis. It is assumed that a 'depressive disorder' has been diagnosed.

SelectCare supports the task of deciding what type of treatment will be proposed to a particular depressed patient, with her or his specific complaints, taking into account the patient's as well as the therapist's own circumstances (compare Paul, 1967). SelectCare is not an expert system that gives the correct treatment plan. It cannot do so, because there is no consensus among therapists what the correct treatment of a depression is, and practicable handbooks with decision guidelines or criteria are absent (Snyder & Thomsen, 1988). SelectCare therefore cannot support a correct decision outcome.

The, more modest, goal of SelectCare is to support a correct decision process. Such support seems welcome, because psychotherapists' unaided decision performance has been found to be imperfect (Ayton, 1992; Shanteau, 1992; Witteman, 1992; Witteman & Koele, 1999). This imperfection may be explained by the inherent uncertainty of knowledge in the psychotherapy domain, added to the general human proneness to error in reasoning and decision making. Such a state of affairs seems unsatisfactory, not in the last place for patients. We therefore decided to construct a decision aid for the treatment selection task.

In the next sections we will first specify the model of correct decision making we have incorporated in our system. Then we describe our design choices, the decision elements in the system and how we acquired these, followed by a short description of the resulting system and evaluation data.

The decision model

Normative decision theories require decision makers to examine all possible courses of action in their domain, to consider each option carefully and to decide upon that alternative that comparative evaluation shows to be the best (compare for example Simon, 1961; Janis and Mann, 1977). In such an empirical cycle, all information should be considered with each option, and options are only acceptable when there has been an unsuccessful attempt to disprove them. If there is more than one acceptable alternative, that alternative is best for which the balance between positive and negative arguments is most favourable.

When a decision maker follows this normative strategy, the resulting decisions are made correctly and are defensible to others by pointing out their internal consistency and the correct use of logical rules (compare Edwards, Kiss, Majone and Toda, 1984). The strategy

does not guarantee that the correct decision will be made, but it does guarantee that the decision has been made correctly.

Translated to a decision about the treatment of a depressed patient, this means all possible therapy options need to be considered, that the positive and negative justifications of each need to be checked, not forgetting the contra-indications, and that one opts for the treatment method with the highest overall validity. It is this process of remaining impartial to the different possible options until the patient data have been carefully looked at, that is supported by SelectCare.

Design choices

People, professional or otherwise, do not commonly use the normative strategy in their decision making. In earlier studies, we established at what points psychotherapists' performance deviated from the correct process.

We found psychotherapists to use conservative decision strategies (Witteman, 1992; 1995; Witteman and Kunst, 1997; Witteman & Koele, 1999). They framed their decision, that is, they adopted a frame of reference, usually their own treatment approach, through which they looked at the patient data. Subsequently they looked for, and found, data that supported their own approach. Framing and a confirmation bias are well-documented phenomena in decision making. Obviously, they impede a correct decision making process.

We designed SelectCare to help therapists improve their strategies, by implementing debiasing techniques (see also Witteman and Kunst, 1995; 1999) that counteract framing and confirmation bias. From the debiasing literature, we lent two techniques with proven effectiveness. The first is structuring the decision problem, by clarifying it and ordering the decision elements in some appropriate way. This provides judges with an overview and thereby enables them to focus on the major issues without overlooking possibly relevant aspects (see among others Keren, 1992; Westenberg and Koele, 1993). The second technique is instilling a more critical attitude in decision makers, both towards their own decision processes and towards their favourite decision options, by asking them to pay attention to decisive reasons (in our system: contra-indications) why their decisions might be wrong (compare among others Arkes, 1981; 1991; Keren, 1990; Williams, 1992). Both techniques counteract the psychotherapists' conservative strategies. They are enforced through the interface.

In our design, we also took human limitations in cognitive processing capacities into account, to improve SelectCare's chances of being accepted in practice (compare Keren, 1992; Rasmussen, 1993). More specifically, therapists are not required to think up all possible arguments for or against treatment decisions themselves, but they are offered structured lists of possibly relevant items to choose from. Combining the items they select into a measure of

suitability of the different treatment options, an operation at which computers outperform humans, is done for them by SelectCare.

The decision elements

SelectCare is not an expert system, yet it has to contain domain knowledge for the users to work with. These domain elements are presented to the user-psychotherapists as the consensus opinion of their colleagues, which they may consult to get a second opinion about the treatment of their patients.

The domain knowledge is represented in a data base, which contains one hundred thirty-one elements. There are six treatment modalities, such as 'psychodynamic therapy' and 'client-centered therapy'. Each of these six is represented twice, once in an individual setting and once in a group setting. There are twenty-nine symptom descriptions, ordered in four categories, for example 'loss of interest' and 'sleeping problems' in the category 'vital symptoms'. Then there are fifty-one descriptions of factors that may influence or have influenced the symptoms, ordered in ten categories. For example, there is 'disrupted reality testing' and 'external locus of control' in the category 'weak personality factors'. Finally, there are thirty-nine contra-indications, in five categories, e.g. 'alcohol addiction' in the category 'behavioural aspects'.

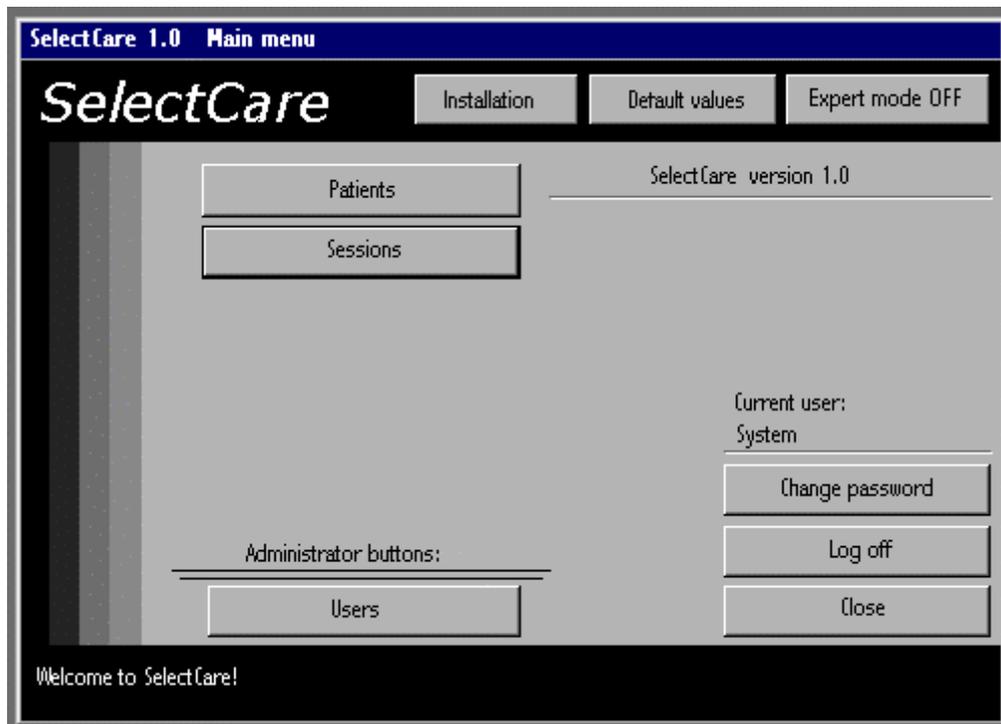
The symptoms, factors and contra-indications in the data base are those that were found to be relevant, to different degrees, in the choice of a treatment plan. This was established with a questionnaire, filled in by one hundred forty-two practising therapists. Respondents were presented with longer lists of possibly relevant decision elements. They marked for each symptom and factor whether it was relevant to a treatment decision, and if so, to what degree. They gave their answers on a scale from -2 to 2, with negative values indicating that that element was a relevant reason against the treatment decision, a zero that it was irrelevant to the decision and positive values that it was a relevant reason for the treatment decision. Factoranalyses over the answers resulted in the exclusion of elements that explained none of the variance and the inclusion of the eighty elements, ordered in fourteen categories, as described above.

The fourteen symptom and factor categories have differential relevance against or in favour of each of the treatment modalities. Their positive or negative decision weights were calculated with an analysis of variance. This revealed that, for example, the category of 'anxious symptoms' constituted a reason in favour of behaviour therapy with a decision weight of .70 and a reason against psychodynamic treatment with a weight of -.60.

The list of thirty-nine contra-indications contains those elements that were said by eighty percent or more of the participating psychotherapists to be decisive reasons against one or more specific treatment plans.

SelectCare: the system

SelectCare was first programmed in LISP, for the Apple Macintosh (Witteman & Kunst, 1999). When its functionality had been established, a less cumbersome programming environment, Microsoft Access, was adopted for a more widely used platform. The system now runs on a Windows PC and presents itself as shown in Figure 1.



The interface

The interface is more than just the window to the program. It enforces the order in which decision steps are performed. First, the psychotherapist-user fills in information about the patient, such as name, gender, address, year of birth, etcetera. Then a 'session' with the program is started. The therapist is shown the names first of the categories of symptoms, and invited to select those symptoms that describe the patient's complaint (see Figure 2).

A category 'all' is added to choose from when a therapist is uncertain in which category a symptom may be found. When a symptom is selected, a small overlay window is presented in which the therapist marks to what extent the symptom applies to the patient. A patient may be very or slightly aggressive, which should and does make a difference for the suitability of the different treatments (as described below). In this small window the therapist may also enter any information that is relevant for the treatment, such as how long the patient has shown the symptom, whether it impedes her or him in work or at home, etcetera.

Session

Session number: 2 Date: Wednesday, March 10, 1999

Patient: 2 Klaasma, Koos

Symptoms Factors Contra-indications Persons

Category: - All -
 Anxiousness and acting out
 Depressive complaints
 Interactional problems
 Vital symptoms

Symptom: Unable to express emotions
 Feelings of inferiority
 Difficulty making new contacts
 Lack of assertiveness

Klachten patient:

Dependency	45%
Unable to make decisions	78%

Add symptom

Details about 'Dependency'

Remove 'Dependency'

Cancel Main menu

Adding factors to the patient description proceeds in the same way as adding the symptoms. The therapist who might then be tempted to ask for advice is prevented from doing so, because the conclusions button on screen only appears after the therapist has checked all possible contra-indications.

Therapists may also indicate that there are persons who are relevant to the onset or maintenance of a patient's complaints. There may for example be intense rivalry with a sibling. Such information is added in a 'persons' window. They do not constitute decision elements as such, but they may be very informative for the treatment. Information provided here is taken up in the report that the therapist may have printed at the end of a session.

Checking the contra-indications may be done by passing over the whole list in alphabetical order, and marking each contra-indication as either present or not present. It may also be done category-wise, and marking a whole category as present or absent (see Figure 3).

The possibility of marking a whole category of contra-indications as present or absent instead of consciously considering each in turn is a compromise. We wished to minimize the possibility of overlooking a possible contra-indication, but therapists became weary of the long series of clicking actions they had to perform. The conclusion button appears on screen only after all contra-indications have been checked.

Session

Session number: 2 Date: Wednesday, March 10, 1999

Patient: 2 Klaasma, Koos

Symptoms Factors Contra-indications Persons

Choose a category: Symptom aspects

Contra-indication	Present	Absent
Psychosis	<input type="radio"/>	<input checked="" type="radio"/>
Biologic or organic basis of the disorder	<input type="radio"/>	<input checked="" type="radio"/>
Psychiatric symptoms	<input type="radio"/>	<input checked="" type="radio"/>
Psychopathology	<input type="radio"/>	<input checked="" type="radio"/>
Schizophrenia	<input type="radio"/>	<input checked="" type="radio"/>
Vital depression, suicidality	<input type="radio"/>	<input checked="" type="radio"/>

All present All absent

Cancel Main menu

On the conclusion window, all twelve treatment possibilities (the six therapies, each in individual and in group setting) are displayed, with a percentage expressing their suitability for the described patient. The most suitable treatment is displayed at the top, the treatment(s) that are unsuitable because of a contra-indication are presented in shaded characters in a separate box (see Figure 4).

Session

Session number: 2 Date: Wednesday, March 10, 1999

Patient: 2 Klaasma, Koos

Symptoms Factors Contra-indications Persons Conclusion

Family therapy in a group	90%
Client centered therapy in a group	90%
Behaviour therapy in a group	80%
Cognitive behaviour therapy	80%
Psychodynamic therapy	50%

Contra-indications

Dependency (Symptom)
Unable to make decisions (Symptom)

Cognitive behaviour therapy <=> Dependency

Weight

Confidence

Combined

Print: Conclusion Explanation conclusion

Cancel Main menu

The data base

The data base contains the decision elements, described above. They are represented in frames (compare Lucas & van der Gaag, 1991), which allows for easy change or addition of elements (see below: Expert mode). There is one super-frame 'therapies', with the twelve modalities as sub-frames. There is one super-frame 'symptoms', with the four categories of symptoms as sub-frames and each symptom as sub-frame in the appropriate category frame. Likewise, there is a super-category 'factors' with its sub- and sub-sub frames, and a super-frame 'contra-indications'.

The decision weights of each category of symptoms and factors relative to each treatment option is represented in the category frame. When a user selects for example a symptom, the decision weight of that symptom relative to each treatment option is activated. With each contra-indication a link to a treatment option indicates that that option should be excluded from consideration when the contra-indication is present.

In the final advice, the decision weights of the symptoms and factors are combined, as described below, into measures of suitability for each treatment option. The suitability of an option that is excluded by the presence of a contra-indication is also presented, but in shaded characters. That way a therapist may see how suitable that option would be in the absence of the contra-indication(s).

The calculations

The decision weights of the selected symptoms and factors need to be combined, first, with the confidence the therapist has expressed in their applicability to the current patient, and then with each other. A first calculation function combines decision weights with measures of confidence by multiplying them. For example a depressive complaint with a weight factor of -0.95 and applicable with probability 0.9 carries a total weight of -0.85.

The second function first takes together all negatively rated elements, that is: the reasons against a treatment option, and all positively rated elements or reasons for an option, for each option separately. Then it combines the two, again for each option separately, by subtracting the value of the reasons against the option from the value of the positive reasons.

The expert mode

SelectCare runs in normal mode and in expert mode. When one identifies oneself as an expert, one may change the data in the data base. A behaviour therapist may for example wish to add 'I feel incompetent to use psychodynamic treatment' as a contra-indication to such treatment. Another therapist may believe that psychodynamic treatment works well with anxious patients,

and change its decision weight accordingly. Symptoms, factors and contra-indications may be changed, removed or added, always supplying decision weights.

We stress again the fact that SelectCare cannot pretend to support decisions for the correct treatment plan given a particular patient, but that it supports a correct decision making process. As long as therapists first describe their patients and check the presence of contra-indications and then consider specific treatment options, our goal has been reached. A therapist who wishes to make changes in the 'default' data base which contains the consensus opinion of many colleagues, will have to explicitly argue why, at least to her or himself. This counteracts random argumentation, and, what's more, it may foster focused debate about decision elements in the selection of a treatment option.

Evaluation

We conducted two evaluation studies with SelectCare, one addressing its ease of use, and one to find out whether psychotherapists could and would use it.

The ease of use of the system was judged quite favourably, by sixteen subjects. These subjects were not practising psychotherapists but advanced psychology students. They were set a task in which they had to use all the functionality offered through the interface, but for which they did not have to think about the precise contents of the selections they made.

The general judgement about the usability of SelectCare, expressed with statements such as 'the system is frustrating (satisfying, difficult, great, etcetera) to work with', had an average of 7.2 (SD = 1.6) on a 1 to 10 scale. The screen layout was assigned a mean of 8.6 (SD = 1.4), the terminology used a 8.1 (SD = 0.9) and the learnability a 7.7 (SD = 1.4). Most convincingly, all subjects thought SelectCare an attractive program.

The psychotherapists who tested SelectCare gave answers to the question of subjective utility of SelectCare, by expressing their satisfaction, and to the question of more objective utility, when they gave more complete patient descriptions. The therapists read a case history of a depressed patient and used SelectCare to come to a proposed treatment plan.

The twenty subjects, eleven very advanced clinical psychology students and nine practising therapists, all read the same case history. Their descriptions were compared to those of a group of colleagues who had described the same patient on paper, without using the system. The psychotherapists using SelectCare were significantly more comprehensive, with a mean of 23.8 versus 2.8 descriptions.

The psychotherapists were satisfied with the system. They judged the terminology adequate with an average score of 7.5 on a ten-point scale, the categorisation satisfactory with an average of 7.6, they judged the completeness of the decision elements and treatment options with a 7, the order in which the decision process had to be performed was given an 8.6 and the advice given by SelectCare a 6.6.

The psychotherapists expressed their experience with SelectCare as pleasant (7 times), useful (6), stimulating (4), easy (4), comfortable (3), difficult (2) and tiring (2). The most rewarding remark was that SelectCare forces a closer look at the patient.

Conclusion

We think SelectCare is ready for professional use. The majority of the expert subjects described their experience with SelectCare as pleasant and useful. We do not foresee that a therapist starts the system and enters selections in the first interview with and presence of her or his depressed patient. Individual therapists may consult SelectCare when they are uncertain about their decisions and they would like a second opinion.

SelectCare may be most useful in teams that discuss the planning of the treatment of patients. Different therapists may individually describe the same patient with the system, and they may then discuss differences in their judgments. This would help avoid a discussion in terms of beliefs and stimulate more focused exchanges. And of course SelectCare may be a very useful training tool for psychotherapists-in-training, who may get to know the vocabulary and possible links between symptoms, factors and treatment plans by describing fictitious patients.

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