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Merkx, M.J.M.

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Guidelines for patient treatment matching in the substance abuse treatment system:
Feasibility, Predictive Validity and Improvement

Maarten Merkx
Guidelines For Patient Treatment Matching In The Substance Abuse Treatment System:

Feasibility, Predictive Validity and Improvement
The studies presented in this thesis were conducted at the Amsterdam Institute for Addiction Research, at Jellinek (now Jellinek, division of Arkin) and at Brijder Verslavingszorg (now ParnassiaBavo Group, division Brijder verslavingzorg). The studies were funded by the Netherlands Organization for Health Research (ZON-MW grant no. 31000031) and Jellinek (Division of Arkin).

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GUIDELINES FOR PATIENT TREATMENT MATCHING IN THE SUBSTANCE ABUSE TREATMENT SYSTEM:
FEASIBILITY, PREDICTIVE VALIDITY AND IMPROVEMENT

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Martinus Johannes Maria Merkx

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PROMOTIECOMMISSIE

Promotores
Prof. dr. G. M. Schippers          Universiteit van Amsterdam
Prof. dr. W. van den Brink        Universiteit van Amsterdam

Copromotor
Dr. M. W. J. Koeter †              Universiteit van Amsterdam

Overige leden
Prof. dr. P. G. M. Emmelkamp       Universiteit van Amsterdam
Prof. dr. V. M. Hendriks           Universiteit Leiden
Prof. dr. A. E. Goudriaan          Universiteit van Amsterdam
Prof. dr. C. A. J. de Jong         Radboud Universiteit Nijmegen
Prof. dr. R. W. H. J. Wiers        Universiteit van Amsterdam

Faculteit der Geneeskunde
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PART 1: General introduction

Chapter 1 | General Introduction

Maarten J. M. Merkx
GENERAL INTRODUCTION

Substance use disorders are highly prevalent. Several empirically supported treatment options are available, which differ in treatment method and treatment intensity. One of the key questions in the field of substance use disorders is which of the different treatment options is most likely to result in a favourable outcome for a particular patient. Patients with substance use disorders are heterogeneous with respect to several clinical features, such as the substances they use, pattern and amount of substance use, length of substance use history, age of onset, presence of co-morbid psychiatric disorders, treatment history, and previous treatment response.

Because of the high prevalence of substance use disorders, the heterogeneity of the patient population, the diversity of treatments, and the limited resources, a rational treatment system is needed. According to the Institute of Medicine (IOM, 1990), a rational treatment system for substance use problems comprises three main aspects: (1) assessment, (2) patient-treatment matching, and (3) routinely monitoring outcome. Each of these aspects is briefly discussed below.

First, in a rational treatment system, assessment should be comprehensive, objective, and reproducible. Assessment must provide the necessary information for patient-treatment matching and execution. Second, a rational treatment system provides optimal patient-treatment matching. No single treatment is effective for all patients with substance use problems, and some generally effective treatments are not effective for some patients. To provide an effective treatment, it is necessary to match patients to specific treatments. The most appropriate way in which to match a patient with a treatment is to use explicit guidelines that are objective, reproducible, and assessable (IOM, 1990). Third, treatment evaluation based on a routine collection of treatment outcomes is needed. Such data can be used in two ways: Routine Outcome Monitoring and Routine Outcome Management (Sperry, Brill, Howard, & Grissom, 1996). Routine Outcome Monitoring (ROM) means providing information during an individual’s treatment, with an aim to evaluate the initial patient-treatment matching decision and if necessary, adjusting this decision during or after
treatment. The necessity of adjusting the initial matching decision is based on treatment response. *Routine Outcome Management* (ROMan) is used to evaluate the effect of a treatment system at an aggregated level. Results obtained in this manner can be used to formulate improvements in the treatment system.

This thesis presents several studies that aimed to integrate the three main aspects of a rational treatment system for patients with a substance use disorder. It presents the results of several studies on patient-treatment matching in the Dutch substance abuse treatment services, which are based on a comprehensive, objective, and reproducible assessment procedure and on treatment results that were routinely collected.

This introductory chapter starts with a review of the theoretical and empirical literature up to 2002 on the matching of patients with a substance use disorder with psychological treatments; 2002 was the year when the current research project started. This review is followed by a short overview of the Dutch substance abuse treatment services. It ends with a description of the quality enhancement programme *To Score Results*. This quality enhancement programme was supported and implemented by 13 substance abuse treatment centres in the Netherlands between 1998 and 2002; it formed the basis for this thesis. The Introduction ends with a description of the most important components in the process of patient-treatment matching in the addiction treatment centres in the Netherlands.

**THEORY OF AND EVIDENCE FOR PATIENT TREATMENT MATCHING**

According to the *Institute of Medicine* (IOM, 1990), there are various ways in which treatments for substance use disorders can differ. Two broad categories of treatment can be distinguished: (1) medical treatments, which include pharmacological interventions, and (2) psychological treatments. This overview is restricted to psychological treatments, because in 2002 when the research project started, pharmacological relapse prevention programs were still rare
and mainly restricted to the use of (1) disulfiram for alcohol dependent patients or (2) methadone for opioid dependent patients and with no perceived need for patient-treatment matching.

In the last decades of the 20th century, increasing knowledge about the efficacy of psychological treatments for substance use disorders resulted in a shift in research from a focus on ‘which treatment is effective’ to a focus on ‘which treatment is effective for whom’, which was the basis for patient-treatment matching. Patient-treatment matching is defined as “selecting from among available alternatives the treatment or treatments that are most likely to facilitate a positive outcome in a particular individual” (IOM, 1990, page 279).

Patient-treatment matching concerns matching patients to treatment methods (e.g. motivational enhancement therapy or cognitive behavioural therapy), treatment services (e.g. substance abuse treatment in combination with vocational training), or levels of care (e.g. outpatient or inpatient).

**Matching patients to different psychological treatment methods**

Project MATCH (1997) has been the largest study aiming to determine whether or not patient-treatment matching with different outpatient treatments for alcohol use disorder patient improves treatment outcome. The primary aim of Project MATCH was to identify patient characteristics that would predict which psychological treatment was most effective for which kinds of patients. The study included three types of evidence based treatments: (1) Twelve-Step Facilitation Therapy (TSF), (2) Motivational Enhancement Therapy (MET), and 3) Cognitive Behavioural Therapy (CBT). All patient characteristics that showed retrospective predictive validity for treatment success were used as matching variables (Mattson et al., 1994). Twenty-one patient characteristics were included, among which were gender, alcohol involvement, cognitive impairment, readiness to change, type and severity of psychiatric disorder, antisocial personality disorder, and psychopathy. The results were disappointing. Of the 16 a priori matching hypotheses, only two a priori contrasts showed a significant matching effect: (1) outpatients who were
high in anger and treated with MET had better drinking outcomes than when these patients were treated with CBT, and (2) aftercare patients with severe alcohol dependence had better outcomes when they received TSF, whereas less severely dependent patients did better with CBT. Other matching effects were not found or, if they were, they varied across time, and some interactions were in a direction opposite to what had been predicted. In short, the results of Project MATCH generated almost no support for the hypothesis that specific patients could be matched with specific outpatient psychological treatments (Project Match Research Group, 1997).

Another project that tested several hypotheses related to matching inpatients with alcohol or drug use disorders to TSF and CBT was conducted in multisite U.S. Department of Veterans Affairs Medical Centers. In the first study (Ouimette, Finney, Gima, & Moos, 1999a), a total of 804 male patients in TSF programs and 1,069 patients in CBT programs completed intake and discharge assessments and a one-year follow-up questionnaire. The findings, however, did not support the hypothesised patient-treatment matching interactions. Patient characteristics, such as severity of alcohol dependence, coping styles, cognitive impairment, and treatment goal did not differentiate between TSF and CBT treatment outcomes. A second study (Ouimette, Gima, Moos, & Finney, 1999b) compared patients with a substance use disorder only (n = 1,932) and those with a substance use disorder combined with a psychotic (n = 157), anxiety/depression (n = 495), or personality (n = 424) disorder. Again, no support for a patient-treatment interaction was found. There were also no diagnostic group-by-treatment matching effects, indicating that patients with a dual diagnosis improved as much with TSF as with CBT for substance abuse.

A study by Woody et al., (1983), however, did provide some evidence for patient-treatment matching. In this study, opiate dependent patients (n = 110) were randomly assigned to one of three treatments: drug counselling alone, drug counselling plus supportive-expressive psychotherapy (SE), or drug counselling plus CBT. At a six-month follow-up, patients who had received SE or CBT did equally well, but both of these groups had improved more than the group that received drug counselling alone. Whereas patients with lower levels
of psychopathology tended to improve regardless of whether they received additional psychotherapy or drug counselling alone, patients with higher levels of psychopathology tended to improve only if they received additional psychotherapy. The improvement was reflected in reduced illicit drug use, lower doses of methadone, and fewer prescribed psychotropic medications. Compared with standard drug counselling, CBT was shown to be more efficacious for non-psychotic, opiate dependent patients with more severe co-morbid psychiatric symptoms. In another clinical trial ($n = 84$) conducted by the same research group, the earlier results were partially confirmed (Woody, McLellan, Luborsky, & O’Brien, 1995).

In a randomized trial (Thomton, Gottheil, Weinstein, & Kerachsky, 1998), a group of 60 substance-dependent patients were randomly assigned to 12 weeks of treatment either in a highly structured behavioural intervention that was comparable with CBT, or in low-structured, facilitative (LSF) individual counselling. The results provided support for the hypothesis that patients with more severe pre-treatment drug problems would benefit more in CBT, whereas those with less severe drug problems would benefit more in LSF.

Carroll, Rounsaville, and Gawin (1991) randomly assigned 42 cocaine dependent patients to one of two outpatient treatments for cocaine abuse: CBT or intrapersonal psychotherapy (IP). Overall, both treatments did equally well, but CBT was more effective for patients with a more severe cocaine use disorder. That is, the more severe cocaine users who were treated with CBT, were significantly more likely to achieve abstinence and be classified as recovered compared to those treated with IP. For patients with lower severity of substance abuse, outcomes were comparable for the two types of treatment.

In another randomized controlled trial (Carroll et al., 1994), 139 cocaine dependent patients were assigned to one of four conditions: CBT plus desipramine hydrochloride, clinical management plus desipramine hydrochloride, CBT plus placebo, or clinical management plus placebo. All groups showed significant improvement in several outcome domains, but baseline severity of cocaine use interacted with the type of psychotherapy
received: patients with high severity of cocaine use had significantly better outcomes with CBT than with clinical management. Furthermore, baseline severity of co-morbid psychiatric disorders interacted with type of psychotherapy: depressed patients had greater reductions in cocaine use than non-depressed patients when they were treated with CBT than when they were treated only with clinical management.

Based on these studies, Carroll (1998) concluded that interventions based on CBT were especially effective for patients with more severe drug use disorders and those with more severe co-morbid psychiatric symptoms. In addition to the limited empirical support for patient-treatment matching for drug use disorders, there are serious doubts about the external validity of most of the matching studies (McKay & McLellan, 1998). For example, patients with acute medical and psychiatric problems or a psychiatric history, which are highly prevalent among patients with drug use disorders, were excluded from most of the studies, and thus the results cannot be generalised to routine practice.

In summary, there is very limited valid support for patient-treatment matching. Neither treatment effectiveness nor treatment efficiency for patients with a substance use disorders has been shown to improve when specific patient characteristics have been matched with specific psychological treatments.

**Matching patients to suplementary interventions**

Patients with a substance use disorder generally have many more problems than their uncontrolled use of alcohol or other drugs. They often report substance-related or independent medical, psychological, or social problems and a perceived need to receive treatment for these additional problems. One possibility for improving both substance use outcomes and other domains of functioning is to match patients with an alcohol use disorder to treatment services that are supplementary to the main substance abuse treatment.

McLellan et al. (1997) randomized 94 alcohol dependent patients to either a standard treatment or a standard treatment plus matched services for
addressing patients’ additional needs. Matched patients stayed in treatment longer, were more likely to complete treatment, were less likely to be readmitted for substance abuse treatment during the six-month follow-up period, and improved significantly more on the targeted problem area than unmatched patients. Nevertheless, the matched patients did not have better post-treatment substance use outcomes than patients receiving the standard treatment. In a controlled quasi-experimental field study with alcohol dependent patients, McLellan et al. (1998) evaluated the effectiveness of adding social services to standard addiction rehabilitation. Compared to controls at a six-month follow-up, patients treated in enhanced programs showed a significantly larger reduction in alcohol use, fewer physical and mental-health problems, and better social functioning. The authors concluded that adding social services to addiction treatment programs substantially improved substance use outcomes.

The results of a naturalistic study with drug-dependent patients \( n = 171 \) suggested that additional services related to housing and child care significantly improved outcome both in the specific problem area and in drug-use outcome for those who expressed a need for the additional services (Hser, Polinsky, Maglione, & Anglin, 1999). Furthermore, the more closely that needs and services were matched, the longer was the retention of patients in the treatment. In a naturalistic study of 183 women undergoing substance abuse treatment, Smith and Marsh (2002) found that although services matched to patients’ specific needs (domestic violence services and family counselling) were associated with reduced substance use, the total number of services that patients received had a stronger relationship with substance use outcomes than services matched with patient-identified problems.

Based on these studies, we conclude that matching patients to special services that target addiction-related problems seems to be effective in reducing the addiction-related problems. However, the effects of the additional interventions on reducing substance use have been inconsistent. It is thus unclear whether matching patients to services for addiction-related problems improves substance use outcomes.
Matching patients to different treatment intensities

Treatment intensity refers to the length of the treatment in time (brief, short, long), the number of therapeutic sessions, or the restrictions imposed on the patient’s daily life (outpatient, intensive outpatient, inpatient). A treatment of low intensity is limited in time and number of sessions and generally takes place in an outpatient setting with no major restrictions on daily life. A more intense treatment takes longer, has more sessions, and tends to take place in an intensive outpatient or inpatient setting with substantial restrictions on daily life. Several experimental and naturalistic studies have assessed interactions between treatment intensity and patient characteristics on treatment outcome.

Mattson et al. (1994) reviewed 31 empirical studies supporting the hypothesis that patients with an alcohol use disorder can be matched with treatment intensity. Patients who benefitted more from a more intensive treatment were described as behaviourally impaired due to excessive drinking, externally controlled, high in psychiatric co-morbidity, and socially unstable.

A randomized controlled trial among cocaine dependent patients with severe social problems (homeless and unemployed) (Milby et al., 1996), suggested that intensive outpatient treatment plus abstinent-contingent work therapy and housing \( (n = 69) \) was more effective than standard outpatient treatment \( (n = 58) \). Significant differences between the treatment groups in favour of the intensive outpatient treatment programme were found for cocaine and alcohol use and employment and homeless status.

In a randomized clinical trial that compared intensive outpatient treatment with inpatient treatment for patients with a substance use disorder (Guydish, Werdegard, Sorensen, Clark, & Acampora, 1998), no differences in outcome were found between intensive outpatient treatment \( (n = 114) \) and inpatient treatment \( (n = 147) \). However, two differences were found when the two treatment intensities were compared and baseline differences on the outcome measures were controlled. Patients who were received inpatient treatment improved more than those in intensive outpatient treatment in terms of reductions in social problems and psychiatric symptoms at the six-month,
12-month, and 18-month follow-ups (Guydish et al., 1999).

Rychtarik et al. (2000) randomly assigned 192 alcohol dependent patients to inpatient treatment, intensive outpatient treatment, or standard outpatient treatment. Patients high in alcohol involvement benefitted more from inpatient than from outpatient treatment. The opposite was found for patients low in alcohol involvement. There was no interaction between the two levels of alcohol involvement and the two levels of outpatient treatment intensity.

A naturalistic, multisite, follow-up study, which included only alcohol dependent patients who completed inpatient treatment (n = 928), examined the possibility of an interaction between several patient characteristics and patients’ length of stay (Welte, Hynes, Sokolow, & Lyons, 1981). An interaction effect on patients’ outcome was, in fact, found between their length of stay in treatment and their social stability. Among the patients with low social stability, alcohol consumption decreased considerably as length of stay increased; however, among the patients with high social stability, length of stay was unrelated to post-treatment alcohol consumption.

In a non-randomized study, Budde, Rounsaville, and Bryant (1992) compared cocaine abusers treated in an inpatient setting (n = 149) with those treated in an outpatient treatment setting (n = 149). At the start of the treatment, the inpatients had heavier recent use of cocaine and alcohol, higher levels of addiction severity, and more psychiatric and family/social impairment. However, at the one-year follow-up, the inpatients had lower problem severity in several areas, including addiction severity, psychiatric problems, and employment status. The authors concluded that inpatient treatment had better long-term effects for patients with greater problem severity.

In a naturalistic study (Harrison & Asche, 1999), inpatient treatment significantly predicted a higher rate of post-treatment abstinence than outpatient treatment, but only for a small subset of patients with a substance use disorder who reported recent suicidal ideation or a suicidal attempt (16% of 2,476 patients).

Another naturalistic, follow-up study using a quasi-experimental design (n = 173)
(Pettinati et al., 1999) found an interaction between the severity of patients’ alcohol problems and the intensity of their treatment. Patients with multiple drinking-related consequences who received inpatient treatment were less likely to return to heavy drinking during the first three months after treatment than patients with multiple drinking-related consequences who received outpatient treatment. This interaction effect between multiple drinking-related consequences and treatment setting was not found at the six-month nor the 12-month follow-up. Finally, psychiatric severity did not interact with treatment setting in predicting drinking status during the post-treatment period.

In summary, several patient characteristics and the intensity of the treatment that patients receive seem to be related to patients’ substance use outcomes (Melnick, De Leon, Thomas, & Kressel, 2001). Specifically, patients with a more severe addiction, psychiatric disorders, or social impairment are likely to benefit from more intensive treatment, whereas patients with a less severe addiction seem to benefit from less intensive treatment in a less restrictive setting. This implies that severity of addiction, psychiatric co-morbidity, and social impairment can be used to match patients with intensity of treatment in order to improve treatment effectiveness.

THE DUTCH SUBSTANCE ABUSE TREATMENT SERVICES

Professional treatment for alcohol use disorders in the Netherlands has a history of more than 100 years; the first sanatorium for alcohol use disorders opened in 1891 (Blok, 2011). At that time, all treatment services were in inpatient facilities. In addition to the inpatient treatment facilities, in the first half of the last century publicly funded outpatient treatment for alcohol use disorders emerged and gradually spread throughout the country (Krauweel, 1955). In the late 1960s, due to the increase in drug use and drug-related problems, these facilities also started to treat people with drug use disorders (Schippers, Schramade, & Walburg, 2002). Gradually, a large number of scattered outpatient and inpatient centres for the treatment of substance abuse developed. They had a variety of aims and target populations, and there was almost no cooperation among them.
Under pressure from public criticism, between 1970 and 2000 the Dutch substance abuse treatment services underwent a major reorganization. All small substance abuse treatment centres merged into larger regional substance abuse treatment centres. Since the 1990s, 13 large regional institutes have provided most of the substance abuse treatment. The treatment includes a comprehensive continuum of various kinds of services. During this period, approximately 55,000 patients were treated annually in substance abuse treatment centres; approximately 20% of these were first admissions. Patients whose primary substance of abuse was alcohol constituted the largest group (approximately 40%), followed by patients with an opiate addiction (30%), and patients with cocaine dependence (15%) (Ouwehand, van Alem, Mol, & Boonzajer Flaes, 2003).

The criticisms that had been levelled pertained to both the organization and the quality and effectiveness of the treatment system. Important issues were that treatments that had been proved to be effective were not widely applied, that scientific findings were not translated into new and more effective treatments, and that the centres did not have enough insight in the outcomes of the treatments and the costs related to them (Schippers et al., 2002). To address these criticisms, in 1998 most substance abuse treatment centres became involved in a nationwide quality-enhancement programme that aimed to redesign the service. It was called To Score Results (GGZ Nederland, 1998) and was based on recommendations provided by the IOM (1990) in Broadening the Base of Alcohol Treatment. The main goal of this project was to improve system functioning and client outcomes. As Schippers et al. (2002) discussed, the main objectives of the programme were to (1) redesign existing forms of treatment and prevention based on scientific evidence of effectiveness and develop new forms of treatment and prevention for underexposed target groups, and (2) improve treatment practices based on assessment of and feedback from clinical and societal outcomes.

To Score Results had been in effect for about 15 years when in 2013 it was transformed into a permanent centre of expertise for substance abuse treatment. The current thesis draws on the events and experiences obtained during the
starting period (2003 – 2007) of the quality enhancement programme To Score Results in the Dutch addiction treatment system.

PATIENT TREATMENT MATCHING IN THE DUTCH SUBSTANCE ABUSE TREATMENT SYSTEM

According to the Dutch Health Care Council (Nederlandse Raad voor de Volksgezondheid [NRV], 1994), patient-treatment matching should (a) be based on an objective and standardized intake assessment and on a needs assessment of the patient, (b) indicate, on the basis of explicit guidelines, which treatment intensity is most likely to result in a positive outcome for each patient, and (c) be evaluated based on treatment information gathered with routine outcome monitoring. According to the NRV, the initial patient-treatment matching decision must be evaluated and adjusted, if necessary, because substance use disorders can be chronic. A matching decision should include type, method, and intensity of treatment.

At the start of the redesign programme, patient treatment allocation in routine practice was not in line with the NRV’s definition of patient-treatment matching, because it was mainly based on the clinician’s intuition and was made without using objective assessment instruments, formal allocation rules, or operationalization of patient characteristics (Kersten, 1998). An important objective of To Score Result was to standardise the procedure for matching patients to treatments, in order to optimize treatment outcomes. In 2000 – 2001, a manual for patient-treatment matching was developed (De Wildt, Schramade, Boonstra, & Bachrach, 2001) that was in line with the NRV definition of patient-treatment matching. This manual was implemented in most of the Dutch substance abuse treatment centres during 2000 – 2003.

Objective and standardized intake assessment

The goals of an intake assessment are to establish whether patients fulfil the criteria for treatment for a substance use disorder and to identify other
factors that should be considered in a comprehensive treatment plan. The assessment must be conducted using standardized assessment instruments that include the factors that are important for developing the treatment plan and making the treatment allocation decision. This warrants using an objective and standardized intake assessment. Fortunately, an instrument was already in use in some substance abuse treatment centres in the Netherlands; it was the European version of the Addiction Severity Index (EuropASI) (Kokkevi & Hartgers, 1995).

**Treatment type and treatment method**

Treatment type refers to the distinction between a medical and a psychological treatment. The evidence presented in this thesis is restricted to matching patients to different types of psychological treatment. Treatment method refers to the different types of psychological interventions that were available during the developments of the Dutch treatment system at the end of the last century. Two types of interventions were believed to be effective (e.g. Baucom, Mueser, Shoham, Daiuto, & Stickle, 1998; Carroll, 1996; Crits-Christoph et al., 1999; Epstein & McCrady, 1998; Irvin, Bowers, Dunn, & Wang, 1999; Marques & Formigoni, 2001; Miller & Wilbourne, 2002; Rietdijk, 2001), both of which were included in Project MATCH (1997):

1. Brief Interventions (BI) and Motivational Enhancement Therapy (MET), which are based on *motivational interviewing* (Miller & Rollnick, 2002). Motivational interviewing is a form of counselling that aims to strengthen a person’s motivation and commitment to change. It assumes that motivation for change can be influenced by the interaction between the therapist and the patient. Motivational interviewing attempts to increase the patient’s awareness of potential problems related to substance use, the consequences already experienced, and the risks faced as a result of using substances. It aims to develop the patients’ ambivalence about his or her substance use and to elicit *change talk*. The counsellor also tries to be positive and reassuring, avoid pressuring tactics, and support self-efficacy. A BI includes
a short assessment of the person’s substance use (amount and severity) and related problems, and then motivational feedback and advice are provided. A BI is generally delivered in one to three sessions. MET aims to enhance the patient’s motivation to change his or her substance use by exploring and resolving the ambivalence that patients with a substance use disorder often have about changing their substance use and is generally delivered in four sessions.

2. Cognitive behavioural therapy (CBT) includes interventions that are based on behavioural learning theories that originate from Pavlov, Skinner, Thorndike, and Watson. A core element of CBT is the functional analysis of high-risk situations for substance use (Kadden et al., 1992). The functional analysis helps patients to analyse the antecedents and consequences of their substance use in terms of behaviour, cognitions, emotions, and external factors. Based on the functional analysis, a repertoire of alternative coping skills to reduce the risk of excessive drinking or other substance use in the future is developed and trained. The intervention can be conducted individually, in a group, or as behavioural couples therapy.

MET and CBT became the main psychological treatment methods for treating patients with addictive behaviours in the Netherlands. In addition, several treatment manuals based on MET and CBT became available and were implemented in the Dutch substance abuse treatment centres (De Wildt, 2000, 2001; Merkx & van Broekhoven, 2002; van de Broek & Merkx, 2003).

**Treatment Intensity**

To be effective, the length and intensity of treatment for substance use disorders must be appropriate (IOM, 1990). There are two basic intensities of treatment, inpatient and outpatient (IOM, 1990), although greater differentiation is possible (Project MATCH, 1997). At the start of the redesign project, in the Netherlands four treatment intensities were distinguished: brief outpatient treatment; outpatient treatment; inpatient treatment, including intensive outpatient treatment; and inpatient or outpatient care. The first three treatment
intensities focus on abstinence or a significant reduction in substance use, whereas the fourth intensity aims at harm reduction and enhance the quality of patients’ lives. The four treatment intensities can be described as follows:

(1) **Brief outpatient treatment.** Treatment is provided either individually or in a group for a maximum of five sessions and for a maximum of two months.

(2) **Outpatient treatment.** Treatment is provided individually or in a group once or twice a week in 10 to 12 sessions and for a maximum of three months. In addition, depending on the patient’s needs, additional interventions can be offered, such as pharmacotherapy, treatment for a co-morbid psychiatric disorder, or training in social skills. The treatment might be either outpatient or a more intensive treatment.

(3) **Intensive outpatient/inpatient treatment.** This treatment intensity provides several types of services to patients in a substance-free, structured environment. Treatment components include individual, group and sometimes family therapy and pharmacotherapy. Based on a structured needs assessment, additional treatment might be added for patients with a co-morbid psychiatric disorder (e.g. medication) or social impairment (e.g. vocational training). Unlike intensive outpatient treatment, inpatient facilities also allow the opportunity for interactions with nurses and night staff in a residential treatment milieu. Aftercare services are offered in a stepped down programme for patients who have completed their treatment program. In the literature, *residential treatment* and *inpatient treatment* are used interchangeably. Also, *day treatment* and *intensive outpatient treatment* are used interchangeably.

(4) **Care.** Unlike the other treatment intensities, which focus on abstinence or a significant reduction in substance use, *care* aims primarily to reduce harm. Neither the number of sessions nor the time frame of the treatment is defined. Treatment can be provided in either an outpatient or an inpatient setting.
**Patient-treatment matching using explicit guidelines**

At the start of the redesign project, there were no empirically based guidelines for matching patients to treatments. Thus, it seemed reasonable to adopt a pragmatic approach for matching patients to the appropriate treatment intensity (referred in the next chapters as levels of care [LOC]). The stepped care paradigm (Sobell & Sobell, 2000) is a rational set of guidelines for matching patients to treatment intensity. The fundamental principles underlying a stepped care approach for patient-treatment matching are: (1) treatment should be individualized, efficient, and available in terms of treatment resources, (2) the selected treatment should be consistent with the contemporary research literature, implying that the clinician should be familiar with and use state-of-the-art, evidence based interventions, (3) the recommended treatment should be the least restrictive to the patient’s lifestyle but still likely to be effective, implying that more intensive treatments should be reserved for patients with more severe problems or who did not respond to initial treatments of lower intensity, and (4) stepped care should be self-correcting. This means that decisions about patient-treatment allocation decisions should be systematically monitored, and changes should be made if current treatments do not achieve significant health gains (‘stepping up’) or if the presenting problem is resolved (‘stepping down’).

The manual for patient-treatment matching mentioned earlier (De Wildt et al., 2001) contains two main components. First, it describes a standardized and comprehensive assessment procedure. Secondly, it provides specific guidelines for matching patients to different intensities of psychological treatment based on the stepped care paradigm (see Fig. 1).

Stepped care implies that patients’ history of treatment for a substance use disorder is the basis for patient-treatment matching. Substance use disorders can be a chronic, relapsing disease with periods of abstinence interspersed with periods of significant use. Change of substance use often requires a longer lasting recovery process with different treatment episodes. Patients with an initial referral may start with the lowest intensity if there are no contra-indications
based on other patient characteristics. On the other hand, patients who have previously failed in a treatment of relatively low intensity should be allocated to a treatment with a higher intensity. Contra-indications for treatment at the lowest intensity are based on information about the severity of the patient’s addiction, psychiatric co-morbidity, and social impairment or instability. The recommended treatment intensity is the one that the treatment allocation guidelines indicate. These guidelines are the general theme of this thesis.

**CONCLUSION AND FOCUS OF THE THESIS**

Patient-treatment matching is an important component in the planning of treatment of patients with a substance use disorder. Research suggests that there is no evidence that treatment outcome can be improved by matching patients to treatment methods or services. However, there is some evidence that matching patients’ characteristics with treatment intensities can improve outcome. Patient characteristics that might be matched with treatment intensity to improve outcome include patients’ (1) treatment history, (2) addiction severity, (3) psychiatric impairment, and (4) social stability.
severity, (3) psychiatric co-morbidity, and (4) social impairment or instability. The main objective of this thesis was to test the feasibility and predictive validity of using these guidelines for allocating patients with a substance use disorder to psychological treatments that were used in the Dutch addiction treatment system during the period 2002-2007.

**Present thesis**

This thesis is based on data collected during the implementation of manual-based guidelines for patient-treatment matching. It comprised the following components: (1) a semi-structured assessment of patient characteristics, (2) matching patients to treatment intensities according to an algorithm, and (3) routine outcome monitoring.

*Chapter Two* aims to determine whether it is feasible to implement a semi-structured assessment of patient characteristics and a treatment-allocation algorithm to match patients to treatment intensities based on the stepped care paradigm used in two Dutch substance abuse treatment centres.

*Chapter Three* examines the predictive validity of the guidelines for allocating patients to two different levels of outpatient care.

*Chapter Four* aims to replicate and extend the results presented in Chapter 3. The two outpatient levels of care were extended with an inpatient level of care and a different study cohort was used.

*Chapter Five* reports the incremental effects of including medically assisted detoxification in outpatient treatment for heavy drinking patients with a more severe alcohol use disorder.

In the General Discussion, presented in *Chapter Six*, the major findings of the thesis are discussed in the context of recent research and new developments related to the main topic of the thesis: matching patients to several different LOC. Limitations of the research and recommendations for future research are also discussed. Finally, the relevance of the results for clinical practice is
discussed, and remaining research questions are discussed in relationship to recent developments in substance abuse treatment. Lastly, in Chapter Seven, a summary of this thesis is presented.
PART 2: Research questions

Chapter 2 | Allocation Of Substance Use Disorder Patients To Appropriate Levels Of Care: Feasibility Of Matching Guidelines In Routine Practice In Dutch Treatment Centres.

ABSTRACT

Aims: To examine the feasibility of implementing manual-based guidelines for patient-treatment matching to levels of care in two Dutch substance abuse treatment centres.

Design: Multi-centre observational follow-up study.

Setting: Two large Substance Abuse Treatment Centres (SATCs).

Participants: All 4,394 referrals to the two SATCs in 2003.

Measurements: Baseline patient characteristics needed for treatment allocation according to protocol, treatment allocation according to matching protocol, treatment allocation according to actual level of care (LOC) entered.

Analysis: Comparison of recommended and actual LOC entered. Evaluation of reasons for observed differences between recommended and actual LOC entered.

Findings: Data needed for treatment allocation according to protocol were available for 2,269 (51.6%) patients. Data needed for evaluation of actual LOC entered were available for 1,765 (40.2%) patients. Of these patients, 1,089 (60.8%) were allocated according to protocol: 48.4% based on the guideline algorithm and 12.4% based on clinically justified deviations from this algorithm. Main reason for deviation was a different appraisal of addiction severity, made by the intake counselor compared to the protocol.

Conclusion: Feasibility of guideline-based treatment allocation is seriously limited due to inadequate data collection of patient characteristics and sub optimal guideline-based treatment allocation. As a consequence, only 24.4% of the patients could be evaluated as being properly matched to the treatment planned. The results indicate several barriers which limit the adequate implementation of patient-treatment matching guidelines: problems in the infrastructure of data collection and storage, and inertia of intake staff who did not adhere to guidelines for assessment and matching.
INTRODUCTION

Recently, most of the regional substance abuse treatment centres (SATCs) in the Netherlands redesigned their treatment programmes in order to build a more evidence based, transparent and accountable treatment system (Schippers, Schramade, & Walburg, 2002). An important element in executing the renovation was the standardisation of matching patients to levels of care.

Patient-treatment matching assumes that outcomes improve if patients are matched to appropriate treatment (Institute of Medicine [IOM], 1990). It concerns matching to treatment modalities (e.g. motivational enhancement or social skill training); treatment services (e.g. substance abuse treatment in combination with vocational training); or levels of care (e.g. outpatient or residential).

At the moment, there are no substance abuse treatment methods that warrant matching (Mattson et al., 1994; Project Match Research Group, 1997). There is, however, some evidence for matching patients to appropriate services: those patients who have received the appropriate services in a particular problem area, compared to those who have not received these services, show more improvement in functioning in the targeted problem areas (Hser, Polinsky, Maglione & Anglin, 1999; McLellan et al., 1997; Smits & Marsh, 2002).

Different levels of care (LOCs), in which multiple treatment modalities are combined, have revealed positive outcomes in treating patients with substance use disorders. Only a few studies, however, examined patient-treatment matching to LOCs. Some studies (Orford, Oppenheimer, Egert, Hensman, & Guthrie, 1976; Rychatrik et al., 2000) have suggested that patients with more severe substance abuse problems benefit more from residential treatment. Patients with co-morbid addiction and psychiatric disorders which were treated in more intensive treatment programmes have better substance use outcomes than those treated in less intensive programmes (Alterman, McLellan, & Shifman, 1993; Avants et al., 1999; Timko & Moos, 2002). With respect to social resources, more socially stable patients (work and housing) experience better
outcomes from lower intensity LOCs. Socially instable patients generally have better outcomes with more intensive LOCs (Guydish et al., 1999; Kissin, Platz, & Su, 1970; McLellan, Woody, Luborsky, O’Brien, & Druley, 1983; Rychatrick et al., 2000). Therefore, matching to different LOCs seems to be justified. The practical challenge is how to match patients to the appropriate LOCs (Finney, Hahn, & Moos, 1996). In sum, (1) severity of alcohol/drug use; (2) psychiatric impairment; and (3) social stability influence outcome can function as parameters for guiding matching and treatment allocation decisions.

Until the Dutch renovation programme, the sole basis for patient-treatment matching in routine practice in Dutch treatment centres was clinical judgement. However, clinicians are not qualified to predict differential treatment efficacy for patients with substance use disorders (Kadden, Cooney, Getter & Litt, 1989). Without using objective matching strategies, therapists employ idiosyncratic, intuitive and non-transparent matching strategies (Westenberg, Koele, & Kools, 1998).

Patient placement strategies used for assigning patients to different LOCs, were developed by the American Society of Addiction Medicine (ASAM PPC) (Mee-Lee, Shulman, Fishman, Gastfriend, & Griffith, 2001). However, the predictive validity of these guidelines on treatment outcome is limited (Gastfriend, 2004; Magura et al., 2003; Mckay, Cacciola, McLellan, Alterman, & Wirtz, 1997).

Given the relative lack of empirically-based matching criteria, it would seem justified to adopt a pragmatic approach for matching patients to appropriate LOCs, using the stepped care concept (Sobell & Sobell, 2000). This approach states that the initial intervention of choice is consistent with empirical evidence and supported by clinical judgement, least restrictive on the patients’ lifestyle, is believed to have a reasonable chance of being effective and is efficient and available in terms of treatment resources. More complex or intensive interventions are provided only to those patients who either have more severe problems or who do not respond to initial treatment (Wilson, Vitousek, & Loeb, 2000).

The Dutch SATCs have adopted a manual-based guideline for matching and
referral comprising the following components: (1) semi-structured assessment of patient characteristics, including treatment history, (2) assessment of four key indicators, to be used in an algorithm, based on the stepped care concept, (3) patient-treatment matching to one of the four LOCs according to the algorithm or to an overruling clinical justification, and (4) treatment referral according to component 3.

We observed the application of this protocol in a large cohort in order to answer the following questions: (1) is systematic data collection of patient characteristics and patient-treatment matching decisions to LOCs in SATC feasible in routine practice? and (2) are patient allocations concordant with the algorithm and what are reasons to deviate?

**METHOD**

**Setting**

Routine practice was observed in two Dutch SATCs, one in a large city and one in a suburban area. The intake counsellors, in total 42, had various backgrounds: psychologist, social worker or psychiatric nurse (BA or MA). Both SATCs offer the following levels of care:

*Brief Outpatient Treatment (LOC-1)*

At this level, a brief cognitive-behavioural intervention is offered, ranging from four to six sessions, either individually or in a group, over an eight-week period. When needed, pharmacotherapy is added.

*Outpatient Treatment (LOC-2)*

Main element at this level is a cognitive-behavioural intervention (CBT), ranging from ten to twelve sessions, either individually or in a group, over a six-months period. In addition, depending on the patient’s needs, additional interventions are offered, such as training in social skills or treatment for anxiety disorders. Pharmacotherapy is recommended.
**Intensive Outpatient or Inpatient Treatment (LOC-3)**

Intensive outpatient and inpatient treatment (both with a maximum length of three months) offer similar types of services. A broad spectrum of interventions is offered including 20-25 (group)sessions of CBT. The principal difference between intensive outpatient and inpatient treatment is that the former does not have the 24-hr structure of a residential programme. Pharmacotherapy is recommended.

**Care (LOC-4)**

Unlike the other LOCs, which focus on abstinence or a significant reduction in substance use, this level aims primarily at harm reduction. The number of sessions or time frame is not defined ex ante. A patient can be treated in either an outpatient or inpatient setting.

**Patients**

We evaluated the feasibility of the manual-based data collection of clinical patient characteristics at the start of a new treatment episode. Subjects were all 4,394 patients who were admitted in 2003 in the two SAT centres (SATC 1 \( n = 2,225 \); SATC 2 \( n = 2,169 \)). Patients were allowed to enter the study only once during the recruitment period. Of these, 3,318 (76%) were assessed during intake process with the EuropASI, in accordance with the protocol.

To evaluate the concordance between manual-based patient-treatment matching decisions to LOC and actual LOC entered, all 1,765 patients (40%) were observed for whom full information on the LOC recommended by the algorithm and the actual LOC entered after intake period was available. (SATC 1 \( n = 980 \); SATC 2 \( n = 785 \)).

In the subgroup, assessed with the EuropASI at the start of a new treatment episode, mean age was 39.5 years, 75.5% were male, 75.9% were of Dutch nationality, and 73.9% were single (never married, divorced or widowed). Almost half (48.4%) was employed, and one-third (32.3%) received unemployment,
social security or disability benefit. Alcohol was the most frequently used primary substance of abuse (53.0%), followed by cocaine (17.0%), marijuana (9.9%) and opiates (6.1%). Finally, 6.3% reported gambling as their primary problem. Regular use of more than one substance was reported by 33.9% (see table 1).

**Procedure**

The matching and allocation procedures were observed under naturalistic, real world, routine conditions. Procedures were uniform in both SATCs and
### Table 1: Subject demographic and clinical characteristics

<table>
<thead>
<tr>
<th></th>
<th>Subgroup 1 (n = 3318)</th>
<th>Subgroup 2 (n = 1756)</th>
<th>Subgroup 3 (n = 1553)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean ± sd</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Age (yrs)</strong></td>
<td>39.53 ± 11.33</td>
<td>39.20 ± 11.46</td>
<td>39.81 ± 11.20</td>
</tr>
<tr>
<td><strong>n (%) of patients</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Gender (males)</strong></td>
<td>2504 (75.5)</td>
<td>1328 (75.2)</td>
<td>1176 (75.7)</td>
</tr>
<tr>
<td><strong>Primary drug of abuse or gambling</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol</td>
<td>1759 (53.0)</td>
<td>980 (55.6)</td>
<td>779 (50.2)</td>
</tr>
<tr>
<td>Opiates</td>
<td>202 (6.1)</td>
<td>102 (5.8)</td>
<td>100 (6.4)</td>
</tr>
<tr>
<td>Cocaine (incl crack)</td>
<td>564 (17.0)</td>
<td>285 (16.1)</td>
<td>279 (18.0)</td>
</tr>
<tr>
<td>Cannabis</td>
<td>328 (9.9)</td>
<td>173 (9.8)</td>
<td>155 (10.0)</td>
</tr>
<tr>
<td>Gambling</td>
<td>208 (6.3)</td>
<td>98 (5.6)</td>
<td>110 (7.1)</td>
</tr>
<tr>
<td>Other</td>
<td>145 (4.4)</td>
<td>101 (5.7)</td>
<td>44 (2.8)</td>
</tr>
<tr>
<td><strong>Secondary drug of abuse or gambling</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No problem</td>
<td>1837 (55.4)</td>
<td>1010 (57.2)</td>
<td>827 (53.3)</td>
</tr>
<tr>
<td>Alcohol</td>
<td>219 (6.6)</td>
<td>114 (6.5)</td>
<td>105 (6.8)</td>
</tr>
<tr>
<td>Opiates</td>
<td>97 (2.9)</td>
<td>46 (2.6)</td>
<td>51 (3.3)</td>
</tr>
<tr>
<td>Cocaine</td>
<td>282 (8.4)</td>
<td>153 (8.7)</td>
<td>129 (8.3)</td>
</tr>
<tr>
<td>Cannabis</td>
<td>264 (8.0)</td>
<td>133 (7.5)</td>
<td>131 (8.4)</td>
</tr>
<tr>
<td>Gambling</td>
<td>28 (.8)</td>
<td>10 (.6)</td>
<td>18 (.12)</td>
</tr>
<tr>
<td>Else</td>
<td>236 (7.1)</td>
<td>115 (6.5)</td>
<td>121 (7.8)</td>
</tr>
<tr>
<td>Other</td>
<td>252 (7.6)</td>
<td>138 (7.8)</td>
<td>114 (7.3)</td>
</tr>
<tr>
<td><strong>Source of income</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employment</td>
<td>1606 (48.4)</td>
<td>906 (51.3)</td>
<td>700 (45.1)</td>
</tr>
<tr>
<td>Unemployment</td>
<td>social security</td>
<td>public assistance</td>
<td></td>
</tr>
<tr>
<td>Pension</td>
<td>74 (2.2)</td>
<td>37 (2.1)</td>
<td>37 (2.4)</td>
</tr>
<tr>
<td>Other</td>
<td>557 (16.8)</td>
<td>271 (15.3)</td>
<td>286 (18.4)</td>
</tr>
<tr>
<td><strong>Martial status</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>656 (19.8)</td>
<td>388 (22.0)</td>
<td>268 (17.3)</td>
</tr>
<tr>
<td>Never married</td>
<td>1910 (57.6)</td>
<td>990 (56.1)</td>
<td>920 (59.2)</td>
</tr>
<tr>
<td>Divorced</td>
<td>seperated</td>
<td>widowed</td>
<td></td>
</tr>
<tr>
<td>Not known</td>
<td>202 (6.1)</td>
<td>105 (5.9)</td>
<td>97 (6.2)</td>
</tr>
<tr>
<td><strong>Nationality</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dutch</td>
<td>2517 (75.9)</td>
<td>1334 (75.6)</td>
<td>1183 (76.2)</td>
</tr>
<tr>
<td>Surninam</td>
<td>Dutch Antilles</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mediterranean outside EU</td>
<td>181 (5.5)</td>
<td>84 (4.8)</td>
<td>97 (6.2)</td>
</tr>
</tbody>
</table>

*Subgroup 1: patients who were assessed with the EuropASI at the start of a new treatment episode*

*Subgroup 2: patients with information on level of care recommended by the algorithm and actual level of care entered*

*Subgroup 3: patients with inadequate information on level of care recommended by the algorithm or actual level of care entered*
guided by the same manual. Assessments were performed following admission to the centre with the European version of the ASI 5th edition (Kokkevi & Hartgers, 1995). The EuropASI is a semi-structured interview that provides information on substance and substance-related problems in different areas: medical; employment/education; alcohol; drugs; legal; family/social support; psychiatric; and gambling. Items in each area are used to generate interviewer severity ratings, which provide an assessment of the overall problem severity in each area.

The guidelines instruct intake counsellors to rate each patient on treatment allocation indicators (see next paragraph). The recommended LOC is derived from an algorithm combining the scores on the treatment allocation indicators. If intake counsellor disagrees with the algorithm-suggested LOC, he can refer the patient to a LOC which is considered to be more appropriate. He should then provide an alternative LOC and an explicit written justification for this deviation.

Matching

In the applied algorithm, matching is based on four patient characteristics (treatment allocation indicators): treatment history, addiction severity, psychiatric impairment, and social stability. Treatment history is used for applying the stepped care concept and is based on previous treatment episodes. The source of information for this characteristics is the patient (retrospective self-report). A treatment episode is defined as a professionally guided attempt by the patient to change his or her addictive behaviour. In order to be considered as a treatment episode, the patient should have participated in at least one session of an outpatient LOC or one day in an intensive outpatient and inpatient LOC. Treatment completion is not required. The number of previous addiction treatments is categorized as 0–1, 2, 3–5 and more than 5.

EuropASI interviewer severity rating (ISR) on five areas were used as proxies for the three other treatment allocation indicators. Alcohol, drug and gambling ISRs were used to assess addiction severity. Psychiatric ISR was used to assess
psychiatric impairment. Both treatment allocation indicators were classified into low, moderate or severe. ISRs of employment/economic and family/social support were used to assess the extent of social stability. This indicator was classified as good, moderate or bad. The algorithm was outlined in an easy-to-score decision tree (see Fig. 2), readily accessible to all intake counsellors. The outcome is a LOC recommended by the algorithm.

**Training and monitoring**

Since its introduction in 2000, all intake counsellors have been regularly trained in administering the assessment procedure, including the EuropASI, and the matching and allocation protocol with monthly supervision and a yearly booster training. Implementation of manual-based matching and treatment allocation was completed in both SATCs in 2002.

**Defining matched and mismatched patients**

Data on the actual provided LOCs were taken from the health care utilization
records of the SATCs. Patients were defined as being matched when the actual LOC entered was concordant with the recommended LOC by the algorithm. Patients were defined as mismatched when the actual LOC entered was discordant with the recommended LOC, based on the algorithm. A further distinction was made between strict and broadly-matched patients. Full adherence to the outcome of the algorithm is seen as being strictly matched. Broadly matched means that the actual LOC is discordant with the algorithm but concordant with an alternative recommended LOC and a written justification for deviation from the algorithm.

Reasons for deviation were categorized into patient characteristics and organization characteristics. Patient characteristics contained the categories addiction severity, psychiatric impairment, social stability, motivation, patient preference, and other (e.g. level of intelligence). Organization characteristics were classified into waiting list and mandated treatment by external organizations. Reasons for deviation were categorized by two researchers. Inter-rater reliability was found to be substantial (Cohen’s Kappa = .8) (Landis & Koch, 1977). If the actual LOC entered was more intensive than the LOC recommended, the patient was classified as being overtreated. If the actual LOC entered was less intensive than the LOC recommended LOC, the patient was classified as being undertreated.

RESULTS

Data collection during intake procedure

First, we evaluated whether systematic data collection of patient characteristics and patient-treatment matching decisions to LOCs was feasible in routine practice. Such data were a prerequisite for applying an algorithm in patient-treatment matching decisions. Sufficient information needed to calculate the recommended LOCs according to the algorithm could be retrieved in 2,269 (51.6%) of the 4,394 patients assessed by intake counsellors. Absence of EuropASI data (n = 160), incomplete EuropASI data (n = 584) or loss of information due to linking problems between separate databases (n = 332)
was responsible for a loss of 24.5% of eligible patients (1,076 out of 4,394). Treatment history was not registered in 1,149 of the 4,934 cases.

**Matching**

Secondly, we evaluated whether patient allocations were concordant with the algorithm and what the reasons were for deviating from the algorithm. Sufficient information needed to calculate the recommended LOC according to the algorithm could be retrieved in 2,269 patients (previous paragraph). Due to missing data with regard to actual LOCs entered (n = 174) or no treatment engagement at all (n = 330), matching could only be evaluated in 1,765 patients (40.2% of the total cohort). This group, however, did not differ on any relevant demographic characteristic than those for whom essential data were missing (n = 1,553). Recommended LOCs by the algorithm (strict definition of matched) and actual LOCs entered of these patients are cross-tabulated in table 2.

The concordance with the strict criterion for matching (on the diagonal) is 48.4% (854 out of 1,765). There seems to be an association between matched/mismatched and LOC ($X^2 = 656.48, p < .001$). Standardized residuals show that this relation is mainly due to a significant higher percentage matched to level 2 (std. residual = 2) as compared to other levels.

Among the mismatched patients, the LOC recommended by the algorithm is in almost all cases less intensive than the actual LOC entered: 46.5% (820 of 1,765) entered a more intensive LOC than recommended by the algorithm (over treated), whereas only 5.2% (91 of 1,765) entered at a less intensive LOC (under treated). LOC-2 shows the highest percentage matched: 304 of 559 (54.4%). For the other levels, the concordance between the actual LOC entered and the LOC recommended ranges from 44.2% (LOC-3) to 47.8% (LOC-4). Among the mismatched, more than 50% entered the outpatient LOC (463 of the 911 mismatched cases).

Written information regarding an alternative LOC, well-founded with a written justification by the intake counsellor was available in 479 of the 911
strictly mismatched patients. Of these 479 patients, 219 of the alternative recommendations were congruent with the actual LOC entered (broadly matched). As can be derived from table 3, the concordance with the broad criterion for matching (on the diagonal) is 60.8% (1,073 out of 1,765). Thirty-five percent (n = 618) entered a more intensive LOC (overtreated) than recommended by the algorithm and only 4.2% entered a less intensive LOC (undertreated). Considering the broad definition of matched, there is also an association between matched/mismatched and LOC ($X^2 = 45.89, p < .001$). Standardized residuals show that in this case, the relation is due to all LOCs except level 3 (std. residual = .8). The percentage matched according to the broad criterion ranges from 53.7% (LOC-1) to 83.1% (LOC-4).

Table 2 | Stepped care recommended level of care by actual level of care strict definition

<table>
<thead>
<tr>
<th>Actual LOC entered</th>
<th>Short outpatient (1)</th>
<th>Outpatient (2)</th>
<th>Intensive outpatient/Inpatient (3)</th>
<th>Care (4)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short outpatient (1)</td>
<td><strong>486 (27.5)</strong>*</td>
<td>38 (2.2)</td>
<td>6 (0.3)</td>
<td></td>
<td>530 (30.0)</td>
</tr>
<tr>
<td>Outpatient (2)</td>
<td>425 (24.1)</td>
<td><strong>304 (17.2)</strong>*</td>
<td>35 (2.0)</td>
<td>3 (.2)</td>
<td>767 (43.5)</td>
</tr>
<tr>
<td>Intensive outpatient/Inpatient (3)</td>
<td>69 (3.9)</td>
<td>139 (7.9)</td>
<td><strong>53 (3.0)</strong>*</td>
<td>9 (.5)</td>
<td>270 (15.3)</td>
</tr>
<tr>
<td>Care (4)</td>
<td>83 (4.7)</td>
<td>78 (4.4)</td>
<td>26 (1.5)</td>
<td><strong>11 (0.6)</strong>*</td>
<td>198 (11.2)</td>
</tr>
<tr>
<td>Total</td>
<td>1063 (60.2)</td>
<td>559 (31.7)</td>
<td>120 (6.8)</td>
<td>23 (1.3)</td>
<td>1765 (100.0)</td>
</tr>
</tbody>
</table>

* cases matched in LOC

Table 3 | Stepped care / clinician recommended level of care by actual level of care broad definition

<table>
<thead>
<tr>
<th>Actual LOC entered</th>
<th>Short outpatient (1)</th>
<th>Outpatient (2)</th>
<th>Intensive outpatient/Inpatient (3)</th>
<th>Care (4)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short outpatient (1)</td>
<td><strong>492 (27.9)</strong>*</td>
<td>32 (1.8)</td>
<td>6 (0.3)</td>
<td></td>
<td>530 (30.0)</td>
</tr>
<tr>
<td>Outpatient (2)</td>
<td>309 (17.5)</td>
<td><strong>429 (24.3)</strong>*</td>
<td>26 (1.5)</td>
<td>3 (.2)</td>
<td>767 (43.5)</td>
</tr>
<tr>
<td>Intensive outpatient/Inpatient (3)</td>
<td>49 (2.8)</td>
<td>111 (6.3)</td>
<td><strong>103 (5.8)</strong>*</td>
<td>7 (0.4)</td>
<td>270 (15.3)</td>
</tr>
<tr>
<td>Care (4)</td>
<td>66 (3.7)</td>
<td>62 (3.5)</td>
<td>21 (1.2)</td>
<td><strong>49 (2.8)</strong>*</td>
<td>198 (11.2)</td>
</tr>
<tr>
<td>Total</td>
<td>912 (51.7)</td>
<td>634(35.9)</td>
<td>156 (8.8)</td>
<td>59 (3.3)</td>
<td>1765 (100.0)</td>
</tr>
</tbody>
</table>

* cases matched on LOC
Reasons for deviation

In 219 cases, the alternative recommendations were congruent with the actual LOC entered (broadly matched). Whereas 92.2% had only one reason for deviation, 7.8% of the patients had two reasons for deviation.

The most frequent reason for deviating from the algorithm (53%) was a difference in appraisal made by the intake counsellor of addiction severity based on the presence of opiates as primary substance use, poly-drug abuse, length of addiction career or frequency of non-professionally guided attempts to maintain abstinence. When a difference in appraisal of addiction severity was presented, the actual LOC entered was in almost all cases (114 out of 116) more intense than the LOC recommended by the algorithm.

The second most frequent reason for deviation from the algorithm (14%) was a difference in appraisal made by intake counsellor of psychiatric impairment compared with the guidelines. The presumption of the co-occurring presence co-morbid psychiatric disorders (e.g. Attention Deficit Hyperactive Disorder or Post Traumatic Stress Disorder) were reasons to deviate. These arguments for deviation resulted in 29 out of 31 patients entering a more intense LOC compared to the recommended LOC.

The third most frequent reason for deviating (13.2%) is patient preference. In almost all the cases (29 out of 31), the preferred LOC (outpatient treatment) was more intense than the recommended LOC (brief outpatient treatment).

The fourth most frequent reason for explicit deviation (11%) is a discrepancy in the appraisal of social stability between intake counsellor and the guidelines. Marital problems, (un)employment, homelessness or (no) social support for changing addictive behaviour were observed as arguments for deviating from the algorithm. These arguments for deviation resulted in 20 out of 23 patients entering a more intense LOC compared to the recommended LOC.

Motivation was given as the main reason for explicit deviation in 4% of the broadly matched patients. The arguments about motivation were mainly related to doubts of intake counsellor about motivation for treatment or doubts about
motivation for change. Finally, organizational characteristics were mentioned as reason for explicit deviation in 6% of the cases, e.g. waiting list or mandated LOC by external organizations.

**COMMENTS**

**Discussion**

Data collection in routine practice of SATCs was incomplete. Complete data were present in only half of the files. Disappointingly, neither the availability of electronic patient files, nor intensive training in the assessment procedure were sufficient in solving this problem.

To improve data collection in routine practice, processes should be efficient, time limited and computerized. Data should be stored in no more than one database to prevent loss of information (Brown, Top, & Ross, 2003). Electronic patient files could be designed so that completing essential data is compulsory. To stimulate the discipline needed for accountability and transparency, clinicians may need more education, training and supervision than they originally received.

Concerning the adherence to the guidelines for treatment allocation, only 60% of the patients with complete intake information were allocated to a LOC in a transparent and accountable way. Of these, most were based on the algorithm and some were based on well founded and explicitly described deviations from this algorithm. Others were allocated to LOCs discordant with the algorithm and without clarification. This is unfortunate, as it makes it impossible to decide whether and how the algorithm should be adapted. A computerized decision support system may be helpful to diminish the mismatched cases.

The majority of the mismatched patients according to the algorithm were allocated to a more intensive LOC than was recommended by the algorithm. It seems that the counsellors often find the algorithm too lenient, and that they evaluated the patients as requiring more intensive treatment. Of the 198 patients entering LOC-4, only 11 were recommended to this level by the
algorithm, and only 49 when the broader definition of recommendation was employed. The majority of this group should have been referred to an outpatient treatment with a limitation in sessions and a restricted time-frame which focuses on abstinence or a significant reduction in substance use. In contrast, LOC-4 is not limited in the number of sessions or time frame and its focus is harm reduction. Of the total group for which we could evaluate the matching and referral procedure (n = 1,765), 5.8% reported opiates as primary drug of abuse (n = 102). On the contrary, more than 50% (n = 58) of this group entered LOC-4. Apparently, intake counsellors regard LOC-4 as being more suitable for opiate users. Unfortunately, we do not know if the aspect of harm reduction or no restriction in number of sessions or time frame was the reason to deviate.

Whether this finding should lead to changes in the algorithm can only be decided based on the effects of matched and mismatched treatments. An interesting question in this respect is whether overtreatment will result in better outcomes than matched LOCs. Follow-up assessment may provide some of the answers.

Counsellors gave different arguments for deviation from the algorithm. Not all reasons fitted in a stepped care concept of matching and referral, e.g. patient preference (Adamson, Sellman, & Dore, 2005). A difference in the appraisal of the key indicator “addiction severity” was accountable for the deviation from the algorithm in more than half of the cases. Intake counsellors often found this score too low and not corresponding with the severity they perceived. This opinion is supported by the formulation of the patient placement criteria of the American Society Addiction Medicine (ASAM PPC) (Mee-Lee, Shulman, Fishman, Gastfriend, & Griffith, 2001) in which addiction severity is related to three different factors: (a) acute intoxication and/or withdrawal potential; (b) biomedical conditions and complications; (c) continued use or continued problem potential. Perhaps differentiation of addiction severity into further factors would prove fruitful.

Differences in the appraisal of psychiatric impairment, social stability, patient preference, or the motivation for treatment were infrequent reasons for deviating from the algorithm. In particular, the relatively small number of deviations due
to a clinically perceived lack of motivation or a non matching preference of the patient is striking. Several authors advocate that these elements play a role in patient placement decisions. However, it cannot be excluded that patient preference reasons were used implicitly by intake counsellors to deviate from the algorithm but that they did not report this.

In general, it is questionable whether the EuropASI is the most adequate instrument for decision making concerning patient-treatment matching. There are several reservations in regard to the reliability and validity of the interviewer severity ratings, and there is also some reluctance to use the instrument more broadly in clinical practice (Broekman, Schippers, Koeter, & van den Brink, 2004).

**Conclusion**

Allocating patients with substance use disorders to the appropriate LOCs using guidelines for assessment and placement process is feasible in routine practice. Guidelines for systematic data collection on patient characteristics during the intake procedure in SATCs are difficult to implement. Essential information, needed for patient-treatment matching, is not being completed out at a sufficient level.

In those cases where the essential intake information is available, the allocations are according to the guidelines for the majority of the patients, but not for all; a substantial part of the allocations deviates. This may have been caused by low clinical acceptance of the content of the patient-treatment matching algorithm. Our research shows that clinicians allocate patients to more intensive LOCs compared to the allocations derived from the algorithm. Despite the practical shortcomings in the feasibility, further research, using follow-up assessment might provide answers on effectiveness of the guidelines for patient-treatment matching.
PART 2: Research questions

Chapter 3 | Guidelines For Allocating Outpatient Alcohol Abusers To Levels Of Care: Predictive Validity.

ABSTRACT

Aim: To study the predictive validity of a priori treatment allocation guidelines on treatment outcome for outpatients with substance abuse or gambling problems in routine clinical practice. Hypotheses were: patients matched at the recommended level of care (LOC) have (1) better outcomes than patients treated at a less intensive LOC, and (2) equal outcomes compared to patients treated at a more intensive LOC.

Design: Multi-centre observational prospective study comparing treatment outcomes between patients treated at the recommended LOC and patients not treated according to allocation guidelines.

Setting: Two Dutch Substance Abuse Treatment Centres.

Participants: 427 patients who completed intake, started brief or standard outpatient treatment, and were successfully followed up (48%).

Measurements: Addiction severity, psychiatric impairment, and level of social stability at baseline necessary to allocate patients to a LOC according to the guidelines. Outcome was measured in terms of self-reported alcohol use 30 days prior to assessment.

Findings: 30% of the patients was matched to a LOC according to the guidelines. The percentage non-response was comparable in all three conditions. Patients allocated to the recommended LOC did not show better outcomes than patients treated at a less intensive LOC, and had equal outcomes compared to patients treated at a more intensive LOC.

Conclusion: The a priori allocation guidelines were followed in a minority of the patients and did not increase the overall effectiveness of treatment. The predictive validity of the guidelines is partially confirmed. Further discussions are needed regarding the content of the treatment allocation guidelines.
INTRODUCTION

Substance abuse treatment services in the Netherlands are well organized in eleven larger regional centres, giving free access to people with alcohol, drugs, gambling, or poly-substance abuse problems. During the past decade, most centres have redesigned their treatment programmes according to a national reform programme, in which managers, scientists, and clinicians cooperate under an initiative of the Ministry of Health (Schippers, Schramade, & Walburg, 2002). The goals of this reform programme were to (a) develop evidence based prevention and treatment interventions, (b) build a system for feeding back results to stakeholders, and (c) improve education and training for professionals working in the addiction treatment. An important goal of the redesign programme was to standardize patient-treatment allocation in order to obtain optimal patient-treatment matching. Patient-treatment matching may include matching patients to treatment modalities (e.g., motivational enhancement therapy or social skills training); treatment services (e.g., with or without vocational training or treatment for anxiety); or intensity of treatment (e.g., outpatient vs inpatient).

There is evidence that matching effects do not occur when attempts are made to match patients to treatment modalities, on the basis of treatment content (e.g., Project Match Research Group, 1997). There is, however, some evidence that patients can be matched to appropriate services. Those patients who have received the appropriate services for a particular problem, compared to those who have not received these services, show greater improvement in functioning in the targeted problem areas. The two groups of patients, however, did not differ on alcohol specific outcome (e.g., McLellan et al., 1997).

Allocation of patients to treatment intensity is more promising. Several patient characteristics have been shown to be important in this process, namely, addiction severity, degree of psychiatric impairment, and social stability. Patients with greater alcohol abuse problems benefit more from intensive treatment (Orford, Oppenheimer, Egert, Hensman, & Guthrie, 1976; Rychtarik et al., 2000; McKay et al., 2002). Other studies have shown that patients with co-
Morbid psychiatric disorders have better alcohol use outcomes in high intensity alcohol-related treatment programmes (Alterman, McLellan, & Shifman, 1993; Timko & Moos, 2002). With respect to social stability, unstable patients (those unemployed, with unstable housing, with strong social support for drinking) generally seem to have better outcomes in more intensive treatment (Kissin, Platz, & Su, 1970; McLellan, Woody, Luborsky, O'Brien, & Druley, 1983; Rychtarik et al., 2000).

When matching patients to different treatment intensities (level of care [LOC]) can be justified, the challenge is how to match them to the appropriate LOCs in routine practice (Finney, Hahn, & Moos, 1996). An important strategy for matching patients to an appropriate LOC is the use of allocation guidelines. One example is the Patient Placement Criteria of the American Society of Addiction Medicine (ASAM PPC) (Mee-Lee, Shulman, Fishman, Gastfriend, & Griffith, 2001), which aims to standardize the process of allocating patients to the appropriate LOC. However, for alcohol dependent patients, the predictive validity of these guidelines for treatment outcome was rather limited (McKay, Cacciola, McLellan, Alterman, & Wirtz, 1997; Magura et al., 2003). Another drawback is that all these studies have been conducted retrospectively, using a passive matching design.

Given the relative lack of empirically-based allocation guidelines, adopting a pragmatic approach for allocating alcohol abusing patients to the appropriate LOC seems justified. Thus, using a stepped care approach (Sobell & Sobell, 2000), we compiled allocation guidelines that can be used in routine practice. This approach states that the initial intervention of choice is consistent with empirical evidence, is the least intrusive, is likely to be effective, and is available in terms of treatment resources (Wilson, Vitousek, & Loeb, 2000).

We have demonstrated that an allocation protocol based on this approach was feasible to use in routine practice in some Dutch substance-abuse treatment centres (Merkx et al., 2007). In these centres, more than half of the patients are abusing alcohol and the majority of them are being treated in one of two outpatient services that differ in the number of intended treatment sessions.
The current study examined the predictive validity of allocation guidelines for matching patients to LOC by following alcohol patients who were allocated to these two outpatient LOCs. Patient-treatment matching variables included treatment history (critical to know in a stepped care approach), addiction severity, psychiatric impairment, and social stability. The following hypotheses were tested: (a) patients treated at the recommended LOC would have better outcomes than those receiving less intensive treatments (i.e., mismatched to a less intensive LOC), and (b) patients treated at the recommended LOC would have comparable outcomes compared to those mismatched to a more intensive LOC.

**MATERIALS AND METHOD**

**Sample**

Eligible participants included all patients with an alcohol use disorder who were allocated to either brief or standard outpatient treatment in 2003 and who had valid baseline and follow-up data. In 2003, 1,395 patients were admitted to one of the two substance abuse treatment centres (SATCs). Patients were excluded if (a) they did not give informed consent to be contacted for follow-up ($n = 16$) or (b) the pre-treatment assessment (which included administration of the European version of the 5th Edition of the Addiction Severity Index [EuropASI]) (Kokevi & Hartgers, 1995), did not yield valid baseline data ($n = 465$). Data were lost because of technical problems related to data storage ($n = 231$) or inadequate recording of patient characteristics during the intake ($n = 195$). Of the remaining 953 patients, 63 were allocated to an inpatient LOC, and 890 were allocated to an outpatient LOC. At follow-up, 471 patients (52.9%) were contacted, 44 of whom were still in treatment. The analyses reported here include the remaining 427 patients (48%) (see Fig. 1).
**Setting**

Routine treatment in two SATCs in the Netherlands was observed, one of which served a city with approximately one million inhabitants, and the other served a suburban area with approximately 1.5 million inhabitants.

**Procedures**

*Matching and allocating patients to treatments*

The two SATCs used identical, manual-guided procedures, including matching and allocation that was routinely used with all new patients. A pre-treatment assessment was conducted using the European version of the 5th Edition of...
the EuropASI (Kokkevi & Hartgers, 1995). The EuropASI is a semi-structured interview that obtains information about the person’s substance use and substance-related problems in these different areas: medical, employment/education, alcohol, drugs, legal, family/social support, psychiatric, and gambling.

The guidelines instruct the intake interviewers to rate each patient on four treatment allocation indicators: (a) treatment history, (b) addiction severity, (c) psychiatric impairment, and (d) level of social stability. Treatment history, which is based on previous treatment episodes, is a critical aspect of stepped care procedures. Interviewer severity ratings (ISRs) from the EuropASI were used as proxies for the other three allocation indicators. Newly admitted patients and patients who had not been treated more than once during the previous five years were referred to brief outpatient LOC, except when addiction severity or psychiatric impairment was severe. Patients who had been treated at least twice during the previous five years were allocated to standard outpatient LOC. For patients to be allocated to either LOC, their social stability had to be rated as moderate to good. Patients who were socially unstable were allocated to inpatient treatment. Detailed information about these allocation guidelines are reported elsewhere (Merkx et al., 2007).

**LOC guideline recommendations**

The study was restricted to two LOCs: Brief outpatient treatment and standard outpatient treatment. The core interventions at these levels were manual-based and were identical at the two SATCs. The manual for each treatment prescribed the content of each therapy session and the techniques to be used in it. Both interventions included modules with demonstrated effectiveness, including motivational enhancement strategies (Miller, Zweben, DiClemente, & Rychtarik, 1992), self-control training (Kadden et al., 1992), and relapse prevention techniques (Marlatt & Gordon, 1985). To assist patients in changing their addictive behaviour, self-help booklets that included take-home exercises for practicing skills were included in both treatments.
LOC-1: Brief outpatient treatment

Brief outpatient treatment (LOC-1) focuses on enhancing patients’ motivation for change, using the principles and techniques of motivational interviewing (Miller & Rollnick, 2002). In addition, alcohol refusal skills and alternative behaviours for coping with craving are trained. The intervention comprises 4-6 sessions conducted either individually or in a group over a period of approximately three months.

LOC-2: Standard outpatient treatment

Like LOC-1, standard outpatient treatment (LOC-2) focuses on enhancing patients’ motivation for change, but it also uses behavioural techniques for preventing relapse that are based on functional analysis of high-risk situations (Monti, Abrams, Kadden, & Cooney, 1989). It helps patients analyze the antecedents and consequences of their drinking episodes, particularly in terms of their emotions and cognitions. It also helps patients to develop a repertoire of alternative coping skills to reduce the risk of excessive drinking in the future. The intervention comprises 10-12 sessions, each conducted either individually or in a group over a period of approximately six months. Depending on the patient’s needs, additional treatment might be offered, such as treatment for anxiety disorders or social skills training.

Follow-up

Since 2003, both of the SATCs have routinely tried to reach all patients for post-treatment follow-up interviews conducted over the telephone by specially trained, independent, master’s-level students in psychology. The interviews occur 9-12 months after the EuropASI was administered, or 3-6 months post-treatment.

Patients still in treatment at the follow-up were not included in the current study because they were at a lower risk for relapse to excessive alcohol use. The follow-up interview lasted 30–40 min. and focused primarily on the patient’s alcohol use during the preceding 30 days (Oudejans et al., 2009).
Electronic Patient File and Service Utilization Records

Existing administrative patient files and databases were used to extract patient and treatment information like patients’ demographic characteristics, EuropASI interviewer severity ratings, and service utilization information, such as type and amount of services received during the treatment episode.

Therapists

The intake interviewers, as well as the therapists delivering the treatments at the two LOCs, were psychologists, social workers, or psychiatric nurses (BA- or MA-level). Implementation of the three manuals, used in both SACTs, was completed in 2001; since then, all intake interviewers, and therapists have been trained to deliver these manual-guided interventions.

OUTCOME

Treatment outcome

We defined treatment outcome as a trichotomous categorical variable (abstinent, controlled drinker, or nonresponder) and as a dimensional variable (the difference between the number of non-excessive and excessive drinking days during the preceding 30 days, which was calculated at baseline and follow-up). The primary treatment outcome measure was self-reported alcohol use in the 30 days before follow-up. Three outcome categories were used: (1) currently completely abstinent, (2) current controlled drinker, and (3) currently drinking excessively (i.e., a nonresponder to treatment). Currently abstinent was defined as having abstained from alcohol during the last 30 days. We defined current controlled drinker as drinking a maximum of four standard drinks per day at a maximum frequency of six days during the last 30 days, but including a maximum of two days during the last 30 days when five or more drinks were consumed. Patients were classified as nonresponders if they did not meet the criteria for complete abstinence or controlled drinking.

The secondary treatment outcome measure was the change in the number of
non-excessive and excessive drinking days between the period of 30 days prior to intake and the period of 30 days prior to follow-up. Non-excessive alcohol use was defined as drinking a maximum of four standard drinks per drinking day; excessive alcohol use was defined as drinking five or more drinks per drinking day. In European countries, a standard drink of alcohol (called a unit of alcohol) contains 10 grams of pure alcohol. This is smaller than the American standard drink, which contains 14 grams of pure alcohol.

**Actual treatment exposure**

Matching was defined as concordance between the recommended LOC based on the guidelines and the actual treatment exposure (ATE; actual number of treatment sessions attended). The service utilization records at both SATCs were used to assess ATE at intake and follow-up.

ATE was categorized as *undertreated, matched, or overtreated*. Undertreated was arbitrarily defined as attending fewer than 75% of the number of treatment sessions recommended according to the LOC. *Matched* was defined as attending 75-110% of the recommended sessions according to the LOC. Finally, ATE was defined as *overtreated* if the patient attended more than 110% of the treatment sessions recommended according to the LOC. See Table 1.

| Algorithm recommended level of care | LOC 1  
| Format | (n = 294) | LOC 2  
| Format | (n = 133) |
|-------|-----------|-------|-----------|
| **Actual treatment exposure** | | | |
| Undertreated | 0 – 2  
| (n = 109 ) | 0 – 4  
| (n = 79 ) | n = 188 |
| Matched | 3 – 5  
| (n = 67 ) | 5 – 7  
| (n = 25) | 8 – 14  
| n = 92 |
| Overtreated | > 5  
| (n= 118 ) | > 7  
| (n= 29) | > 14  
| n = 147 |
| | | | }
**Statistical analysis**

Differences in baseline characteristics between patients allocated according to the guidelines to LOC-1 and LOC-2 and those between patients with and without follow-up data were assessed using t-tests or χ²-tests. In cases of skewed data, the Mann-Whitney U-test was used.

To assess whether matched patients had better outcomes than undertreated patients and outcomes equivalent to overtreated patients, we assessed the relationship between ATE and categorical treatment outcome using polytomous logistic regression analysis with the categorical outcome measure as the dependent variable. We assessed the relationship between ATE and dimensional treatment outcome using linear regression analysis with changes in the number of days on which alcohol had been used nonexcessively vs. excessively as the dependent variable. In both analyses, ATE was the predictor variable. SPSS for Windows (Version 18) was used for all of the analyses.

**RESULTS**

**Patients’ baseline characteristics by LOC**

The mean age of the entire sample was 45.03 years (sd ± 11.7); 71.0% of them were male; 74.1% were currently single; and 80.8% were Dutch. One-fifth (21.5%) of the sample reported that they regularly used another substance besides alcohol or they engaged in gambling behaviour. The other substances most frequently used were cannabis (by 8.7% and 5.9% of the LOC-1 and LOC-2 samples, respectively; see Table 2). In the 30 days prior to the baseline assessment, patients drank alcohol on a mean of 2.42 (sd ± 5.92) days in a non-excessive manner (maximum of four standard drinks per day) and on a mean of 15.42 (sd ± 11.97) days in an excessive manner (five or more standard drinks per day).

Patients allocated to LOC-1 or to LOC-2 did not differ in age, gender, or nationality. Patients allocated to LOC-2 were more often reported using a secondary drug (45.8% vs. 18.8%, p < .001), and LOC-1 and LOC-2 patients
differed significantly in their excessive alcohol use. In the 30 days prior to intake, patients allocated to LOC-1 and LOC-2 drank excessive amounts of alcohol on an average of 14 days and 18 days, respectively ($F_{(1)} = 6.59, p > .001$).

As expected, patients allocated to LOC-2 had significantly more treatment episodes prior to their inclusion in the study than patients allocated to LOC-1. A greater proportion of LOC-2 patients also had EuropASI ISRs higher than 4 on problems related to alcohol, drugs, psychiatric impairment, and family/social functioning (indicating moderate problems and in need of some treatment). Finally, fewer patients allocated to LOC-2 were employed than those allocated to LOC-1 (42.8% vs. 57.5%, respectively, $p < .001$), and fewer of them were married (48.3% vs. 57.2%, respectively, $p = .012$).

**Response to follow-up**

We contacted 471 (52.9%) of the patients at follow-up, 44 of whom were still in treatment. The mean time between the intake interview and the telephone follow-up interview was 339 days ($sd \pm 53.5$). Follow-up rates were significantly different for patients allocated according to the algorithm to LOC-1 and those allocated to LOC-2. More LOC-1 than LOC-2 patients were interviewed at follow-up (55.9% vs. 47.5%; $\chi^2_{(1)} = 5.87, p = .02$). In addition, compared to patients who were not interviewed at the follow-up, those who were interviewed were somewhat older (45.00 vs. 42.32 years, $t_{(888)} = -3.63; p < .001$), less frequently reported using or abusing a secondary drug or having a gambling problem (42.3% vs. 57.7%, $\chi^2_{(1)} = 20.79; p < .001$), and at intake more often reported having drunk excessively (17.43 vs.15.75 days, respectively, $F_{(1, 824)} = 4.31; p = .04$). No other significant differences were found.

**Actual treatment exposure (ATE)**

Of the 427 patients assessed at follow-up, almost half (44.0%) of them had been undertreated; one-fifth (21.5%) had been matched according to the guidelines; and one-third (34.4%) had been overtreated (see Table 3).
### Table 2 | Baseline characteristics and differences by LOC

<table>
<thead>
<tr>
<th>Study sample (n=427)</th>
<th>LOC 1 (n=294)</th>
<th>LOC 2 (n=133)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean ± sd</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Age (yrs)</strong></td>
<td>45.03 ± 11.27</td>
<td>45.22 ± 11.64</td>
<td>.18</td>
</tr>
<tr>
<td>% (n) of patients</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Gender (males)</strong></td>
<td>71.0 (301)</td>
<td>71.4 (210)</td>
<td>.75</td>
</tr>
<tr>
<td><strong>Martial status</strong></td>
<td></td>
<td></td>
<td>.001</td>
</tr>
<tr>
<td>Married</td>
<td>25.9 (221)</td>
<td>30.0 (165)</td>
<td>18.5 (56)</td>
</tr>
<tr>
<td>Never married</td>
<td>54.2 (462)</td>
<td>50.5 (278)</td>
<td>60.7 (184)</td>
</tr>
<tr>
<td>Divorced</td>
<td>separated</td>
<td>widowed</td>
<td>19.9 (170)</td>
</tr>
<tr>
<td><strong>Nationality</strong></td>
<td></td>
<td></td>
<td>.49</td>
</tr>
<tr>
<td>Dutch</td>
<td>80.8 (719)</td>
<td>81.5 (466)</td>
<td>79.6 (253)</td>
</tr>
<tr>
<td>Other</td>
<td>19.2 (171)</td>
<td>18.5 (106)</td>
<td>19.2 (171)</td>
</tr>
<tr>
<td><strong>Secundairy drug of abuse or gambling (yes / no)</strong></td>
<td></td>
<td></td>
<td>.001</td>
</tr>
<tr>
<td>No problem</td>
<td>78.4 (305)</td>
<td>83.1 (217)</td>
<td>68.8 (88)</td>
</tr>
<tr>
<td>Cocaine</td>
<td>5.9 (23)</td>
<td>4.6 (12)</td>
<td>8.6 (11)</td>
</tr>
<tr>
<td>Cannabis</td>
<td>8.7 (34)</td>
<td>6.9 (18)</td>
<td>12.5 (16)</td>
</tr>
<tr>
<td>Other</td>
<td>6.9 (27)</td>
<td>5.4 (14)</td>
<td>10.2 (13)</td>
</tr>
<tr>
<td><strong>Alcohol use at intake</strong></td>
<td></td>
<td></td>
<td>.58</td>
</tr>
<tr>
<td>Non-excessive</td>
<td>2.42 ± 5.92</td>
<td>2.54 ± 6.00</td>
<td>2.18 ± 5.78</td>
</tr>
<tr>
<td>Excessive</td>
<td>15.42 ± 11.97</td>
<td>14.00 ± 11.68</td>
<td>18.57 ± 12.02</td>
</tr>
<tr>
<td><strong>Treatment History</strong></td>
<td></td>
<td></td>
<td>&lt;.001</td>
</tr>
<tr>
<td>0-1</td>
<td>93.0 (397)</td>
<td>100 (294)</td>
<td>77.4 (103)</td>
</tr>
<tr>
<td>2</td>
<td>7.0 (30)</td>
<td>0 (0)</td>
<td>22.6 (30)</td>
</tr>
<tr>
<td><strong>% EuropASI ISR &gt; 4</strong></td>
<td></td>
<td></td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Alcohol severity</td>
<td>71.5 (304)</td>
<td>63.3 (186)</td>
<td>90.1 (118)</td>
</tr>
<tr>
<td>Drugs severity</td>
<td>9.2 (39)</td>
<td>2.4 (7)</td>
<td>24.4 (32)</td>
</tr>
<tr>
<td>Psychiatric impairment</td>
<td>24.0 (101)</td>
<td>11.6 (34)</td>
<td>52.8 (67)</td>
</tr>
<tr>
<td>Vocational</td>
<td>education</td>
<td>9.4 (39)</td>
<td>8.7 (25)</td>
</tr>
<tr>
<td>Family</td>
<td>social</td>
<td>15.0 (64)</td>
<td>10.9 (32)</td>
</tr>
</tbody>
</table>

*numbers can be discrepant because of missing values
Table 3 | Actual treatment exposure by treatment outcome

<table>
<thead>
<tr>
<th>Treatment outcome</th>
<th>Undertreated</th>
<th>Matched</th>
<th>Overtreated</th>
<th>n = 127 (29.7%)</th>
<th>n = 64 (15.0%)</th>
<th>n = 239 (55.3%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstinence</td>
<td>59 (31.4%)</td>
<td>22 (23.9%)</td>
<td>46 (31.3%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Controlled substance use</td>
<td>26 (13.8%)</td>
<td>14 (15.2%)</td>
<td>24 (16.3%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harmful substance use</td>
<td>103 (54.8%)</td>
<td>56 (60.9%)</td>
<td>77 (52.4%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>188 (44.0%)</td>
<td>92 (21.5%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Treatment outcome**

Table 3 shows that at follow-up, 29.7% of the sample had been abstinent during the preceding 30 days; 15.0% of them were designated as controlled drinkers; and 55.3% were nonresponders to treatment. The patients who were classified as abstinent had reduced the frequency of their non-excessive drinking by one day (mean = -1.22 days, sd ± 4.21). The patients classified as controlled drinkers had not reduced the frequency of their non-excessive drinking (x̅ = 0.02, sd ± 5.42); the patients classified as nonresponders had increased the frequency of their non-excessive drinking by five days (x̅ = 5.43, sd ± 10.91).

The patients classified as abstinent had reduced the frequency of their excessive drinking by about 12 days (x̅ = -12.43, sd ± 11.99). The patients classified as controlled drinkers had reduced the frequency of their excessive drinking by almost 11 days (x̅ = -10.70, sd ± 11.08), and the nonresponders had done so by almost seven days (x̅ = -6.89, sd ± 14.16).

**Matching effects using categorical outcomes**

Using the categorical outcome variable in logistic regression analyses, we found no main effect for ATE on treatment outcome (likelihood-ratio test: χ²(4) = 2.50, p = .65). Compared to matched patients, undertreated patients were equally likely as nonresponders to be abstinent (OR = 1.46; 95% CI [0.81, 2.63]) and equally likely as nonresponders to be controlled drinkers (OR = 1.01; 95% CI [0.49, 2.09]). The overtreated patients had a similar pattern. Compared to
matched patients, overtreated patients were also equally likely as nonresponders to be controlled drinkers (OR = 1.52; 95% CI [0.82, 2.81]) and equally likely as nonresponders to be abstinent (OR = 1.25; 95% CI [0.59, 2.62]).

In a post hoc manner, we dichotomized the categorical treatment outcome variable into treatment responders (including abstinent and controlled drinkers) and treatment nonresponders. The effect of ATE on treatment outcome was not significant (likelihood-ratio test: $\chi^2(2) = 1.69, p = .43$), indicating the absence of a robust matching effect.

**Matching effects using dimensional outcomes**

We also assessed matching effects using the dimensional outcome variable (undertreated, matched, or overtreated) in linear regression analyses. The dependent variable was the change in the number of non-excessive and excessive drinking days between the period of 30 days prior to intake and the period of 30 days prior to follow-up. The predictor variable was ATE. We did not find a main effect for ATE when the change in the number of non-excessive drinking days was the dependent variable ($F_{(2,388)} = .89, p = .41$); neither did we find a main effect for ATE with difference in the number of excessive drinking days as the dependent variable ($F_{(2,388)} = .24, p = .79$).

**COMMENTS**

**Discussion**

How can the current findings be interpreted? If we assume that the treatments provided at the two LOCs are effective because the methods used are evidence based, there are several possible explanations for the present results. The first is that the diversity among the undertreated patients was great. Some of the undertreated patients were probably not in need of formal treatment because their alcohol problems were not severe enough. Accordingly, these patients may not have exposed themselves to the treatment. Not having a no treatment needed option might be a conceptual shortcoming of the algorithm, and we
would recommend adding this option. Other undertreated patients simply dropped out of treatment; therefore, they received less of it. These kinds of diversity could account for the fact that the undertreated group did not differ in treatment outcome from the matched and overtreated groups.

That overtreated and matched patients had comparable outcomes can be explained in one of two ways. The first possibility is that the algorithm for allocating patients to LOC is, in fact, correct, but patients received more treatment than needed because of the counselors’ biases. Overtreating did not lead to better outcomes and can be considered as a waste of resources. Another possibility is that overtreated patients actually were in need of more treatment than the algorithm suggested, and the counselors recognized this and overruled the guidelines. If these patients had been treated as the algorithm suggested, they might have had worse outcomes. One-third of the patients were overtreated, suggesting that counselors decided that these patients required more intensive treatment than the algorithm suggested. We recommend, therefore, that the number of recommended treatment sessions must be increased.

A fruitful next step would be to develop and test a new algorithm for allocating patients to outpatient LOCs, including a no treatment needed option and increasing the difference in intensity between the LOCs.

**Strengths and limitations**

Patient-treatment interactions, which are identified by using retrospective research designs, need to be replicated using prospective allocation procedures (Bühringer, 2006). Doing so would provide the critical test for being able to use research results in standard routine practice. A strength of the current study was its prospective design and its execution in routine practice. To our knowledge, this was the first study to use a prospective research design to evaluate the validity of allocating patients to different intensities of substance-abuse treatment that were already being used in routine practice.

The study did, however, have several limitations. The first was the low response
rate (52.9%). The subset of original participants on whose data the analyses were performed was even smaller (48%). This level of attrition might question the value of the findings. How, for example, can we be sure that the follow-up sample did not differ in important ways from the patients not included? First, the loss of data was partly caused by software and other technical problems and was unrelated to patients’ characteristics.

Second, although follow-up rates for patients allocated according to the algorithm to LOC-1 differed significantly from those allocated to LOC-2, and more patients who had been allocated to LOC-2 were not interviewed at the follow-up, the effect size for this difference was small (Cramer’s V = .081). The difference can be attributed to the sample size. The two groups, moreover, were equivalent on several important characteristics. For example, they were the same in (a) the distribution of actual treatment exposure according to LOC, and (b) the number of treatment episodes patients had had prior to their inclusion in the study. The two groups were also the same with respect to the proportion patients with EuropASI ISRs higher than 4 on alcohol problems, psychiatric impairment, and family/social dysfunction. Notwithstanding the fact that more severe patients were less well-represented at follow-up, in our view patients allocated to LOC-1 and LOC-2 were comparable in other respects and did not systematically differ in any important way.

Third, a self-report questionnaire was used to measure alcohol use at follow-up and was not verified by biochemical markers. In our view, however, using biochemical markers as outcome measures adds little value to self-reports. Although the specificity of biochemical markers is high, their sensitivity is questionable (Aegeerts, Buntinx, Ansoms, & Fevery, 2001), and they provide little additional information.

Fourth, although the counselors were trained to deliver the interventions and were supervised in doing so, they had little experience using manual-based MET and CBT. Finding no predictive validity for the allocation guidelines could have resulted from low fidelity of the practitioners to the treatment manuals. In the future, greater emphasis should be placed on training and supervision.
In short, we could find no differences between undertreated, matched, and overtreated patients in the severity of their alcohol use disorder that could explain why some patients were undertreated and others were overtreated. The present study leaves open the possibility that other unmeasured, pre-existing differences between the groups could account for the comparability of the undertreated, matched, and overtreated patients on the outcome measures.

**Conclusion**

Only one-fifth of the patients were exposed to the recommended LOC (i.e., were matched), whereas 44% of them were treated at a less intensive LOC than recommended (i.e., were undertreated), and 34% were treated at a more intensive LOC (i.e., were overtreated). Overall, 45% of the patients were responders to treatment, and almost one-third of them were abstinent at follow-up. Using neither a categorical outcome measure (abstinent, controlled drinker, no responder) nor a dimensional outcome measure (difference in number of days drinking alcohol no excessively vs. excessively in the 30 days before baseline and before follow-up) we did not find support for the main hypothesis that patients matched at the recommended LOC would have better outcomes than undertreated patients. We did, however, find support for the hypothesis that patients matched to the recommended LOC would have outcomes comparable to overtreated patients.
PART 2: Research questions

Chapter 4 | Predictive Validity Of Treatment Allocation Guidelines On Drinking Outcome In Alcohol Dependent Patients.

ABSTRACT

Aim: The purpose of this study was to establish the predictive validity of guidelines for allocating patients to outpatient or inpatient treatment for an alcohol use disorder. It was hypothesized that patients who were matched to the recommended level of care would have (a) better outcomes than patients treated at a less intensive level of care, and (b) outcomes equivalent to those of patients treated at a more intensive level of care.

Design: A single centre observational prospective study comparing treatment outcomes between patients treated at the recommended level of care and patients not treated according to allocation guidelines.

Setting: One Dutch Substance Abuse Treatment Centre.

Participants: 1253 patients who completed intake, started brief outpatient treatment, standard outpatient treatment or inpatient treatment and were successfully followed up (44%).

Measurements: Addiction severity, psychiatric impairment, and level of social stability at baseline necessary to allocate patients to level of care according to the guidelines. Outcome was measured in terms of self-reported alcohol use 30 days prior to follow-up and prior to intake-assessment.

Findings: Of the 2,310 patients, 65.4% was successfully followed up 9.67 month after intake. Only 22% of the patients were treated according to the level of care prescribed by the guidelines; 49% were undertreated; and 29% were overtreated. The results were not in line with our hypotheses. Patients treated at a more intensive level of care than recommended had favourable outcomes compared to patients treated at the recommended level of care (55.5% vs. 43.9% success). Patients allocated to the recommended level of care did not have better outcomes than those treated at a less intensive level of care (43.9% vs. 38.3% success).

Conclusion: The a priori allocation guidelines were followed in a minority of the patients and did not increase the overall effectiveness of treatment. Based on these results, we suggest ways to improve the algorithm for allocating patients to treatment.
INTRODUCTION

According to the Institute of Medicine (IOM, 1990), no treatment is generally effective but some treatments are effective for some persons. The “matching hypothesis” states that patients who are matched to a form of treatment that is known to be especially suitable for them, will have better outcome than patients who are mismatched (Project Match Research Group, 1997). Despite considerable research, empirical support for the predictive validity of patient-treatment matching has been inconsistent.

Matching patients to different psychological treatment modalities does not seem to work (e.g., Project Match Research Group, 1997). There has been some evidence that patients with a specific problem who are matched to an appropriate treatment for that problem do better at addressing that specific problem than patients who did not receive this treatment. However, the two groups of patients did not differ on alcohol specific outcomes (McLellan et al., 1997).

Allocating patients to an appropriate treatment intensity has been more promising. Several patient characteristics have been shown to be important. For example, more intensive treatment seems to be associated with better alcohol specific outcomes in patients with more severe alcohol problems (McKay et al., 2002; Orford, Oppenheimer, Egert, Hensman, & Guthrie, 1976; Rychtarik et al., 2000), a co-morbid psychiatric disorder (Alterman, McLellan, & Shifman, 1993; Timko & Moos, 2002), and less social stability (Kissin, Platz, & Su, 1970; McLellan, Woody, Luborsky, O’Brien, & Druley, 1983; Rychtarik et al., 2000).

The challenge is to match patients to different treatment intensities or levels of care (LOC) in routine practice (Finney, Hahn, & Moos, 1996). An important strategy for matching patients to an appropriate LOC is to use allocation guidelines. An example is the Patient Placement Criteria of the American Society of Addiction Medicine (ASAM PPC) (Mee-Lee, Shulman, Fishman, Gastfriend, & Griffith, 2001). However, for alcohol dependent patients, the predictive validity of these allocation guidelines for treatment outcome has been limited
(Magura et al., 2003; McKay, Cacciola, McLellan, Alterman, & Wirtz, 1997). Moreover, all studies were conducted retrospectively, using a passive matching design.

Because of the relative lack of empirically-based allocation guidelines, adopting a pragmatic approach for allocating alcohol abusing patients to an appropriate LOC seems justified. We, therefore, developed allocation guidelines that can be used in routine practice. They are based on the stepped care approach by which patients are first allocated to the lowest level of treatment from which a successful outcome can be expected (Sobell & Sobell, 2000). Patient-treatment matching variables that were needed for implementing a stepped care strategy included patient treatment history, addiction severity, psychiatric impairment, and social stability. The allocation guidelines contain four LOCs, namely brief outpatient treatment (LOC-1), standard outpatient treatment (LOC-2), intensive outpatient/inpatient treatment (LOC-3), and a harm-reduction programme (LOC-4).

We have previously demonstrated that the use of this allocation protocol was feasible in routine practice in some Dutch substance-abuse treatment centres (Merkx et al., 2007). However, we found no support for the predictive validity of these allocation guidelines for the outpatient LOCs (LOC-1 and LOC-2) (Merkx et al., 2011). Patients allocated to the recommended outpatient LOC had outcomes comparable to patients treated at either a less intensive or at a more intensive outpatient LOC.

The lack of predictive validity of our allocation guidelines could be due to the fact that our sample was relatively small (n = 427) and our follow-up rate was relatively low (52.9%). Another explanation could be that we tested the predictive validity in only two outpatients LOCs, excluding patients receiving higher levels of care (Merkx et al., 2011). Therefore, in the present observational study, which was conducted under naturalistic, real world conditions, we examined the predictive validity of our allocation guidelines in a considerable larger sample, with a higher follow-up rate, and with patients allocated to an inpatient LOC being included.
The following hypotheses were tested: (a) patients treated at the recommended LOC would have better outcomes than those mismatched with a less intensive LOC, and (b) patients treated at the recommended LOC would have comparable outcomes with those mismatched with a more intensive LOC.

**MATERIALS AND METHODS**

**Sample**

Eligible participants were patients with an alcohol use disorder who were admitted to a regional substance abuse treatment centre (SATC) between January 2004 and February 2007 for outpatient or inpatient treatment; 2,953 patients met this criterion. Patients were excluded if (a) they did not consent being contacted at follow-up \( n = 107 \), or (b) their pre-treatment assessment did not yield valid data \( n = 523 \) because the data were lost because of technical problems related to data storage \( n = 383 \) or because the patient’s characteristics were inadequately recorded during the intake \( n = 140 \). Of the remaining 2,323 patients, 13 were allocated to a harm-reduction programme for chronic substance abusers, 1,510 of whom (65.4%) were contacted for follow-up. Of these, 238 were excluded because they were still in treatment at follow-up, and 19 because they had language problems that made it difficult for them to understand the telephone interview. The final sample comprised 1,253 patients (see Fig. 1). At intake, all patients had been informed about the routine procedure that would be followed, and informed consent was taken for the telephone follow-up interview.

**Procedure: instrument and process**

The SATC used a manual-guided procedure to allocate patients to treatments. As a first step, a pre-treatment assessment was conducted using the European version of the 5th Edition of the Addiction Severity Index (EuropASI) (Kokkevi & Hartgers, 1995). The EuropASI is a semi-structured interview that obtains information about the person’s substance use and substance use related
problems in the following domains: medical, employment/education, alcohol, drugs, legal, family/social support, psychiatric, and gambling. Items in each area are used to generate interviewer severity ratings (ISRs), which provide an assessment of the person’s overall problem severity in each domain.

As a second step, the allocation guidelines were applied. They instructed the intake interviewers to rate each patient on four treatment allocation indicators: (a) number of previous treatment episodes, (b) addiction severity, (c) psychiatric impairment, and (d) level of social stability. The number of previous addiction treatments was categorized as 0–1, 2, 3–5, or more than 5. EuropASI ISRs were then used for the three other treatment allocation indicators. The algorithm was outlined in an easy-to-score decision tree (see Fig. 2), which was readily accessible to all intake counselors. Application of the allocation algorithm, which combines the scores on the treatment allocation indicators, results in a recommended LOC ranging from LOC-1 to LOC-4 (Merkx et al., 2007). If the intake counselor disagreed with the LOC that the algorithm suggested, he or she could refer the patient to the LOC that was considered more appropriate.
**LOC guideline recommendations**

The current study included three LOCs to which patients could be assigned: Brief outpatient treatment (LOC-1), standard outpatient treatment (LOC-2), and intensive outpatient/inpatient treatment (LOC-3). These LOCs focus on abstinence or a significant reduction in the substance use. LOC-4 was not used in this study, because its primarily goal is harm reduction. Neither the number of sessions nor the time frame of the treatment was specified ex ante. Each patient could be treated in either an outpatient or an inpatient setting.

**LOCs: Core interventions**

The core interventions used in all three of the LOCs comprised manual-guided cognitive behavioural therapy. The treatment manuals prescribed the content of each therapy session and the techniques that were to be used. The interventions included modules with demonstrated effectiveness, including motivational enhancement strategies (Miller & Rollnick, 2002; Miller, Zweben, DiClemente, & Rychtarik, 1992), self-control training (Kadden et al., 1992), and relapse prevention techniques (Marlatt & Gordon, 1985). To assist patients in
changing their addictive behaviour, self-help booklets that included take-home exercises for practicing the skills that were taught were included in all of the treatments.

Brief outpatient treatment (LOC-1), which comprised 4-to-6 sessions, was conducted either individually or in a group over a period of approximately three months. It focused mainly on enhancing patients’ motivation for changing alcohol use. In addition, however, alcohol refusal skills and alternative behaviours for coping with craving were taught. Standard outpatient treatment (LOC-2), which comprised 10-to-12 sessions, was conducted either individually or in a group over a period of approximately six months. Depending on each patient’s needs, additional treatment might be offered, such as social skills training or treatment for Post Traumatic Stress Disorder. Like LOC-1, the intervention focused mainly on enhancing patients’ motivation for changing alcohol use, but it also used behavioural techniques for preventing relapse that were based on the functional analysis of high-risk situations. Intensive inpatient/inpatient treatment (LOC-3) comprised 18 group sessions. The first 12 sessions were at a frequency of two sessions per week; the last six sessions were at a frequency of one session per week. This intervention focused on enhancing patients’ motivation for changing alcohol use, and it used behavioural techniques for preventing relapse that were based on functional analysis of high-risk situations. The length of the LOC-3 treatment, which included detoxification, was a minimum of six weeks and a maximum of 12 weeks. During the daily programme, a broad spectrum of interventions might be offered (e.g., social skills training, vocational therapy, pharmacotherapy), depending on patients’ needs. In the inpatient programme, patients also experienced the residential milieu, which included interactions with nurses and the night staff.

**Follow-up**

Since 2003, the SATC has routinely attempted to contact all patients for a post-treatment follow-up interview over the telephone by a call centre. The interview lasts 30-40 minutes and is conducted by specially trained, independent, masters-
level students in psychology. The interviews occurred 9-12 months after the EuropASI was administered at intake, and focused primarily on the patient’s alcohol use during the preceding 30 days. The call centre that administers the interviews has previously been described in detail (Oudejans et al., 2009).

Electronic patient file and service-utilization records

Existing patient files and databases were used to extract patients’ information, such as their demographic characteristics, EuropASI ISRs, and service utilization information (e.g., type and amount of services received during the treatment).

Therapists

Both the intake interviewers and the therapists delivering the treatments were psychologists, social workers, or psychiatric nurses (BA or MA level). Implementation of the three treatment manuals used at the SACT was completed in 2001; since then, all intake interviewers and therapists have been trained to deliver the manual-guided interventions.

OUTCOME

Alcohol use

The primary treatment outcome measure was self-reported alcohol use in the 30 days before the follow-up. Three outcome categories were used: (a) currently abstinent, defined as continuously abstinent from alcohol during the 30 days prior to follow-up, (b) current controlled drinking, defined as having a maximum of six drinking days during the 30 days prior to follow-up, with a maximum of two drinking days on which five or more drinks were consumed, and (c) current harmful drinking, defined as not meeting the criteria for currently abstinent or current controlled drinking. The outcome measure was then dichotomized into treatment responders according to strict criteria (abstinent from alcohol
at follow-up) and treatment responders according to more lenient criteria (abstinent from alcohol and patients who were engaged in controlled drinking at follow-up).

The secondary treatment outcome measures were changes in the number of abstinent days (abstained from alcohol for 24 hours) and changes in the number of heavy drinking days (days on which five or more standard drinks of alcohol were consumed) from 30 days prior to intake 30 days prior to follow-up. In the Netherlands, a standard drink contains 10 grams of pure alcohol.

**Matching**

Matching was defined as the degree of concordance between the recommended LOC based on the guidelines and the actual treatment received. The SATC’s service-utilization records were used to assess matching, which was categorized undertreated, matched, or overtreated. Undertreated was defined as having attended fewer than 75% of the number of treatment sessions recommended for the outpatient LOC or fewer than 75% of the recommended days in treatment for the intensive outpatient/inpatient LOC. Being matched was defined as having attended 75%-110% of the number of sessions that were recommended according to the outpatient LOC or 75%-110% of the days in treatment that were recommended for the intensive outpatient/inpatient LOC. Finally, being overtreated was defined as having more than 110% of the number of treatment sessions recommended according to the outpatient LOC or more than 110% of the recommended days in treatment for the intensive outpatient/inpatient LOC (see Table 1).

**Statistical analysis**

Differences in baseline characteristics (a) between patients allocated to LOC-1, LOC-2, or LOC-3 according to the guidelines, and (b) between patients with and without follow-up data were assessed using t-tests or $\chi^2$-tests.
To determine whether *matched* patients had more favourable outcomes than *undertreated* patients, and comparable outcomes to *overtreated* patients, two separate logistic regression analyses were conducted, for respectively treatment responder according to the *strict* criteria and treatment responder according to the more *lenient* criteria as dichotomous dependent variables. In both analyses, matching (*undertreated, matched, or overtreated*) was the predictor variable.

Multiple regression analysis was used to assess the relationship between the matching variable and secondary dimensional treatment outcome, with changes in the number of abstinent days and the changes in the number of heavy drinking days as the dependent variables. Statistical analyses were performed using SPSS.

### RESULTS

**Patients’ baseline characteristics**

The mean age of the sample (*n* = 1,253) was 45.26 years (*sd* ± 10.93); 71.7% were male, 76.6% were single, and 84.8% were of Dutch nationality. Two-fifths (40.2%) of the sample reported that they regularly used drugs or that they were involved in gambling. The drugs that were most frequently used were cannabis and cocaine. In the 30 days prior to the baseline assessment, patients drank no alcohol on a mean of 11.63 (*sd* ± 11.69) days, and they had 16.33 (*sd* ± 11.99) days of heavy drinking.

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#### Table 1 | Percentage of matched and mismatched patients in each level of care

<table>
<thead>
<tr>
<th>Algorithm recommended level of care</th>
<th>Brief outpatient</th>
<th>Standard outpatient</th>
<th>Inpatient</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual treatment exposure</td>
<td><em>n</em> = 848</td>
<td><em>n</em> = 337</td>
<td><em>n</em> = 68</td>
<td>100%</td>
</tr>
<tr>
<td>Undertreated</td>
<td>43.8% (371)</td>
<td>58.2% (196)</td>
<td>75.0% (51)</td>
<td>49.3% (628)</td>
</tr>
<tr>
<td>Matched</td>
<td>23.2% (147)</td>
<td>21.1% (71)</td>
<td>8.6% (5)</td>
<td>21.8% (273)</td>
</tr>
<tr>
<td>Overtreated</td>
<td>33.0% (280)</td>
<td>20.8% (70)</td>
<td>17.4% (12)</td>
<td>28.9% (362)</td>
</tr>
</tbody>
</table>

---
heavy drinking days. Patients allocated to the three LOCs did not differ in age, gender, or nationality. However, they differed significantly in the number of heavy drinking days—LOC-1: 15 days, LOC-2: 19 days, and LOC-3: 17 days ($F_{(2)} = 9.47, p < .001$). As expected, patients who were allocated to the brief outpatient LOC had significantly fewer previous treatment episodes than patients allocated to the two other LOCs. In addition, significantly fewer of the LOC-1 patients had EuropASI ISRs > 4 on alcohol-related problems, vocation/education, and family/social functioning (indicating that their problems were moderate but that they were in need of treatment) compared to LOC-2 and LOC-3 patients. Patients allocated to LOC-2 were generally comparable to patients allocated to LOC-3, even in terms of social instability, but the LOC-3 patients had had significantly more previous treatments ($p < .001$) (see Table 2).

**Response to follow-up**

Of the 2,310 eligible patients, 1,510 (65.4%) were contacted at follow-up (see Fig. 1). The mean length of time between the intake and follow-up interviews was 9.67 months ($sd = 0.84$). At baseline, patients who were contacted for a follow-up interview ($n = 1510$) were comparable to those who were not contacted ($n = 800$) in terms of days abstinent (11.2 days and 10.6 days for follow-up and not follow-up, respectively) and in terms of heavy-drinking days (16.8 days and 17.8 days respectively). At baseline, the two groups differed significantly on several other baseline patient characteristics, but the effect sizes associated with these differences were small. For example, patients who were interviewed were older than those who were not (45.4 vs. 42.2 years, $t_{(2308)} = 6.67; p < .001$), but this difference has little clinical relevance. In fact, all the significant differences can be attributed to the strong power resulting from the large sample size. On all relevant variables, the two groups were comparable.

**Matching**

Of the 1,253 patients who were assessed at follow-up, 618 (49.3%) were undertreated; 273 (21.8%) were matched to the appropriate LOC according to the guidelines; and 362 (28.9%) were overtreated (see Table 2).
### Table 2 | Patients’ baseline characteristics and differences by LOC

<table>
<thead>
<tr>
<th></th>
<th>Study Sample</th>
<th>LOC-1</th>
<th>LOC-2</th>
<th>LOC-3</th>
<th>p</th>
<th>Cramer's V</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n = 1253)</td>
<td>(n = 848)</td>
<td>(n = 337)</td>
<td>(n = 68)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean ± sd</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (yrs)</td>
<td>45.26 ± 10.93</td>
<td>45.76 ± 11.02</td>
<td>43.86 ± 10.31</td>
<td>46.00 ± 12.3</td>
<td>.39</td>
<td></td>
</tr>
<tr>
<td>% (n) of patients</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender (males)</td>
<td>71.7 (897)</td>
<td>70.2 (595)</td>
<td>74.8 (232)</td>
<td>74.6 (50)</td>
<td>.26</td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.1</td>
</tr>
<tr>
<td>Married</td>
<td>23.4 (287)</td>
<td>26.8 (244)</td>
<td>17.4 (57)</td>
<td>8.9 (6)</td>
<td>&gt; .001</td>
<td></td>
</tr>
<tr>
<td>Never married</td>
<td>59.8 (735)</td>
<td>57.4 (479)</td>
<td>63.9 (209)</td>
<td>70.1 (47)</td>
<td>.26</td>
<td>&gt; .001</td>
</tr>
<tr>
<td>Divorced</td>
<td>separated</td>
<td>widowed</td>
<td>16.8 (207)</td>
<td>15.8 (132)</td>
<td>18.6 (61)</td>
<td>20.9 (14)</td>
</tr>
<tr>
<td>Nationality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dutch</td>
<td>84.8 (19.0)</td>
<td>86.3 (732)</td>
<td>81.3 (274)</td>
<td>83.8 (57)</td>
<td>.09</td>
<td>.06</td>
</tr>
<tr>
<td>Other</td>
<td>15.2 (190)</td>
<td>13.7 (116)</td>
<td>18.7 (63)</td>
<td>16.2 (11)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary drug</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.19</td>
<td></td>
</tr>
<tr>
<td>No substance</td>
<td>59.8 (749)</td>
<td>68.1 (577)</td>
<td>40.9 (138)</td>
<td>50.0 (34)</td>
<td>&gt; .001</td>
<td></td>
</tr>
<tr>
<td>Cocaine</td>
<td>9.2 (115)</td>
<td>5.3 (45)</td>
<td>17.8 (60)</td>
<td>14.7 (10)</td>
<td>.26</td>
<td>&gt; .001</td>
</tr>
<tr>
<td>Cannabis</td>
<td>9.6 (120)</td>
<td>8.1 (69)</td>
<td>13.1 (44)</td>
<td>10.3 (7)</td>
<td>&gt; .001</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>21.4 (268)</td>
<td>18.4 (156)</td>
<td>28.2 (95)</td>
<td>6.3 (17)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol use at intake</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-excessive</td>
<td>2.04 ± 5.64</td>
<td>2.28 ± 6.06</td>
<td>1.64 ± 4.42</td>
<td>1.23 ± 5.64</td>
<td>.19</td>
<td></td>
</tr>
<tr>
<td>Treatment history</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&gt; .001</td>
<td>.76</td>
</tr>
<tr>
<td>0-1</td>
<td>86.2 (1080)</td>
<td>100 (848)</td>
<td>67.1 (226)</td>
<td>8.8 (6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>8.9 (111)</td>
<td>0</td>
<td>32.9 (111)</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-5</td>
<td>4.9 (62)</td>
<td>0</td>
<td>0</td>
<td>91.2 (62)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% EuropASI ISR &gt; 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol severity</td>
<td>70.6 (884)</td>
<td>61.3 (520)</td>
<td>88.4 (298)</td>
<td>97.1 (66)</td>
<td>&gt; .001</td>
<td>.30</td>
</tr>
<tr>
<td>Drugs severity</td>
<td>10.6 (133)</td>
<td>2.0 (17)</td>
<td>31.0 (104)</td>
<td>17.6 (12)</td>
<td>&gt; .001</td>
<td>.41</td>
</tr>
<tr>
<td>Psychiatric impairment</td>
<td>20.4 (254)</td>
<td>11.1 (94)</td>
<td>41.9 (139)</td>
<td>33.3 (21)</td>
<td>&gt; .001</td>
<td>.34</td>
</tr>
<tr>
<td>Vocational</td>
<td>education</td>
<td>9.0 (112)</td>
<td>6.4 (54)</td>
<td>13.1 (44)</td>
<td>21.5 (14)</td>
<td>&gt; .001</td>
</tr>
<tr>
<td>Family</td>
<td>social</td>
<td>11.0 (137)</td>
<td>8.0 (68)</td>
<td>16.9 (57)</td>
<td>19.0 (12)</td>
<td>.04</td>
</tr>
</tbody>
</table>

1Numbers can be discrepant because of missing values

2Variables used as proxies for the allocation indicators addiction severity, psychiatric impairment, and level of social stability
**Treatment outcomes**

Table 3 shows that at follow-up, 44.5% of the patients had been abstinent (30.8%) or were controlled drinkers (13.7%) during the preceding 30 days, and 55.5% were drinking harmfully and thus had not responded to treatment. Response rates were significantly higher in *overtreated* patients (55.3%) than *matched* (43.9%) or *undertreated* patients (38.3%, \( p < .001 \)), whereas response rates for *matched* and *undertreated* patients did not differ significantly. Furthermore, patients who were designated as *undertreated* had increased their number of abstinent days by only 5.49 days (\( sd \pm 13.30 \)), whereas *matched* patients had increased their number of abstinent days by almost 7.64 days (\( sd \pm 13.24 \)) and *overtreated* patients by 10.52 days (\( sd \pm 13.57 \)). Finally, the *undertreated* patients had decreased their number of heavy drinking days by 8.68 days (\( sd \pm 12.50 \)), whereas *matched* patients had decreased by 10.53 days (\( sd \pm 12.79 \)) and *overtreated* patients by 12.45 days (\( sd \pm 12.21 \)) (see Table 3).

<table>
<thead>
<tr>
<th>Treatment exposure by treatment outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment outcome</td>
</tr>
<tr>
<td>Abstinence</td>
</tr>
<tr>
<td>Abstinent + Controlled alcohol use</td>
</tr>
<tr>
<td>Days abstinent</td>
</tr>
<tr>
<td>Days excessive use</td>
</tr>
</tbody>
</table>

**Matching effects based on dichotomous outcomes**

The effect of matching, assessed with logistic regression analysis, was significant for both of the primary dichotomized outcome measures (see Table 4). Using treatment responders according to *strict* criteria as the dichotomous dependent variable, we found a significant effect of matching on treatment
outcome (Overall Wald $_{(2)} = 15.71, p < .001$). This effect resulted from the fact that overtreated patients were more likely to abstain from alcohol than patients who were matched to the LOC that they received (OR = .65; 95% CI [1.28, 2.23], $p = .004$). Undertreated and matched patients were equally likely to abstain from alcohol (OR = .98; 95% CI [0.71, 1.34], $p = .88$).

Using treatment responders according to more lenient criteria (i.e., including patients who at follow-up either abstained from alcohol or drank in a controlled fashion) as dichotomous dependent variable, we also found a significant effect for matching on treatment outcome (Overall Wald $_{(2)} =26.12, p < .001$). Compared to matched patients, overtreated patients were more likely to abstain or control their drinking (OR = 1.57; 95% CI [1.15, 2.16], $p = .005$). Comparing undertreated and matched patients, we found no significant differences (OR = .79; 95% CI [0.59, 1.06], $p = .11$).

**Table 4 | Results of logistic regression analyses of matching on treatment outcome**

<table>
<thead>
<tr>
<th>Treatment outcome</th>
<th>OR</th>
<th>Wald</th>
<th>$p$</th>
<th>CI 95%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstinence</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>undertreated vs matched</td>
<td>.98</td>
<td>0.02</td>
<td>.88</td>
<td>.71 – 1.34</td>
</tr>
<tr>
<td>overtreated vs matched</td>
<td>1.65</td>
<td>8.48</td>
<td>.004</td>
<td>1.18 – 2.32</td>
</tr>
<tr>
<td>Abstinence and controlled drinking</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>undertreated vs matched</td>
<td>.79</td>
<td>2.47</td>
<td>.12</td>
<td>.59 – 1.06</td>
</tr>
<tr>
<td>overtreated vs matched</td>
<td>1.57</td>
<td>7.90</td>
<td>.005</td>
<td>1.15 – 2.16</td>
</tr>
</tbody>
</table>

**Matching effects based on dimensional outcomes**

We also assessed the effect of matching on changes in number of abstinent and heavy drinking days between the 30 days prior to intake and the 30 days prior to follow-up. We found a main effect for matching on the number of abstinent days [$F_{(2,850)} = 10.73, p < .001$] and on the number of heavy drinking days [$F_{(2,850)} = 6.37, p = .002$]. Neither effect, however, was in line with our hypotheses. Rather, they could be attributed to differences between the undertreated and overtreated patients.


### COMMENTS

#### Discussion

This study, which was conducted in a “real life” alcohol treatment programme, did not find improved treatment outcome using treatment allocation guidelines. We failed to find support for the predictive validity of allocation guidelines in matching patients to different LOC. Patients were matched to different LOCs on the basis of their treatment history, addiction severity, co-morbid psychiatric disorders, and social stability. The hypotheses being tested were that using an algorithm to match patients to LOCs would lead to better outcomes than undertreating them, and that overtreating them would have no additional value. Contrary to our hypotheses, matched patients did not have better outcomes than undertreated patients, and overtreated patients had significantly better outcomes.

The current algorithm was derived from results found in the literature on matching patients to LOCs. They emphasize that the greater the severity of the alcohol problem, the co-morbid psychiatric impairment and social dysfunction, the more intense the treatment that is required. In addition, in accordance with the stepped care approach, a more intense LOC should be offered to patients for whom the treatment was unsuccessful at a lower LOC. The algorithm that was tested distinguishes between three LOCs: two intensities of outpatient treatment and one of inpatient treatment.

How can we explain the inability of the allocation algorithm to predict treatment outcome? First, the algorithm allocated each patient to a LOC after intake, regardless of the patient’s actual need for treatment. For some of the undertreated patients, the intake procedure alone may have led to a reduction in their alcohol use. These patients can be regarded as early responders to a minimal/brief intervention (e.g., Hildebrandt, McCrady, Epstein, Cook, & Jensen, 2010). Epstein et al. (2005) reported that drinking frequency decreased during their pre-treatment assessment phase, and 44% of the participants became abstinent before the first session of treatment. In addition, patients who significantly reduced their drinking prior to the first
session had better drinking outcomes during and 12 months after treatment. In Project MATCH (1997), the greatest reduction in alcohol use occurred during the first week of treatment (Cutler & Fishbain, 2005). In the present study, the intake procedure, which occurred in one or two sessions, may have had a therapeutic effect, acting as a stand-alone brief intervention. For patients who seek treatment, brief interventions have been found to be as effective as more intensive treatment (Moyer, Finney, Swearingen, & Vergun, 2002). Second, the finding that outcomes for undertreated and matched patients were comparable could be due to the fact that there was little difference in treatment intensity between LOC-1 and LOC-2; perhaps these should be combined into one LOC. In addition, the intensity of treatment offered at LOC-2 was not comparable to the intensity of outpatient treatment in several other studies (e.g. Weisner et al., 2000).

What could be the explanation for the finding that treatment outcomes for the overtreated group were significantly better than for the matched group? The most straightforward answer is that the overtreated patients probably simply needed more intensive treatment than the other patients. It is not known, however, if and when the clinicians decided to intensify the treatment. Alcohol consumption was not measured during treatment, and there were no explicit decision rules for changing the intensity of the treatment once it was underway. Evaluating a treatment while it is in progress would be complicated, but it would have the advantage of allowing continuous patient-treatment matching (Sobell & Sobell, 2000).

With the stepped care approach, more problematic cases would likely be directed to more intensive treatments, but this is not properly reflected in our algorithm. According to our algorithm, outpatients assigned to LOC-2 and inpatients assigned to LOC-3 would be comparable in terms of the severity of their alcohol and co-morbid psychiatric problems. The only difference between these patients is the number of prior treatments they have had (see Table 1). Recent research suggests, however, that the current algorithm should be changed. Specifically, patients with a high addiction severity have been found to benefit more from inpatient treatment, and patients with low-to-moderate
severity benefit more from outpatient treatment (Chen, Barnett, Sempel, & Timko, 2006; Tiet, Ilgen, Byrnes, Harris, & Finney, 2007). The same difference holds for severity of co-morbid psychiatric problems. That is, patients with higher addiction severity and more severe psychiatric problems benefit more from inpatient than from outpatient treatment (Timko & Moos, 2002).

Another possibility is that the present results indicate simply that treatment outcome is positively related to duration of treatment. In fact, several prior studies of treatment effectiveness in patients with substance use disorders have reported that longer treatments were associated with better outcomes (e.g., UKATT Research Team, 2008; Moos, Pettit, & Gruber, 1995; Peterson, Swindle, Phibbs, Recine, & Moos, 1994). Finally, it should be noted that the allocation guidelines tested here, are based on a pre-treatment assessment, and they assume that changes in alcohol use occur as a linear process. One of the tenets of the stepped care approach is that once treatment has started, any further allocation decisions (including those to increase the LOC if a patient is not responding to treatment) should be based on within treatment information and made according to transparent guidelines (Sobell & Sobell, 2000). According to the stepped care concept, treatment for alcohol use disorders includes these two continuously interacting dynamic processes; patient’s progress and evaluating the adequacy of the initial allocation decision. This concept, however, was not adhered to the current study. One way of systematically collecting within-treatment information would be to use valid and reliable instruments to conduct routine outcome monitoring. In fact, plans are now being made to introduce routine outcome monitoring into the addiction treatment services in the Netherlands (Oudejans et al., 2009).

**Strength and limitations**

As already stated in a previous report (Merkx et al., 2011), patient-treatment interactions, which have been identified using retrospective research designs, need to be replicated using prospective allocation procedures (Bühringer, 2006). The present study used a prospective design to examine the predictive
validity of a patient-placement system. In our view, assessing placement systems is important because although they are widely used, there is little evidence for their predictive validity. Additional strengths of this study were the large sample size, the fact that matching effects were evaluated at two levels of outpatient care and one level of inpatient care, and that the study was conducted in an actual treatment setting.

The study, however, also had a number of limitations. Perhaps the most important of these was the disappointing follow-up rate. Although 1,510 (65.4%) of the patients were contacted for follow-up, only 54.4% of the original sample was included in the analyses. Fortunately, patients who were and were not contacted at follow-up were comparable at intake on measures that were related to outcomes, including the number of previous heavy-drinking and abstinent days. At baseline, significant differences were found on several other patient characteristics; however, these differences seemed to have little clinical relevance. Another limitation was the use of the ISRs from the EuropASI as the main index for determining the LOC for three of the treatment allocation parameters: addiction severity, psychiatric impairment, and social stability. The ISRs are global interviewer ratings based on items describing both 30-day and lifetime problems, but the former is hardly taken into consideration. Several studies have shown that the interrater reliability of the ISRs is less than optimal, especially when counsellors use them in routine practise (Alterman et al., 2001; Hodgins & El-Guebaly, 1992; Stottlemayr, Mavis, & Kasim, 1994).

**Conclusion**

The main hypotheses tested in the current study were not supported. Patients who were *matched* to the recommended LOC had neither (a) better outcomes than *undertreated* patients, nor (b) outcomes that were comparable to those *overtreated* patients. Instead, *overtreated* patients had better outcomes than patients who were *matched* to the recommended LOC. These findings suggest that the current algorithm is inadequate either (a) because patients with high levels of problem severity should be allocated to programmes with a higher
level of intensity, or (b) because treatment allocation at a discrete moment in time is inadequate because recovery from a drinking problem is not a linear process. It is our impression that both conclusions are correct and that (a) both the existing algorithm and the treatments that were offered should be modified, and (b) during the course of treatment, the adequacy of the initial treatment allocation should be re-evaluated based on progress that the patient has made toward achieving the main goals of the treatment. In line with the stepped care approach, once treatment has started, extending or intensifying treatment should be based on within-treatment findings and transparent reallocation guidelines (Sobell & Sobell, 2000).

In summary, the present results suggest that our treatment allocation algorithm could be improved by (a) increasing the difference in treatment intensity between LOC-1 and LOC-2, (b) using within-treatment findings to develop guidelines for reallocating patients to LOCs after the treatment has started, and (c) reassessing the predictive validity of new treatment allocation guidelines after the first two improvements have been implemented.
PART 2: Research questions

Chapter 5 | Treatment Outcome Of Alcohol Use Disorder Outpatients With Or Without Medically Assisted Detoxification.

ABSTRACT

**Aim:** Little is known about the incremental effects of medically assisted detoxification on outpatient treatment for alcohol use disorders. The objective of this study was to compare drinking outcomes in a psycho-social outpatient treatment programme between two groups of heavy drinking patients who had an alcohol use disorder: (a) one group with initial medically assisted detoxification and (b) a second group without initial medically assisted detoxification.

**Design:** A single centre observational study comparing treatment outcome between patients who were treated in an outpatient treatment programme who were or were not initial medically assisted detoxified.

**Setting:** One Dutch Substance Abuse Treatment Centre.

**Method:** Analyses were conducted on 262 patients with a more severe alcohol use disorder who completed both an intake assessment and a 9-month follow-up assessment. The effect of medically assisted detoxification was determined using logistic regression analysis with a propensity score to control for possible baseline differences between the two groups.

**Findings:** Of the 262 patients, 82 (31.3%) received medically assisted detoxification. These patients were more likely to abstain from alcohol than those without medically assisted detoxification. Abstinence rates in the month before follow-up were 32.9% and 18.9%, respectively (OR$_{adj}$ = 3.48, $p = .01$, number needed to treat = 7.1).

**Conclusion:** Medically assisted detoxification may add to the effects of outpatient psycho-social treatment for heavy drinking patients with an alcohol use disorder.
INTRODUCTION

There is convincing evidence that pharmacotherapy can substantially improve the effectiveness of psycho-social treatment for patients with alcohol dependence (De Sousa, 2010; Garbutt et al., 1999; van den Brink, 2012). However, the added value of medically assisted detoxification in the context of outpatient psycho-social treatment has not been systematically studied, although it is considered an important component in the treatment of patients with an alcohol use disorder (Myrick, Anton, & Kasser, 2003). Medically assisted detoxification is most appropriate if severe withdrawal symptoms are expected after the patient has started to abstain from alcohol.

Medically assisted detoxification is generally defined as the medical management of an acute withdrawal syndrome in a controlled setting, normally a clinic (Myrick et al., 2003). The goals of medically assisted detoxification are (a) to interrupt the process of compulsive alcohol use, (b) to provide withdrawal that is humane and which protects the patient’s dignity, (c) to prevent or treat complications, such as delirium and seizures, (d) to initiate a period of abstinence, and (e) to prepare the patient for continuing treatment. This period can also be used to initiate medications to help prevent relapse (Blondell et al., 2011; Center for Substance Abuse Treatment, 1995). Although detoxification alone is not considered to be an adequate treatment for patients with an alcohol use disorder, integrating detoxification services into a treatment aimed at abstinence or reduced drinking may be important (Institute of Medicine, 1990; McLellan & McKay, 2003).

During the last 15 years, most of the larger substance use disorder treatment centres in the Netherlands have redesigned their services to align them with the recommendations of the Institute of Medicine (1990) regarding alcohol treatment services (Schippers, Walburg, & Schramade, 2002). The redesign focused on three important components: (a) implementing evidence based psycho-social interventions, (b) incorporating a system of regular monitoring and feedback of clinical outcome, and (c) standardizing the process of allocating patients to levels of care based on the stepped care model (Sobell & Sobell,
Implementation of these components provided opportunities to study the effectiveness of treatment that was routinely provided using naturalistic designs (Glaser, 2001; Merkx et al., 2007, 2011, 2013).

Stepped care is based on the principle that treatment should be (a) individualized, (b) evidence based and supported by clinical judgement, and (c) least restrictive but still likely to be effective. Used in this way, stepped care emphasizes serving the needs of patients in the most efficient way without sacrificing quality of care (e.g., Berner et al., 2008; Drummond et al., 2009; Jaehne et al., 2012; Sobell & Sobell, 2000). In a stepped care programme for patients with an alcohol use disorder, it is very important to determine which patients are at risk for alcohol withdrawal complications and may thus need medically assisted detoxification. However, our treatment allocation protocol (Merkx et al., 2007) lacked explicit rules for clinicians to decide whether patients should be offered medically assisted detoxification.

In the current study, we used this omission as an opportunity to answer the following question: are there differences in drinking outcomes between those patients with a more severe alcohol use disorder treated in a psycho-social outpatient treatment programme who received and those who did not receive medically assisted detoxification?

**METHOD**

**Sample**

Analyses were conducted on clinical data from a large regional substance use disorder treatment centre in the Netherlands that served a catchment area of approximately 1 million people. Between January 2004 and February 2007, 1,626 patients with an alcohol use disorder were treated in the psycho-social outpatient programme at this centre (Fig. 1).

Based on results from the European version of the 5th Edition of the Addiction Severity Index (EuropASI) (Kokkevi & Hartgers, 1995) and consistent with World Health Organization (WHO) criteria for defining medium to high risk of
chronic harm attributable to alcohol use (WHO, 2000), we arbitrarily defined patients as potentially eligible for medically assisted detoxification if they had at least 20 heavy drinking days (≥ 5 drinks /≥ 50 g per day) in the 30 days before intake. At intake, 509 patients (31.9%) did and 524 patients (32.2%) did not meet this criterion; 593 (36.5%) patients could not be included because they had a missing value on number of heavy drinking days in the 30 days before intake. Of the 509 patients who were eligible for medically assisted detoxification, 163 (32.0%) received detoxification and 346 (68.0%) did not. We were able to contact 262 (51.5%) of the 509 patients for the 9-month follow-up assessment; of these, 82 (31.3%) did and 180 (68.7%) did not receive medically assisted detoxification.

Figure 1 | Flow-chart sampling

![Flow-chart sampling](image)

**Treatment allocation process**

Intake and treatment allocation were conducted according to a protocol based on data collected with the EuropASI (Merkx et al., 2007). The EuropASI is a semi-structured interview that provides ratings of problem severity in the following domains: medical, employment/education, alcohol, other drugs, legal, family/
social support, psychiatric, and gambling behaviour. However, the need for medically assisted detoxification was not included in the treatment allocation model; therefore, the decision to allocate patients to a medically assisted detoxification programme was not standardized. The physician assigned to the outpatient treatment programme decided whether to allocate each patient to a medically assisted detoxification programme based on the patient’s medical history (e.g., alcohol consumption, previous withdrawal complications, stability of housing) and routine physical examination (e.g., presence of edema, ascites, or extreme underweight).

**Medically assisted detoxification**

Medically assisted detoxification was designed as a intensive outpatient or inpatient programme to actively treat patients’ alcohol withdrawal symptoms with pharmacotherapy and to facilitate their ongoing treatment. The programmes were roughly comparable with an American Society of Addiction Medicine (ASAM) level II–IV detoxification (Mee-Lee, Shulman, Fishman, Gastfriend, & Griffith, 2001). Patients entering the medically assisted detoxification stayed in the programme for a mean 9.60 days (sd ± 5.29) and were subsequently referred to the outpatient psycho-social relapse prevention CBT program.

**Outpatient treatment**

The outpatient programme mainly consisted of evidence based and manual-guided psycho-social interventions (Kadden et al., 1992; Marlatt & Gordon, 1985; Miller & Rollnick, 2002; Miller, Zweben, DiClemente, & Rycgartik, 1992; Monti, Abrams, Kadden, & Cooney, 1989). Outpatient treatment was conducted either individually or in a group over a period of 3 to 6 months. Depending on each patient’s needs, additional treatments—including treatment for co-morbid psychiatric disorders or social skills training—could be offered. Although the outpatient treatment facility was not strictly abstinence oriented (reduced drinking was an option), it’s policy was for intake counselors to advise every
patient with a more severe alcohol use disorder to refrain from alcohol use for at least a certain period.

**Measures**

Existing patient files and databases were used to extract patient and treatment information, such as patients’ demographic characteristics, their service utilization, and the type and amount of treatment received during the treatment episode. Since 2003, the treatment centre personnel have routinely tried to contact all patients for a telephone follow-up interview (Oudejans et al., 2009). These interviews were conducted 9 months after the intake assessment and focused primarily on the patient’s alcohol use during the preceding 30 days.

**Outcome measure**

Treatment success was defined as abstinence from alcohol during the 30 days before the follow-up interview.

**Statistical analysis**

Differences in baseline characteristics between patients who had or had not received medically assisted detoxification and between those who had or did not have a follow-up interview were assessed using t-tests or \(X^2\)-tests. The effect of medically assisted detoxification was determined using logistic regression analysis, with medically assisted detoxification (with or without) as the independent variable and abstinence (yes or no) as the dependent variable. To reduce the risk of selection bias in this naturalistic study, we included a propensity score (Bartak et al., 2009) as a covariate. The propensity score was based on the following baseline measures known to be related to treatment outcome (Trim, Schuckit, & Smith, 2013): (a) age at onset of alcohol use, (b) age at onset of heavy drinking, (c) regular use of an illicit drug or gambling, (d) EuropASI interviewer severity rating (ISR) of medical problems, (e) EuropASI ISR of alcohol problems, (f) EuropASI ISR of other drug problems, and (g) EuropASI ISR of psychiatric impairment.
RESULTS

Participants’ baseline characteristics and alcohol use

The mean age of the subsample eligible for medically assisted detoxification (n = 262) was 45.85 years (sd ± 10.58); 78.6% were single, and 87.6% were of Dutch nationality. Almost one third (30.1%) also reported regular use of an illicit drug or gambling. In the 30 days before the baseline assessment, the subsample had a mean of 27.68 (sd ± 3.62) heavy drinking days and 1.80 (sd ± 3.26) abstinent days, and 64.5% of the patients reported 30 heavy drinking days.

At intake, there were no significant differences between the two treatment groups in age, gender, nationality, number of heavy drinking days, or number of abstinent days. However, the treatment group that received medically assisted detoxification had a greater proportion with a EuropASI ISR of 5 or more (moderate problem, some treatment needed) on the domains medical, alcohol, other drugs, and psychiatric impairment than those not receiving medically assisted detoxification. These results are shown in Table 1.

Follow-up responses

Of the 509 patients who were potentially eligible for medically assisted treatment, we were able to contact 262 (51.5%) for follow-up. The mean time between the intake interview and the follow-up interview was 9.9 months (sd ± 0.8). Patients with a follow-up interview were comparable to those without a follow-up interview on their respective number of baseline abstinent days (1.8 days, [sd ± 3.16], vs. 2.1 days, [sd ± 3.3], t (1, 507) = .88, p = .38), and the number of baseline heavy drinking days (27.8 days, [sd ± 3.4] vs. 27.7 days, [sd ± 3.6], t (1, 507) = 379, p = .71) in the 30 days before intake. The two groups also had comparable EuropASI severity ratings. However, compared with patients who did not have a follow-up interview, patients who had a follow-up interview were older (45.9 vs. 43.8 years, t (1, 507) = 2.20, p = .03), and a greater proportion of them were of Dutch ancestry (87.8% vs. 77.7%, χ² (1) = 9.07, p = .003). Although statistically significant, these differences were relatively small and were not considered clinically relevant.
### Table 1 | Patients’ baseline characteristics according to detoxification status

<table>
<thead>
<tr>
<th></th>
<th>Total sample</th>
<th>Heavy alcohol use and detoxification</th>
<th>Heavy alcohol use without detoxification</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>n =262</td>
<td>n = 82</td>
<td>n = 180</td>
<td></td>
</tr>
<tr>
<td>Mean ± sd</td>
<td>45.85 ± 10.58</td>
<td>46.07 ± 10.81</td>
<td>45.76 ± 10.50</td>
<td>.83</td>
</tr>
<tr>
<td><strong>Age (yrs)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% (n) of patients</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Gender (males)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>77.9 (204)</td>
<td>79.3 (65)</td>
<td>77.2 (139)</td>
<td></td>
<td>.71</td>
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<tr>
<td><strong>Marital status</strong></td>
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<td></td>
<td></td>
<td>.41</td>
</tr>
<tr>
<td>Married</td>
<td>21.4 (56)</td>
<td>18.3 (15)</td>
<td>22.8 (41)</td>
<td></td>
</tr>
<tr>
<td>Currently single</td>
<td>78.6 (206)</td>
<td>81.7 (67)</td>
<td>77.2 (139)</td>
<td></td>
</tr>
<tr>
<td><strong>Nationality</strong></td>
<td></td>
<td></td>
<td></td>
<td>.11</td>
</tr>
<tr>
<td>Dutch</td>
<td>87.6 (230)</td>
<td>82.9 (68)</td>
<td>90.0 (162)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>12.2 (32)</td>
<td>17.1 (14)</td>
<td>10.0 (18)</td>
<td></td>
</tr>
<tr>
<td><strong>Illicit drug</strong></td>
<td></td>
<td></td>
<td></td>
<td>.11</td>
</tr>
<tr>
<td>Yes</td>
<td>30.1 (75)</td>
<td>37.2 (29)</td>
<td>27.1 (46)</td>
<td></td>
</tr>
<tr>
<td><strong>Alcohol use at intake</strong></td>
<td></td>
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<td></td>
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<tr>
<td>Abstinent days</td>
<td>1.80 ± 3.26</td>
<td>1.73 ± 3.05</td>
<td>1.83 ± 3.35</td>
<td>.44</td>
</tr>
<tr>
<td>Heavy drinking days</td>
<td>27.68 ± 12.01</td>
<td>27.96 ± 3.30</td>
<td>27.54 ± 3.77</td>
<td>.39</td>
</tr>
<tr>
<td>Age of onset (drinking)</td>
<td>19.62 ± 6.60</td>
<td>19.17 ± 5.82</td>
<td>19.84 ± 6.94</td>
<td>.48</td>
</tr>
<tr>
<td>Age of onset (HDD)</td>
<td>29.50 ± 10.64</td>
<td>27.48 ± 9.07</td>
<td>30.42 ± 11.19</td>
<td>.04</td>
</tr>
<tr>
<td><strong>% EuropASI ISR &gt; 4</strong></td>
<td></td>
<td></td>
<td></td>
<td>.002</td>
</tr>
<tr>
<td>Medical problems</td>
<td>7.8 (20)</td>
<td>15.7 (12)</td>
<td>4.5 (8)</td>
<td></td>
</tr>
<tr>
<td>Alcohol severity</td>
<td>86.2 (225)</td>
<td>96.3 (79)</td>
<td>81.6 (146)</td>
<td>.001</td>
</tr>
<tr>
<td>Drugs severity</td>
<td>10.4 (27)</td>
<td>15.9 (13)</td>
<td>7.9 (14)</td>
<td>.05</td>
</tr>
<tr>
<td>Psychiatric impairment</td>
<td>20.5 (52)</td>
<td>28.8 (23)</td>
<td>16.7 (29)</td>
<td>.03</td>
</tr>
<tr>
<td>Vocational/education</td>
<td>12.5 (26)</td>
<td>16.3 (13)</td>
<td>10.9 (19)</td>
<td>.23</td>
</tr>
<tr>
<td>Family/social</td>
<td>10.5 (26)</td>
<td>12.5 (10)</td>
<td>9.6 (16)</td>
<td>.48</td>
</tr>
</tbody>
</table>

Notes: EuropASI = European version of the 5th Edition of the Addiction Severity Index.
1) Missing values up to 22%;
2) Regular use of an illicit drug or gambling;
3) Heavy drinking days = ≥ 5 drinks/ ≥ 50 g per day;
4) EuropASI ISR > 4. Indicating a moderate problem, some treatment needed.
Treatment outcome

At follow-up, 23.3% of the patients were abstinent. Patients receiving medically assisted detoxification were more likely to be abstinent than patients not receiving this treatment: 32.9% versus 18.9% (number needed to treat = 7.1; OR\textsubscript{adj} = 3.48, 95% CI = [1.68, 7.18], p = .001) (Table 2).

Table 2 | Effect of detoxification status on abstinence at follow-up (n = 197)*

<table>
<thead>
<tr>
<th>B</th>
<th>Se(b)</th>
<th>Wald</th>
<th>p</th>
<th>Odds ratio</th>
<th>95% Confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>lower</td>
<td>upper</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-1.30</td>
<td>-0.42</td>
<td>9.49</td>
<td>.002</td>
<td>.272</td>
</tr>
<tr>
<td>Detoxification</td>
<td>1.25</td>
<td>0.37</td>
<td>11.33</td>
<td>.001</td>
<td>3.48</td>
</tr>
<tr>
<td>Propensity score\textsuperscript{b}</td>
<td>-1.05</td>
<td>1.24</td>
<td>0.72</td>
<td>.40</td>
<td>0.35</td>
</tr>
</tbody>
</table>

\*Logistic regression analysis with treatment responder strict (abstinent) as the dependent variable, detoxification status as the independent variable, and propensity score as the covariate.

\textsuperscript{b} propensity scores are based on baseline variables known to be related to outcome (Trim et al., 2013): (a) age of onset of alcohol use, (b) age of onset on heavy drinking, (c) regular use of an illicit drug of use or gambling behavior, (d) EuropASI severity rating of medical problems, (e) EuropASI severity rating of alcohol problems, (f) EuropASI severity rating of other drugs problems, and (g) EuropASI severity rating of psychiatric impairment.

COMMENTS

Discussion

The current study shows that patients with a more severe alcohol use disorder allocated to outpatient psychotherapy do benefit from pre-treatment medically assisted detoxification in a day-care or residential setting and are significantly more likely to abstain from alcohol at follow-up than patients who do not receive such a medically assisted detoxification (31.9% vs. 18.9%, respectively).

The current study has several strengths. It was conducted in a naturalistic setting with a large, unselected sample of patients with a more severe alcohol use disorder. In addition, the treatment was standardized, but the usual-care conditions were preserved.

The study also has limitations. First, allocation to medically assisted detoxification was not a randomized controlled trial and was based on clinical
judgement only. Therefore, we cannot rule out the possibility that the observed benefits of medically assisted detoxification were (partly) attributable to selection bias or confounding, especially because there were some baseline differences between the two treatment groups. To control for the possible effect of relevant baseline differences, we applied propensity score analysis, and the adjusted effect on abstinence at follow-up remained significant. However, we cannot fully exclude residual confounding by baseline differences that were not measured, such as level of motivation or preferred treatment goal (abstinence vs. reduced drinking). However, there is no consistent evidence that motivation and preferred treatment goal are associated with treatment outcome (Adamson, Heather, Morton, Raistrick, & the UKATT Research Team, 2010; Bujarski, O’Malley, Lunny, & Ray, 2013; Sanchez-Craig & Lei, 1986; Sanchez-Craig, Annis, Bromet, & MacDonald, 1984; Schippers & Nelissen, 2006).

Second, our operationalization of a more severe alcohol use disorder $\geq 20$ heavy drinking days per month with a heavy drinking day meaning $\geq 5$ units of alcohol in 24 hours) was arbitrary. However, in general, the amount of alcohol consumption related to the risk of developing alcohol dependence and the relationship between frequency of harmful drinking and severity of alcohol dependence appears to be linear (Li, Hewitt, & Grant, 2007; Rehm et al., 2013; Rubinsky, Dawson, Williams, Kivlahan, & Bradley, 2013). In addition, using 50 g of alcohol per day as a definition of a heavy drinking day is consistent with the definition that other researchers have used (e.g., Nutt & Rehm, 2014; Plunk, Syed-Mohammed, Cavazos-Rehg, Bierut, & Gruza, 2014).

Also, according to the recommendations of the World Health Organization, our definition of a more severe alcohol use disorder constitutes a medium to high risk of developing acute problems and chronic harm for men and a high risk for developing acute problems and chronic harm for women (WHO, 2000). Therefore, we believe that 20 or more heavy drinking days per month is a good operationalization of a more severe alcohol use disorder with an increased risk of more severe alcohol withdrawal symptoms and an increased need for a medically assisted detoxification. The actual data from the study empirically support this belief: Participants who were identified as patients with a more
severe alcohol use disorder were drinking nearly a daily amount of alcohol that is considered to be medium to high risk for developing chronic alcohol-related harm (WHO, 2000).

However, it is still possible that the subgroup of participants who received medically assisted detoxification drank more alcohol on their heavy drinking days than those who were not detoxified and that their alcohol-related problems per month represent a more severe alcohol use disorder. If this had been the case, our results would have been even stronger, because this would represent a bias toward the nil (i.e., the observed effect of medically assisted detoxification is likely to be an underestimation of the real effect).

Third, only 52% of the baseline sample was included in the final analysis, and this may have implications for the validity of the results. However, because patients with or without a follow-up interview were comparable on all baseline measures related to outcome, including the number of abstinent and heavy drinking days before intake, the effect of non-participation is likely to be small. Finally, the study was conducted in routine clinical practice with data that trained clinicians routinely collected. Although this procedure did not guarantee optimal data quality, it is very unlikely that there were systematic differences in how the two groups were assessed.

**Conclusion**

The present study provides evidence that medically assisted detoxification may have an incremental effect on outpatient treatment outcomes for patients with more severe alcohol use disorders. However, well-controlled studies are lacking, and further research using randomized controlled designs is needed to confirm the added value of medically assisted detoxification for patients with a more severe alcohol use disorder. This is important to establish inasmuch as it has already been shown that patients who are able to abstain from alcohol early in the recovery process have better treatment outcomes (Maisto, Kirouac, & Witkiewitz, 2006).
PART 3: General discussion

Chapter 6 | General Discussion and Conclusions

Maarten J. M. Merkx
INTRODUCTION

The main objectives of this thesis were to assess the feasibility and predictive validity of using guidelines for allocating patients to different levels of care (LOC) for substance use disorders in the Dutch substance abuse treatment system. These guidelines and the studies presented in this thesis are based on the three main requirements for a rational treatment system for patients with a substance use disorder (Institute of Medicine, 1990), namely (1) using a comprehensive, objective, and reproducible assessment procedure, (2) using an optimal patient-treatment matching procedure, and (3) routinely collecting treatment outcome data.

Chapter One provides a general theoretical, historical, and empirical background for the studies presented in the thesis. In Chapter Two, results are presented from a study on the feasibility using of a semi-structured assessment procedure and an algorithm for allocating patients to different treatment intensities (level of care) based on the stepped care treatment allocation paradigm. In Chapter Three, the predictive validity of this algorithm is examined for allocating patients to two different levels of outpatient care. In Chapter Four, the results of a replication study are presented, but with three instead of two levels of care; inpatient treatment was the additional level of care included. In Chapter Five, the incremental effect of adding medically assisted detoxification to outpatient treatment for heavy drinking patients is reported. In Chapter Six, the major findings, strengths, and limitations of the studies reported in the thesis are discussed in the context of recent research and developments related to the main topic of the thesis: matching patients with different levels of care. In addition, recommendations for future research are presented. The chapter ends with a discussion of the relevance of the results for clinical practice.
SUMMARY OF FINDINGS

*Feasibility of using matching guidelines in routine practice in Dutch substance abuse treatment centres*

The first research question sought to determine the feasibility of (a) implementing a semi structured assessment of patient characteristics into the treatment intake and (b) using a treatment-allocation algorithm based on the patient characteristics. Patient characteristics that were measured at baseline and used as parameters for guiding decision for allocating patients to different level of care included: (1) treatment history, (2) addiction severity, (3) severity of psychiatric co-morbidity, and (4) level of social impairment/instability. The different levels of care were: (a) brief outpatient treatment, (b) outpatient treatment, (c) inpatient (or intensive outpatient) treatment, and (d) long-term care. The main findings were that the data needed for treatment allocation according to the protocol were available for only half of the patients (51.6%), and the data needed for evaluating the actual LOC entered were available for only 40% of the patients. Of these patients, 854 (48.4%) were allocated based on the algorithm, and 219 (12.4%) were allocated based on clinically justified deviation from the algorithm. The main reason for deviating from the protocol was that the intake counsellor judged the level of addiction severity to be greater than the protocol indicated. Of the 52% patients who were not allocated according to the protocol almost 90% (820 of 911) entered a more intensive LOC than the algorithm indicated. We concluded that it was feasible to allocate patients with substance use disorders to an appropriate LOC by using guidelines for the assessment and placement. Nevertheless, implementing guidelines for systematically collecting data on patient characteristics during intake proved difficult.

This research project utilized both data obtained from patients’ files and data that the practitioners collected. Both data are called administrative data. This kind of data is used primarily to inform stakeholders about patients who seek substance abuse treatment. Administrative data are increasingly viewed as essential to use in longitudinal naturalistic studies designed to make
addiction treatment services accountable (Evans, Grella, Murphy, & Hser, 2010). The incompleteness of the administrative data set used in this study is noteworthy. There have been several large naturalistic research projects that used administrative data, including DATOS (Friedmann, Lemon, Anderson, & Stein, 2003), NTORS (Stewart, Gossop, Marsden, Kidd, & Treacy, 2003) and the City Target Project (Klein, di Menza, Arfken, & Schuster, 2002; Woods, Klingemann, & Guydish, 2002). None of these studies indicated the amount of missing data. This makes it impossible to compare our findings with those of other naturalistic studies.

Several barriers have been mentioned in using administrative data for research purposes (Brown, Topp, & Ross, 2003; Evans et al., 2010). These barriers include the fact that data are often difficult to extract from databases; linking problems between databases; many data are collected merely because the information would be “nice to know” rather than researchers “need to know” it; and perhaps most importantly, researchers often have participated in neither designing the data base nor in identifying the most important predictors of outcome. Part of the problem of missing data in this thesis was related specifically to the redesign project (To Score Results) itself, which is described in Chapter One. The redesign project led to several changes in the substance-abuse treatment centres. For example, a manualized intake and allocation procedure was implemented, which included collecting objective data and utilizing electronic patient files and manualized treatments based on MET and CBT. The importance of collecting adequate data was possibly buried under all these changes and thereby did not receive adequate attention.

**Predictive validity of treatment allocation guidelines on drinking outcomes in alcohol dependent patients**

The second research question was to determine the predictive validity on treatment outcome of using guidelines to match patients to different treatments. To address this question, two prospective matching studies were run. In both studies, it was hypothesized that patients with an alcohol use disorder who were
matched with the recommended LOC would have better outcomes than patients treated at a less intensive LOC than recommended, and that patients treated at a more intensive LOC than recommended would have outcomes similar to those treated at the recommended LOC. In both studies, patients were allocated to a LOC according to the algorithm that has already been described. Patients were included in the analyses if they had completed the intake with no missing data on key variables and if they provided follow-up data. Outcome was measured in terms of whether or not patients were abstinent or engaged in controlled drinking and whether or not changes had occurred in the number of excessive versus non-excessive drinking days between the intake and follow-up. The first study examined the predictive validity of using the allocation guidelines to assign patients with an alcohol use disorder to one of two different levels of outpatient care. The patients were recruited from routine practice for the one-year study. They (n = 471) were allocated to either a brief or a standard outpatient LOC and were followed up prospectively to determine differential outcomes for those who had been or had not been treated at the recommended LOC. About half of those in the original sample were successfully contacted 11 months after the intake for the follow-up. Only 21% of the patients were matched with the LOC that the guidelines recommended. Patients allocated to the recommended LOC did not have better outcomes than those treated at a less intensive LOC, and their outcomes were very similar to patients who had been treated at a more intensive LOC. It was concluded that the low adherence to the treatment allocation guidelines was not associated with poorer outcomes.

The second study concerning the predictive validity of using the treatment allocation algorithm aimed to replicate and extend the results of the first study. Along with the two outpatient LOC, a third LOC—viz., inpatient treatment—was included in a different and larger sample of patients (n = 1,273). Again, only a minority (22%) of the patients were treated according to the allocation algorithm; 49% of them were undertreated, and 29% were overtreated. The results of the study did not support our hypotheses. Specifically, patients who had been treated at a less intensive LOC than recommended showed outcomes similar to those who had been treated at the recommend LOC (43.9% vs. 38.3%);
however, in contrast to the first study, patients who had been treated at a more intensive LOC than recommended had better outcomes than patients who had been treated at the recommended LOC (55.5% vs. 43.9%). Again, adherence to the allocation guidelines did not improve treatment outcome. Based on the results of these two studies, it must be concluded that using our treatment allocation guidelines did not improve treatment outcome.

How do our findings compare with those of similar studies? Of particular interest is the predictive validity of other allocation guidelines for allocating patients to different LOCs based on their pre-treatment characteristics and the assumption that patients with more severe problems will require higher treatment intensity? An example of such guidelines is the ASAM placement criteria, developed by the American Society for Addiction Medicine (ASAM PPC) (Hofman, Halikas, Mee-Lee, & Weedman, 1991; Mee-Lee, Shulman, Fishman, Gastfriend, & Griffith, 2001). The ASAM guidelines use the following variables for matching patients to treatments: patients’ demographic characteristics (e.g. age, gender), type and severity of substance use (e.g. age of onset, quantity and frequency of use), intrapersonal characteristics (e.g. psychiatric diagnosis, cognitive functioning, self-efficacy), and interpersonal functioning (social stability). Results from the available studies are inconsistent with regard to the predictive validity of the ASAM algorithm. For example, alcohol dependent patients who were correctly matched to outpatient or residential treatment according to the ASAM criteria had no better outcomes than mismatched patients (McKay, Cacciola, McLellan, Alterman, & Wirtz, 1997). However, in another study (Magura et al., 2003), patients who were classified as undertreated according to the ASAM placement criteria had significantly poorer drinking outcomes at both the three-month and one-year follow-up than patients who were classified as having received the correct LOC. Finally, cocaine-dependent patients who were correctly matched according to the guidelines had no better outcomes than patients who were not matched (McKay, Cacciola, McLellan, Alterman, & Wirtz, 1997).

In more recent studies (Stallvik & Gastfriend, 2014; Stallvik, Gastfriend & Nordahl, 2015), the authors concluded that there was convergent and predictive validity to support the use a computerized clinical decision support
programme to implement the ASAM placement criteria. These conclusions are, however, highly questionable. Convergent and predictive validity was measured primarily by using composite scores (CSs) from the ASI. There are fundamental problems with using these scores (Melberg, 2004). There are some methodological problems with using the CSs in routine practice. The CSs are not standardized, so it is difficult both to interpret the scores and to compare individual scores with one another. It is also difficult to know how to interpret changes in a composite score and to know whether the change is large or small. Finally, one might question the objective validity of some of the composite scores because some of the questions included in the calculation of the composite scores invite subjective responses. Concerning predictive validity, only a statistical significant effect was found for stimulants, which indicated that matched patients had a significant reduction in days of stimulant use compared to overtreated patients. This was consistent with the hypothesis that overtreating would not be beneficial.

Another example of guidelines for allocating patients to different treatment intensities is the Client Matching Protocol (Melnick, De Leon, Thomas, & Kressel, 2001). It appears that these guidelines have predictive validity, but only for patients who have stayed longer than 90 days in a residential treatment setting (Mellnick & De Leon, 2008). In the Netherlands, the length of inpatient treatment is limited to a maximum of 90 days. Moreover, the inpatient or outpatient LOC used in the Melnick et al. (2001) study was based on the therapeutic community ideology, which is no longer used in the Netherlands. Thus, these guidelines would not be suitable for use in the Dutch substance-abuse treatment system. In fact, we did not find any other allocation guidelines for substance use disorders that have been shown to be effective. Accordingly, it seems that there are currently no proven effective treatment allocation guidelines for treating substance use disorders which can be applied in Dutch substance abuse treatment centres.
Treatment outcomes of alcohol use disorder outpatients with or without medically assisted detoxification

The last study in this thesis aimed to determine the incremental effect of including medically assisted detoxification in outpatient treatment for alcohol use disorders. In this naturalistic study, we compared the drinking outcomes of two groups of alcohol dependent patients in a psycho-social treatment program: (a) a group that initially had medically assisted detoxification and (b) a group that did not receive medically assisted detoxification. However, whether or not patients were allocated to receive medically assisted detoxification was not random, but was based on clinical judgement.

The analyses were conducted on a cohort of 262 patients with a severe alcohol use disorder who completed the intake assessment and a nine-month follow-up assessment. The effect of having medically assisted detoxification was determined by using logistic regression analysis with a propensity score to control for possible baseline differences between the two groups. Of the 262 patients, 82 (31.3%) received medically assisted detoxification. Abstinence rates in the month before the nine-month follow-up assessment were higher for those patients who had received medically assisted detoxification: 32.9% and 18.9%, respectively (OR$_{adj} = 3.48$, $p = .01$, number needed to treat = 7.1).

We concluded that for heavy drinking alcohol dependent patients, medically assisted detoxification might enhance the effects of outpatient psycho-social treatment. Although this was not a randomized controlled trial, until now it is the only published study on the added value of medically assisted detoxification in the context of outpatient psychological treatment. However, the treatment-allocation algorithm evaluated in this study lacked explicit rules for clinicians to decide whether or not patients should be offered medically assisted detoxification. Adding rules for allocating patients to medical assisted detoxification might enhance the predictive validity of the allocation algorithm.

A new allocation rule, in line with our study of the incremental effects of detoxification for patients with a more severe alcohol use disorder who were allocated to outpatient psychotherapy (Merkx et al., 2014), rule might be:
“patients with abstinence as their treatment goal and who have at least 20 heavy drinking days (≥ 5 drinks / ≥ 50 g per day) in the 30 days before intake should be allocated to a medically assisted detoxification program”. Instead of having a decision rule for allocating patients to a medically assisted detoxification programme based on amount of alcohol use, it might be more appropriate to allocate those patients to a detoxification programme whose treatment goal is abstinence and who are at high risk of experiencing a complicated alcohol withdrawal. The Prediction of Alcohol Withdrawal Severity Scale (PAWSS) (Maldonado et al., 2015) is a tool which can help clinicians to identify patients at high risk of experiencing severe alcohol withdrawal and whose treatment goal is abstinence. Using a PAWSS cut-off of 4 among hospitalized medically ill patients, the sensitivity for identifying complicated alcohol withdrawal symptoms is 93.1%, and the specificity is 99.5%. What the cut-off score should be for individuals with a substance use disorder who are seeking treatment is not clear and must be answered by future research.

STRENGTHS AND LIMITATIONS

The studies presented in this thesis have both strengths and limitations. The main strength is that all of the studies did not have stringent inclusion or exclusion criteria because they were all naturalistic studies, performed using administrative data obtained during routine patient care. The studies, therefore, should have good external validity. The use of a semi-structured assessment as part of the intake procedure in routine practice can be considered as another strength. We tried to eliminate clinical judgement as the sole source of patient-treatment matching.

Another strength of the studies is the use of an active matching design. Generally, a distinction is made between passive and active matching designs (e.g. Bühringer, 2006; De Leon, Melnick, & Cleland, 2010; Miller & Cooney, 1994). Passive matching designs retrospectively examine the interactions between patient characteristics and LOCs to which patients were unintentionally matched or were mismatched, whereas active matching designs involve a
prospective testing of matching hypotheses by comparing outcomes of patients intentionally matched with a certain treatment or LOC based on specific decision rules identified through other patients who were mismatched. Active matching studies are the critical test for determining whether or not the results should be used in standard routine practice (Bühringer, 2006). Our predictive validity studies used this kind of research design.

Finally, the main strength of the study on the incremental effects of using medically assisted detoxification in outpatient treatment is that a propensity score was used to control for baseline differences between the groups. Using a propensity score to control for baseline differences is considered the most appropriate strategy if baseline differences across groups are observed after randomization or, as in our case, when randomization is not feasible (Bartak et al., 2007; Witkiewitz, Finney, Harris, Kivlahan, & Kranzler, 2015).

The studies also have some limitations. Patients’ eligibility to be in the studies was based on the availability of their data. About 50% of the patients had insufficient data, and this made it impossible to compare patients included with those excluded on the basis of baseline differences. Part, but not all, of the missing data was due to technical problems. It is not clear why intake counsellors did not obtain these data as intended, so there is a possibility of a selection bias, which can be a threat to the external validity of the results.

Another limitation is that in the studies we used the EuropASI Interviewer Severity Ratings (ISR) as a proxy for the three allocation indicators: addiction severity, psychiatric impairment, and level of social impairment. Besides the methodological problems of using ISRs as an indicator of problem severity and the restrictions that come with using those scores in routine practice (Broekman, Schippers, Koeter, & van den Brink, 2004; Mäkela, 2004;), ISRs provide scores for overall problem severity, whereas more specific, individualized information would perhaps be more appropriate and more useful for allocating patients to LOCs.

Another important limitation of our studies on the predictive validity of using the guidelines is that the differences in treatment intensity were small,
especially between the two outpatient LOCs. LOC-1 consisted of 4-to-6 intended sessions, and LOC-2 consisted of of 10-to-12 intended sessions. In Project MATCH (1997), no difference in treatment outcome was found between Motivational Enhancement Theraphy (MET) (consisting of four sessions) and Cognitive Behavioural Theraphy (CBT) (consisting of eight sessions). Similarly, perhaps our negative findings are due to the similarity in the intensity of the two outpatient LOCs. Finally, it should be noted that our studies employed self-reported alcohol use as the main outcome measure. The accuracy of the self-report data were not verified by biochemical markers or collateral information, although both of these approaches to verification have important limitations and do not seem to enhance the accuracy of self-reported data (Witkiewitz et al., 2015).

**IMPLICATIONS**

Do our negative results indicate that it is time to abandon stepped care as a matching paradigm? Our results and the results of other studies might suggest that the answer to this question is positive. However, we did not test the paradigm itself. The guidelines for patient-treatment allocation were an operationalization of this paradigm, and our results relate to only one operationalization of the stepped care paradigm. Maybe our operationalization of stepped care was not optimal, and the guidelines should be modified rather than abandoning the paradigm. Recall the fundamental principles underlying a stepped care approach to patient-treatment matching: (1) treatment should be individualized, (2) potential treatments must be evidence based, (3) the recommended treatment should be the least restrictive to the patient’s lifestyle but still likely to be effective, implying that more intensive treatments should be reserved for patients with more severe problems or who have not responded to initial treatments of lower intensity, and (4) stepped care should be self-correcting, i.e. the initial allocation decision must be adapted using within-treatment information. Next, we review these principles as they are related to our studies, in order to see whether a better operationalization of the stepped care approach would be feasible.
**Treatment should be individualized**

Treatment should be individualized what means that when there is evidence that patients’ individual characteristics moderate the effectiveness of a certain treatment or LOC, these characteristics should be used to match patients with a treatment for substance use disorders (Kranzler & McKay, 2012; Sobell & Sobell, 2000). Patients with an alcohol use disorder have a variable course of recovery (e.g. Witkiewitz & Masyn, 2008). Three common patterns of post-lapse drinking during treatment have been observed: infrequent moderate drinking, heavier drinking with decreased frequency over time, and frequent heavy drinking (Witkiewitz, Maisto, & Donovan, 2010; Witkiewitz & Marlatt, 2007; Witkiewitz & Masyn, 2008). In our guidelines, we assumed a unified recovery process with a linear model of change (a one-size-fits-all approach); thus, our guidelines did not adhere to the first principle of stepped care.

Three categories of patient characteristics that might moderate treatment outcome can be distinguished (Ooteman, Koeter, Verheul, Schippers, & van den Brink, 2005; van den Brink & Schippers, 2012): (1) phenotypic or clinical indicators, i.e., sociodemographic characteristics, clinical behaviours or symptoms, (e.g., treatment history, age of onset, baseline level of drinking, drinking patterns, drinking motives, and alcohol outcome expectancies), (2) genotypic indicators (e.g., family history, polymorphisms of certain genes), and (3) endophenotypic indicators, which are patient characteristics that are measurable between the phenotype and the genotype (e.g., neurocognitive, neurophysiological or neurochemical markers). Patient characteristics that were used in our treatment allocation algorithm were based exclusively on phenotypic information. However, there is still no convincing evidence that matching patients with psychological treatments or with levels of treatment intensity using phenotypic indicators adds to the overall effectiveness. In a multi-centre RCT (the UK Alcohol Treatment Trial: the UKATT research team, 2008), which resembled the design of Project MATCH (1997), five *a priori* hypotheses concerning patient-treatment matching were evaluated, with the aim of identifying phenotypic patient characteristics that would predict which psychological treatment was most effective for which kinds of
patients. The study included two types of evidence based treatments: MET and Social Behaviour and Network Therapy (SBMT). None of five phenotypic matching hypotheses was confirmed at either of two follow-up points on any outcome variable. This means that the UKATT study (2008), in line with the results of Project MATCH (1997), did not support the hypothesis that specific phenotypically defined patients could be matched with specific outpatient psychological treatments. Regarding matching patients with different kinds of pharmacotherapy, there is also little evidence that phenotypic information can moderate the effectiveness of pharmacological interventions. In contrast, in the case of cannabis abuse, there is some evidence that phenotypic indicators can be used for matching patients with different psychological treatments, although this evidence is restricted to a retrospective analysis of one study with adolescent patients (Hendriks, van der Schee, & Blanken, 2013). To evaluate the effectiveness of Multidimensional Family Therapy (MDFT) and CBT for adolescents with a cannabis-use disorder, 109 patients were randomly assigned to outpatient MDFT or CBT. At follow-up, both groups showed a significant and clinically relevant reduction in both cannabis use and delinquency. Moreover, age and co-morbid psychiatric problems were important moderators of the treatment results. Older adolescents and younger adolescents without co-morbid psychiatric problems benefitted considerably more from CBT, whereas younger adolescents with co-morbid psychiatric problems benefited much more from MDFT. Therefore, these patient characteristics could be used for matching adolescents with a cannabis-use disorder with the most appropriate and most cost-effective type of treatment.

What about genotypic indicators as moderators for treatment? There is no evidence that they can function as moderators of psychological treatment, but there are some very promising genetic moderators for specific pharmacotherapies for alcohol use disorders. For example, a potential genotypic moderator for naltrexon is a positive family history of alcohol dependence (Garbutt et al., 2014). Another potential genetic moderator of responsiveness to naltrexone is the presence of a specific variation of the μ-opiate receptor (OPRM1) gene (Garbutt et al., 2014). According to Dom and van den Brink (2013), there is
enough evidence that OPRM1 moderates the effectiveness of naltrexone to justify routine screening for the presence of this gene variation. However, a recent RCT in which the OPRM1 polymorphism was used as a pre-stratification factor failed to show a moderating effect of the OPRM1 gene on the effectiveness of naltrexone in the treatment of alcohol dependent patients (Oslin et al., 2015). With regard to the effectiveness of acamprosate in the treatment of alcohol dependence, it has been suggested that different polymorphisms for the opioid, dopamine, glutamate, and GABA-receptors might function as effective moderators (Ooteman et al., 2009). Finally, there is evidence for a moderating role of a specific glutamate gene (GRIK1) in the effects of topiramate in the treatment of alcohol dependence (Kranzler et al., 2014).

With respect to endophenotypic indicators such as neurocognitive measures, neurophysiological cue reactivity, or neurochemical markers, may be these endophenotypic indicators can function as a moderator in levels of care. According to Passetti et al. (2011), may be the degree of decision-making deficiency at the start of a treatment episode for substance use disorders, can be used matching factor to an outpatient versus an inpatient LOC. In an outpatient LOC, patient with intact decision-making were more likely to achieve and maintain abstinence. For pharmacological treatment, evidence has started to emerge that endophenotypic indicators—such as impaired self-regulation, impulsivity, and cue-reactivity—can serve as effective moderators (Dom & van den Brink, 2013). For example, impulsiveness can function as moderator of the effects of modafinil for patients with an alcohol use disorder or for patient who are pathological gamblers. This pharmacological agent has (a) a positive effect on the treatment course for patients who are high in impulsivity and (b) a negative effect on patients who are low in impulsivity (Joos, Docx, Schmaal, Sabbe, & Dom, 2010; Smart, Desmond, Poulos, & Zack, 2013). With regard to cue reactivity, patients with an alcohol use disorder and a high level of cue-reactivity are more likely to respond to naltrexon than patients with a low level of cue-reactivity (Mann & Hermann, 2010).

Altogether, genotypic matching of patients to pharmacological treatments seems promising. It is unclear, however, what information should be used
for matching of patients to levels of care. With regards to endophenotype information which can be used in patient-treatment matching decision, more research is needed. Nevertheless, it seems that we are getting closer to being able to implement the first principle of stepped care in our treatment allocation algorithms.

**Potential treatments must be evidence based**

How can the current guidelines be adapted or redesigned to fulfil the second principle? Since 2002, much new research has been conducted to evaluate existing and newly developed psychological interventions. The effectiveness of most existing interventions has been confirmed; these include Motivational Enhancement Therapy, Cognitive Behavioural Therapy, Behavioural Couples Therapy, and Contingency Management (National Institute for Clinical Excellence, 2011; Landelijke Stuurgroep Multidisciplinaire Richtlijnontwikkeling in de GGZ, 2009; Emmelkamp & Vedel, 2007). In addition, new psychological treatments have been developed and evaluated, including Cognitive Bias Modification training (Wiers, Eberl, Rinck, Becker, & Lindemeyer, 2011) and Automatic Action Tendency training (Wiers, Gladwin, Hofmann, Salemink & Ridderinkhof, 2013). These new training modules are promising, especially as an add-on to CBT or MET (Cox, Klinger, & Fadardi, 2015; Wiers & Salemink, 2015).

When our research project started in 2002, the number and diversity of pharmacological interventions for preventing relapse in patients with an alcohol use disorder was very small. Today, there are many more evidence based pharmacological treatments for alcohol use disorders (van den Brink, 2012), including: (a) four effective medications for this specific purpose (disulfiram, acamprosate, naltrexone, nalmefene), (b) a growing number of compounds that have been studied quite rigorously but which have not yet been registered for this purpose (topiramate, baclofen, GHB), and (c) some promising compounds that need further study (modafinil, varenicline). New treatment allocation guidelines need to include new psychological and pharmacological
interventions as essential elements in the LOCs. In this case, pharmacological treatment could be more systematically implemented in routine clinical practice. Although prescribing medication for alcohol use disorders in routine clinical practice is no longer an anomaly, it is still relatively rarely used, and many more patients could benefit from it (Mark, Kassed, Vandivort-Warren, Levit, & Kranzler, 2009).

**The recommended treatment should be the least restrictive but still likely to be effective**

The third principle of stepped care is that the recommended treatment should be the least restrictive to the patient’s lifestyle and resources, but still likely to be effective. This implies that more intensive treatments should be reserved for patients with more severe problems or those who have not responded to initial treatments of lower intensity.

The idea that patients with more severe problems should be treated with more intensive treatments is appealing in routine practice. There is also new evidence to support the possibility of combining disorder severity/complexity with treatment intensity. In a randomized clinical trial of substance abuse treatment that compared outpatient (n = 691) and inpatient treatment (n = 586), no main effect for treatment condition was found (Tiet et al., 2007). However, patients with more severe substance use disorders at intake responded better when treated in more structured and more treatment intensive settings (i.e. inpatient/residential versus outpatient), whereas patients with less severe substance use disorders had similar outcomes in the two treatment settings. Recent reviews of this topic (McCarty et al., 2014; Reif et al., 2014) also concluded that inpatient treatment settings might provide more effective treatment for patients with more severe substance use problems. In their review of the effectiveness of intensive outpatient treatment, McCarty et al. (2014) concluded that there is some evidence to suggest that patients with greater impairment might have better outcomes if they are treated in inpatient settings than in intensive outpatient programmes, but they also stated that this incremental effect might
apply only to the most severely impaired individuals. In another review of the effectiveness of inpatient treatment (Reif et al., 2014), the authors concluded that after baseline severity had been controlled, individuals in inpatient residential treatment had lower alcohol and drug severity scores at a six-month follow-up than those in outpatient treatment. Thus, there are indications that matching patients with more severe substance use disorders with more intense treatment programmes leads to better outcomes.

What can we conclude about the four treatment intensities included in our guidelines? Do these four LOCs cover the full spectrum of care? Considering the least intensive end of the continuum, there is evidence that individuals with an alcohol use disorder who reduce their drinking after completing an assessment might not need formal treatment (Epstein et al., 2005; Kypri, Langley, Saunders, & Cashell-Smith, 2007; McCambridge & Day, 2008; Worden, Epstein, & McCrady, 2015). To deal with mild symptoms, several European and American guidelines for mental-health care other than alcohol use disorders (e.g. depression or anxiety) recommend a period of ‘active monitoring’ or ‘watchful waiting’ as the first step in a stepped care approach (Davidson, 2010; National Institute for Clinical Excellence, 2009; National Institute for Clinical Excellence, 2011).

Self-help training programmes, including online ones, for people with an early-stage alcohol use problem provide additional evidence for the effectiveness of a continuum-of-care approach. A recent meta-analysis (Riper et al. 2014), which included 16 randomized controlled clinical trials of guided and unguided low-intensity Internet interventions for adults, concluded that Internet interventions had a small but significant effect on drinking behaviour. Participants in the Internet interventions drank less alcohol than participants in control groups, and they were also more likely to adhere to low-risk drinking guidelines after the intervention. Despite the small effect sizes ($g = 0.20$), online self-help interventions could have a large influence on public health because of their potential for reaching many people (Riper et al., 2014). Thus, a self-help Internet intervention might be considered the lowest intensity of care and as a first step in a stepped care approach. Similarly, medically assisted
detoxification could be used as a refinement of the treatment spectrum. These and other adaptations are in line with the third principle of stepped care.

**Stepped care should be self-correcting**

Stepped care involves monitoring patients’ responses during treatment and adjusting the treatment based on these responses. As Sobell and Sobell (2000) have stated: “selecting an initial treatment that is judged to be best matched to a client, it may be possible to base further stepped care decisions on patient’ early responses to treatment rather than monitoring for an extended interval (p. 577).” Thus, self-correcting means that the results of an initial treatment are monitored systematically, and necessary changes are made during the initial phase of treatment based on these results. The treatment needs to be discontinued, decreased in intensity, continued, or increased in intensity, based on the patient’s treatment response during the initial phase of the treatment. If the initial treatment does not significantly improve the patient’s health, a different intervention is implemented. This means either adding another intervention or increasing the intensity of the existing intervention. If, on the other hand, the patient shows good improvement during the initial phase of treatment, it can be continued as is, decreased in intensity, or even be discontinued. However, adapting the initial allocation decision during treatment must be done using evidence based guidelines. Our guidelines did not include this self-correcting principle, although there is ample evidence to support use of the principle. There is evidence that drinking behaviour early in treatment is a strong and good predictor for treatment outcome at follow-up (e.g. Breslin, Sobell, Sobell, Buchan, & Cunningham, 1997; Miller, Westerberg, Harris, & Tonigan, 1996; Witkiewietz, 2011).

Several studies have shown that adjusting treatment based on the patient’s early response enhances the effectiveness of treatment for substance dependence (e.g. Brooner & Kidorff, 2002; McKay et al., 2011; O’ Malley et al., 2003). For example, Bischof et al. (2008) conducted a study that was based on the stepped care approach. In a medical setting, they compared the effectiveness
of a treatment based on the stepped care paradigm (SC), a full treatment (FC), and care as usual (UC). Patients with problematic alcohol use were randomly assigned to one of these three treatment conditions. Both the FC and the SC conditions consisted of automated feedback about patients’ alcohol use, defined as alcohol dependence, alcohol abuse, or at-risk drinking (British Medical Association, 1995). Patients in the FC condition had four standard telephone consultations, which were based on motivational interviewing (Miller & Rollnick, 2002) and contained structured elements of behavioural change counselling (Rollnick, Mason, & Butler, 1999). For patients in the SC condition, the telephone consultations were indicated only if the patients reported that their alcohol use was still above the criteria for at-risk drinking or binge drinking within the previous four weeks. Finally, patients in the UC condition had no telephone consultations. Results from the FC and the SC conditions were equal and significantly better than those from the UC condition. However, in the SC condition, telephone consultations were offered to only half as many patients as the number of patients to whom they were offered in the FC condition. This resulted in the SC condition being significantly less costly than the FC condition.

Another study (Hildebrandt, McCrady, Epstein, Cook, & Jensen, 2010) examined the predictive validity of weekly within-treatment drinking among women (n = 102) with alcohol use disorders who were randomized to receive either individual behavioural therapy for alcohol misuse or behavioural couples therapy for alcohol misuse. It was found that failure to achieve or to maintain abstinence by the end of treatment and at a one-year follow-up were rather well predicted by within-treatment percentage of days abstinent during Week 4. Also, percentage of days abstinent during Week 6 predicted both abstinence and percent days of drinking at the end of treatment and at the one-year follow-up. The authors concluded that for women with an alcohol use disorder who receive individual behavioural therapy for alcohol misuse, the level of drinking in Week 6 can be used to determine whether the treatment should be continued or intensified. The decision to continue the treatment for women with an alcohol use disorder who receive behavioural couples therapy
for alcohol misuse can be made only at the end of the treatment and based on the level of drinking at the end of the treatment.

These findings underline the importance of applying the self-correcting principle in stepped care. That is, within-treatment information should be used to decide whether or not to change the initial allocation decision during treatment instead of waiting until the end of treatment to adapt it. This advice is in line with the view that many patients with a substance use disorder are characterized by repeated cycles of abstinence and relapse, and for some patients substance abuse is a chronic relapsing disorder (e.g. Hser, Anglin, Grella, Longshore, & Prendergast, 1997; McLellan, Lewis, O’Brien, & Kleber, 2000; McLellan, McKay, Forman, Cacciola, & Kemp, 2005). Thus, changing patients’ treatment based on their substance use during treatment is entirely to be expected.

The fact that early responses to treatment are a predictor of future outcome has also been well documented in the case of other mental disorders (e.g. Masheb & Grilo, 2008; Van Calker et al., 2009; Walsh, Sysko, & Parides, 2006; Welten et al., 2015). Treatment guidelines for many other chronic disorders, such as hypertension, depression, diabetes, obesity, and cancer, specify that treatment should be regularly monitored for indications of progress or lack of it and that the treatment should adjusted for treatment non-responders (ALLHAT Collaborative Research Group, 2002; Look Ahead Research Group, 2003; National Comprehensive Cancer Network, 2015; National Institute Clinical Excellence, 2014; Rush et al., 1998). Unfortunately, most treatment guidelines for substance use disorders do not include recommendations for adjusting the treatment based on within-treatment information, although such recommendations would be expected to improve predictive validity. There is, however, almost no evidence on which to base decisions about when and how to increase, decrease, or continue the current treatment intensity. Nevertheless, a rational and effective treatment system for patients with a substance use disorder requires guidelines based on this kind of evidence.
IMPLICATIONS FOR FUTURE RESEARCH

Kadzin (2008) described well the ideal that should be pursued in patient-treatment matching: “the clinical challenge of clinical decision making can be conveyed by the effort to tailor treatment to meet the needs of individual patients. This statement is one we make and accept routinely in our clinical work, but research has yet to help us to do that” (p. 149). The existing knowledge about matching patients with substance use disorders to treatments is still insufficient to reach this ideal. Future research on this subject should, therefore, be aimed at specifying guidelines that will allow clinicians to offer each patient the most appropriate treatment, both initially and during the course of the treatment. Research should be aimed at identifying patient characteristics (genotypic, endophenotypic, and phenotypic) that moderate treatment effectiveness and thus can be used both for (a) initial patient-treatment allocation decisions and (b) adaptations based on actual treatment responses. Treatment responses include, for example, substance use and adherence to and retention in treatment. According to Maisto et al. (2014), the most relevant research findings are those that will allow clinicians to customize treatments to match individual patients’ needs prior to and during treatment.

Both naturalistic and experimental research designs can help us to design decision rules to be used in patient-treatment matching (IOM, 1990; Kranzler & McKay, 2012; Maisto et al. 2014). Naturalistic studies can generate useful data during both intake and treatment through a method sometimes referred to as Ecological Momentary Assessment (EMA) (Maisto et al., 2014). EMA refers to ongoing daily monitoring of specific risk factors that might influence relapse to substance abuse in the natural environment. Shiffman, Stone, and Hufford’s (2008) study is an example of this kind of research. Based on their EMA data, they concluded that an important risk factor for relapse to smoking is an elevation in negative affect just prior to the relapse rather than a build-up of stress and negative affect during a longer period (e.g. the previous two days). Research such as this generates information about specific situations that place substance users at risk for relapse, and this can help clinicians to devise personalized treatments for their patients.
Nowadays, it is customary for data to be collected on substance abusers who are seeking treatment, and collecting data related to the treatment process is more or less obligatory in the Netherlands and many other countries; the latter is referred to as Routine Outcome Monitoring (ROM). These data that are routinely collected can also be used for research purposes. They can be used to compare subcategories of substance use disorders, including differences in the course of treatment, treatment utilization, and, more importantly, patient characteristics that predict outcome and how they are related to different kinds of treatment. In hematological cancer research, naturalistic studies such as these are both very common and very successful (Huijgens, 2012). In fact, 25 years ago the Institute of Medicine (IOM, 1990) recommended using this kind of research. There are, however, prerequisites for conducting research that uses administrative and ROM data. These include (a) designing an overarching database, which includes various other databases that are efficiently interconnected, e.g. necessary data such as demographic information is gathered only once, and collection of the data is either administratively or clinically justifiable at the time they are collected; and (b) the data collectors must demonstrate explicit competencies and have adequate training in data collection (Allen, Donohue, Sutton, Haderlie & Lapota, 2009).

Experimental studies can use sequential multiple assignment randomized trial (SMART) designs (Murphy, Lynch, Oslin, McKay, & TenHave, 2007). Studies having a SMART design can be used to assess the predictive value of following decision guidelines both at the start of treatment and for changing the strategy during the course of treatment. Outcome is monitored during a treatment episode at different time points. Each patient is randomly assigned to a treatment condition twice, once at the start of treatment, and again at a certain time point during treatment once it is known whether or not the patient is responding to the treatment. An example can be given to clarify this design. At the start of treatment, patients with severe alcohol dependence, based on the definition of our detoxification study (Merkx et al., 2014) are randomly assigned to either: (a) medically monitored detoxification followed by individual outpatient cognitive behavioural therapy or (b) individual outpatient CBT only. A second randomly
assignment might occur for patients who are not responding at a certain time point during the treatment in the outpatient CBT only condition, for example, after six weeks. Non response can be based on the results of the Hildebrandt et al. study (2010) and defined as not achieving 88% cumulative percentage days abstinence since the start of the CBT. At this point, non-responders are randomly assigned to either (a) a detoxification programme after which the outpatient CBT is continued or (b) a detoxification programme after which the LOC is intensified to inpatient treatment. The results from the first randomization can indicate whether detoxification for heavy drinking patients should be a first step in treatment. The results of the second randomization can indicate whether intensifying the treatment for non-responders is restricted to detoxification only or must include residential treatment.

The ultimate goal of these various research designs is to build a so-called clinical decision support system (CDSS) (Maisto et al., 2014), which uses algorithms to allocate patients to treatment intensities or treatment methods and helps to determine for which patients and at which time points during treatment the treatment should be changed, based on patients’ response to the treatment. Such a system has already been successfully implemented with other chronic disorders such as cancer and diabetes mellitus (Bright et al., 2012; Huijgens, 2012; Priebe et al., 2007), and it also provides information about how treatment results can be improved (Huijgens, 2012; Stacey et al., 2012).

**IMPLICATIONS FOR CLINICAL PRACTICE**

The conclusion drawn from this thesis is that our current guidelines for patient-treatment allocation, based on the stepped care approach, are not tenable. From our limited observations of clinical practice during the period 2003-2007, we must conclude that the predictive validity of current matching guidelines is not very impressive. The results of our studies imply that we should not continue to adhere to our current treatment-allocation guidelines, which are based on the stepped care approach. Unfortunately, there are no evidence based alternative allocation guidelines that could be used in routine practice for allocating patients.
to LOCs. Furthermore, it seems that the algorithm that is currently being used contains several important design flaws. For example, it is not self-correcting in that it does not include guidelines for changing the treatment when a patient’s lack of progress in treatment indicates that it should be.

Stepped care as a heuristic approach for matching patients with substance use disorders to treatments is still valid and necessary for use in routine practice because of the limited evidence based information that we have about matching patients to treatments, especially psychological treatments. For some pharmacological treatments, some information about the predictive validity of using genotypic information in the case of certain medications is already available, and this information could be used for developing personalized medicine.

According to the Institute of Medicine (IOM, 1990), a rational treatment system for substance use problems comprises three main aspects: (1) a comprehensive, objective, and reproducible assessment procedure, (2) an optimal patient-treatment matching procedure, and (3) routinely collected treatment outcomes. The national Dutch quality enhancement programme for the treatment of substance use disorders called *To Score Results* has now been in use for 15 years. Moreover, several important changes—in line with the recommendations of the IOM—for improving the quality of care in the treatment system have been made, such as using a semi-structured intake assessment and allocating patients to a LOC based on an objective treatment-allocation algorithm. The next steps in building a rational treatment system for substance use problems should include (1) redesigning the existing allocation guidelines based on new information that has become available, (2) implementing a system for routine monitoring of patients’ clinical data at the start of and during a treatment episode, (3) building a database for storing the clinical data that have been obtained, and (4) building empirically based new allocation guidelines. If these elements are implemented, the substance-abuse treatment system could be transformed into a continuous process of testing, reformulating, and executing allocation guidelines, which would enhance treatment outcome substantially.
PART 4: Appendix

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PART 4: Appendix

Summary

Maarten J. M. Merkx
SUMMARY

Introduction

Substance use disorders are highly prevalent, the patient population who suffers from these disorders is heterogeneous and there is a diversity of evidence based treatments available. This and the limited resources, which are available for treatment of these disorders, call for a rational treatment system defined by the following aspects: (1) structured assessment, (2) patient-treatment matching, and (3) routine outcome monitoring (Institute of Medicine, 1990).

So an important element in a treatment of patients with a substance use disorder is patient-treatment matching which is to select from amongst all available alternatives that treatment or these treatments that are most likely to facilitate a positive outcome in a particular individual. Patient-treatment matching concerns the matching of patients to specific treatment methods (e.g. motivational enhancement or cognitive behavioural therapy), additional treatment services (e.g. substance abuse treatment in combination with vocational training), or treatment intensities (e.g. outpatient or inpatient). Empirical data suggest that there is no evidence for an adequate matching of patients to specific treatment methods or additional treatment services in terms of outcome. However, there is some evidence for the matching patients to treatment intensities, based on certain patient characteristic.

In the late 1990s, most substance abuse treatment centres started a nationwide quality-enhancing redesign programme, called “To Score Results” (GGZ Nederland, 1998). An important component of this quality-enhancing redesign programme was standardisation of the patient-treatment matching process, including a standardized and comprehensive assessment procedure and explicit algorithms or guidelines for patient treatment allocation to treatment intensities. Because at the start of the redesign programme no evidence based allocation algorithms were available, these algorithms were based on the stepped care paradigm, a rational set of guidelines for matching patients to treatment intensity. The fundamental principles underlying a stepped care approach for patient-treatment matching are: (1) treatment should be individualized, (2)
the selected treatment should be consistent with the contemporary research literature, implying that the clinician should be familiar with and use state-of-the-art, evidence based interventions, (3) the recommended treatment should be the least restrictive to the patient’s lifestyle but still likely to be effective, implying that more intensive treatments should be reserved for patients with more severe problems or who did not respond to initial treatments of lower intensity, and (4) stepped care should be self-correcting. This means that decisions about patient-treatment allocation decisions should be systematically monitored, and changes should be made if current treatments do not achieve significant health gains (‘stepping up’) or if the presenting problem is resolved (‘stepping down’).

*Stepped care* implies that patients’ history of treatment for a substance use disorder is the basis for patient-treatment matching. Substance use disorders can be a chronic, relapsing disease with periods of abstinence interspersed with periods of significant use. Change of substance use often requires a longer lasting recovery process with different treatment episodes. Patient characteristics that influenced outcome and together with treatment history could function as matching factors to treatment intensity were: (1) addiction severity, (2) severity of psychiatric co-morbidity, and (3) level of social impairment/stability. The main focus of this thesis is the feasibility and predictive validity of explicit guidelines for the allocation of specific patients to treatment intensities in terms of substance use outcome in the Dutch addiction treatment system in the period 2003-2007.

**Feasibility of patient-treatment matching**

The first goal was to test the feasibility of implementing guidelines for matching patients with substance use disorders to different treatment intensities (levels of care) in two Dutch substance abuse treatment centres (SATC), based on the *stepped care* paradigm, using a multi-centre observational follow-up design. Eligible patients were all 4,394 referrals to two different SATCs in 2003. At baseline, we measured patient characteristics needed for treatment allocation
according to the matching guidelines, treatment allocation according to the
matching guidelines, and treatment allocation according to actual level of care
(LOC) entered. We then compared recommended LOC according to matching
guidelines and actual LOC entered and evaluated reasons for observed
differences between recommended and actual LOC entered.

The data needed for treatment allocation according to the guidelines were
available only for 2,269 of the 4,394 (51.6%) patients. Data needed for the
evaluation of the outcome of the actual LOC entered were available for only
1,765 of the 4,394 (40.2%) patients. Of these 1,765 patients, 1,073 (60.8%)
were actual allocated according to the guidelines: 48.4% based on the guideline
algorithm and 12.4% based on clinically justified deviations from this algorithm.
The main reason for deviation was a different appraisal of the addiction severity
by the intake counsellor compared to the matching guidelines.

Based on these results, we concluded that the feasibility of guideline-based
treatment allocation was seriously limited due to inadequate data collection of
patient characteristics and suboptimal guideline-based treatment allocation. As
a consequence, only (60.8% of 40.2%) 24.4% of the patients could be evaluated
as being properly matched to the intended LOC. These results indicated several
barriers that limited an adequate implementation of patient-treatment matching
guidelines: problems in the infrastructure of data collection and storage, and
inertia of intake staff in their adherence to the guidelines for assessment and
matching to pre-specified LOCs.

**Predictive validity of treatment allocation guidelines on drinking
outcomes in alcohol dependent patients**

The second goal was to test the predictive validity of *a priori* treatment allocation
guidelines in terms of treatment outcome. Two studies were performed to
reach this goal. In both studies, patients were allocated to a LOC according
to the treatment allocation guideline based on the *stepped care* matching
paradigm using the following patient characteristics: 1) treatment history, 2)
adoption severity, 3) severity of psychiatric co-morbidity, and 4) level of
social impairment/stability at baseline. Patients were included for analyses if they completed the intake, were allocated to treatment at a LOC, and provided prospective follow-up data. We determined differential outcomes for those who were and were not treated at the recommended LOC. Outcome was measured in terms of self-reported alcohol use 30 days prior to follow-up and changes in number of excessive and non-excessive drinking days between intake and follow-up.

The first study examined the predictive validity of guidelines for allocating patients to two different levels of outpatient care in routine practice in a one year cohort (2003). We hypothesized that patients matched to the recommended LOC would have better outcomes than patients treated at a less intensive level of outpatient care, and that outcomes of matched patients would be equivalent to patients treated at a more intensive level of outpatient care. Patients at two Dutch substance-abuse treatment centres who completed the intake and were allocated to either a brief or standard outpatient treatment ($n = 471$) were followed prospectively to determine differential outcomes for those who were matched and those who were mismatched at the recommended LOC. About half (52.9%) of the original sample was successfully contacted for follow-up 11 months after intake. Outcome was measured in terms of self-reported alcohol use 30 days prior to follow-up and changes in the number of excessive and non-excessive drinking days between intake and follow-up. Only 21% of the patients was matched to the LOC according to the guidelines. There was no significant matching effect ($p = 0.43$) with 39.1% responders in the matched group, 45.2% responders treated at a less intensive LOC than recommended and 47.6% responders treated at a more intensive LOC than recommended. It was concluded that only a small minority of the patients was allocated according to the guidelines and that adherence to the guidelines was not associated with a better outcome.

The second study on the predictive validity aimed to replicate and extend the results of the first study. The two outpatient LOC were extended with a third level of inpatient care and a different cohort was used with more patients ($n = 1,273$). The study was restricted to one of the two substance abuse treatment
centres that took part in the first study about the predictive validity. It was again hypothesized that patients matched to the recommended LOC would have better outcomes than patients treated at a less intensive LOC, and that outcomes of these matched patients would be equivalent to patients treated at a more intensive LOC. Again, only a small minority (22%) of the patients was treated according to the treatment allocation guideline, whereas 49% was undertreated and 29% overtreated. Once more, the results were not in line with our hypotheses. Patients treated at a less intensive level than recommended showed outcomes similar to those treated at the recommended level (43.9% vs. 38.3% responders), and patients treated at a more intensive level than recommended did better than patients treated at the recommended LOC (55.5% vs. 43.9% responders). Based on these results, we again concluded that the use of these treatment allocation guidelines was not associated with a better outcome. In our view, the finding that patients treated at a more intense level than recommended had better treatment results compared to patients who were treated at the recommended LOC or a less intensive LOC, implicated that our guidelines caused undertreatment.

**Treatment outcomes of alcohol use disorder outpatients with or without medically assisted detoxification**

The third research question was about the incremental effect of medically assisted detoxification on cognitive behavioural outpatient treatment for patients with a more severe alcohol use disorders. In this naturalistic study the drinking outcomes between two subgroups of alcohol dependent patients in a psycho-social treatment programme were compared: (a) a group with initial medically assisted detoxification and (b) a group without initial medically assisted detoxification. Allocation to medically assisted detoxification was not random, but based on clinical judgement.

The analyses were conducted for a cohort of 262 patients with a more severe alcohol use disorder who completed the intake assessment and a 9-month follow-up assessment. The effect of medically assisted detoxification was
determined using logistic regression analysis with a propensity score to control for possible baseline differences between the two groups. Of the 262 patients, 82 (31.3%) received a medically assisted detoxification program. Abstinence rates in the month before follow-up were significantly higher for those with than for those without medically assisted detoxification: 32.9% and 18.9%, respectively (OR_{adj} = 3.48; number needed to treat = 7.1). We concluded that for heavy drinking alcohol dependent patients, medically assisted detoxification may add to the effects of outpatient psycho-social treatment. The question about the cost-effectiveness is not answered yet.

**Strengths and limitations**

The studies presented in this thesis have both strengths and limitations. A major strength of all studies presented in this thesis is that no stringent inclusion or exclusion criteria were used. The studies were all naturalistic, using administrative data obtained during routine patient care and thus have high external validity. A major limitation of the studies was the eligibility for the studies since eligibility was based on the availability of data. About 50% of the patients had insufficient data, and this made it impossible to compare patients included with those excluded on the basis of baseline differences. Therefore, we cannot rule out the possibility that our results are (partly) attributable to selection bias. Another important limitation was that in the studies the EuropASI Interviewer Severity Ratings (ISRs) were used as a proxy for the three allocation indicators: addiction severity, psychiatric impairment, and level of social impairment. Besides the important methodological problems of using ISRs as an indicator of problem severity, there are restrictions using this score in routine practice. The ISRs provide only scores for overall problem severity, whereas more specific, individualized information would be more appropriate and more useful for allocating patients to LOCs.
General discussion and conclusion

Do these negative results indicate that it is time to abandon stepped care as a matching paradigm? The answer to this question, based on the results presented in this thesis, might be “yes”. However, we did not test the stepped care paradigm itself, but only our operationalization of the stepped care paradigm. Maybe this operationalization of stepped care was not optimal, and the treatment allocation guideline should be modified rather than abandoning the paradigm. Fundamental principles underlying a stepped care approach to patient-treatment matching include: (1) treatment should be individualized, (2) potential treatments must be evidence based, (3) the recommended treatment should be the least restrictive to the patient’s lifestyle but still likely to be effective, implying that more intensive treatments should be reserved for patients with more severe problems or who have not responded to initial treatments of lower intensity, and (4) stepped care should be self-correcting, i.e. the initial allocation decision must be adapted using within-treatment information.

The first principle of stepped care is that treatment should be individualized. This principle is related to patient-treatment matching based on individual patient characteristics but also to the differences in recovery process between patients. Considering individual patient characteristics, it means that when there is evidence that individual patient characteristics moderate the effectiveness of a certain treatment or LOC, these characteristics should be used to match patients with a treatment for substance use disorders. Three categories of patient characteristics that might moderate treatment outcome can be distinguished: (1) phenotypic or clinical indicators, (2) genotypic indicators, and (3) endophenotypic indicators. Patient characteristics that were used in our treatment allocation algorithm were based exclusively on phenotypic information. Nowadays, it is still unclear what kind of patient characteristics should be used for matching patients to LOC. However, for matching patients to pharmacological treatments, genotypic matching seems promising. Considering the recovery process, there is evidence that patients with an alcohol use disorder have variable courses of recovery. The basic
assumption of our guidelines is that a recovery process follows a linear recovery course; thus, our guidelines did not adhere to the first principle of stepped care. This means that much more attention should be paid to adjustments during treatment based on treatment results. Allocation to a LOC must be considered as a longitudinal and dynamic process, including explicit moments for deciding to step up or step down treatment intensity.

The second principle of stepped care is the effectiveness of the specific treatment methods used in our studies has been confirmed in several studies. Also, new evidence based psychological and pharmaceutical treatments are available. However, the current treatment allocation guideline does not include all these new effective treatment approaches. Therefore, new treatment allocation guidelines need to include new psychological and pharmacological interventions as essential elements in the LOCs. Also, it seems wise to include decision rules for allocation to a medically assisted detoxification programme to an outpatient LOC.

The third principle of stepped care is that the recommended LOC should be the least restrictive to the patient’s lifestyle and resources, but still likely to be effective. This implies that more intensive treatments should be reserved for patients with more severe problems or those who have not responded to initial treatments of lower intensity. This principle of combining disorder severity or disorder complexity with treatment intensity is already integrated in our guidelines and is supported by already existing and new evidence: inpatient treatment may be more effective for patients with more severe substance use disorders or with greater impairments. Using more specific, individualized information than overall problem severity, as proxy for the three allocation indicators (addiction severity, psychiatric impairment, and level of social impairment) is probably more appropriate for allocating patients with more severe problems to more intensive LOCs.

The last principle of stepped care is that patient-treatment matching is a self-correcting process, meaning that the results of an initial treatment decision should be monitored systematically, and that necessary changes should be
made during the initial phase of treatment based on the monitoring results. The treatment intensity needs to be continued, decreased or intensified, stopped, or changed to another treatment method based on the patient’s treatment response during the initial phase of the treatment. The strongest predictor of treatment outcome at follow-up is substance use behaviour early in treatment. Several studies have shown that adjusting treatment based on the patient’s early response enhances the effectiveness of treatment for substance dependence which underscores the importance of applying this self-correcting principle. This evidence underline the importance of this principle. Treatment guidelines for many other chronic disorders, such as hypertension, depression, diabetes, obesity, and cancer, clearly specify that treatment should be regularly monitored for indications of progress or lack of it and that the treatments should adjusted for in the case of treatment non-response. Unfortunately, most treatment guidelines for substance use disorders do not include recommendations for adjusting the treatment based on within-treatment information. A rational and effective treatment system for patients with a substance use disorder requires guidelines based on this kind of evidence, although evidence which can be used for decisions about when and how to increase, decrease, or continue the current treatment intensity is almost non-existing.

Future research on this subject should, therefore, be aimed at specifying guidelines that will allow clinicians to offer each patient the most appropriate treatment, both initially and during the course of the treatment. Research should be aimed at identifying patient characteristics (genotypic, endophenotypic, and phenotypic) that moderate treatment effectiveness related to treatment intensity or treatment method and thus can be used both for (a) initial patient-treatment allocation decisions and (b) adaptations of the initial patient-treatment allocation decisions based on actual treatment responses. Both naturalistic and experimental research designs can generate knowledge that can help to redesign decision rules for patient-treatment matching. Nowadays, it is customary for SATC to collect data on substance use behavior who are seeking treatment. These data can be used for evaluation of the initial allocation decision of an individual patient (routine outcome monitoring) and for research
purposes (routine outcome management). These data can also be used to compare subcategories of substance use disorders, including differences in the course of treatment and treatment utilization. Quasi-experimental studies can be used to assess the predictive value of decision guidelines both at the start of treatment and after changes during the course of treatment. The ultimate goal of these various research designs is to build a so-called clinical decision support system which uses algorithms to allocate patients to LOCs which helps to determine for which patients and at which time points during the treatment process, treatment strategies should be changed, based on the patients’ response to the treatment.

The conclusion from this thesis is that our current guideline for patient-treatment allocation, based on the stepped care approach, is no longer tenable. The algorithm that is currently used contains several important design flaws. Unfortunately, there are no evidence based alternatives that could be used in routine practice for allocating patients to LOCs.

Stepped care as a heuristic approach for matching patients with substance use disorders to treatments is still valid and necessary for use in routine practice because of the limited evidence based information that we have about matching patients to specific treatments, especially to psychological treatments.

The national Dutch quality enhancement programme for the treatment of substance use disorders (To Score Results) has been in use now for 15 years. Moreover, several important changes - in line with the original recommendations of the Institute of Medicine (1990) - for improving the quality of care in the treatment system have been made, such as using a semi-structured intake assessment and allocating patients to a LOC based on an objective treatment-allocation algorithm. The next steps in building a rational treatment system for patients with a substance use disorder should include the following elements: (1) redesigning the existing allocation guidelines based on new information that has become available, (2) implementing a system for routine monitoring of patients’ clinical data at the start of and during a treatment episode, (3) building a database for storing the clinical data that have been obtained, and
(4) building empirically based new allocation guidelines. If these elements are implemented, the substance-abuse treatment system could be transformed into a continuous process of testing, reformulating, and executing allocation guidelines, which would enhance treatment outcome substantially.
PART 4: Appendix

Samenvatting (Summary in Dutch) | Geprotocolleerde indicatiestelling in de verslavingszorg: toepasbaarheid, voorspellende waarde en toekomstperspectief.

*Maarten J. M. Merkx*
SUMMARY IN DUTCH

Inleiding

Een stoornis in het gebruik van een middel komt veelvuldig voor, de patiëntengroep die lijdt aan deze stoornis is heterogeen en er zijn diverse bewezen effectieve behandelingen die zich richten op verandering van het middelengebruik. Deze feiten, gekoppeld aan de beperkte financiële middelen die beschikbaar zijn voor behandeling van patiënten met deze stoornis, vragen om een rationeel behandel- en zorgsysteem, met als belangrijkste pijlers: (1) een gestructureerde intake en probleeminventarisatie, (2) een geprotocolleerde indicatiestelling, en (3) het routinematig monitoren van de behandelresultaten tijdens en na de behandeling (Routine Outcome Monitoring).

Een belangrijk element in de behandeling van patiënten met een stoornis in het gebruik van een middel is dus indicatiestelling. Indicatiestelling is de keuze voor die behandeling(en) uit alle mogelijke behandelvormen die de grootste kans biedt (of bieden) op een positief resultaat voor een specifieke patiënt. In de Engelstalige literatuur wordt dit *patient-treatment matching* genoemd. De Engelse term *matching* betekent het op elkaar laten aansluiten van behandeling of zorg op basis van specifieke patiëntkenmerken voor een individuele patiënt. In het Nederlands wordt ook wel gesproken van ”behandeling op maat”.

Indicatiestelling is dus de spil tussen de hulpvraag van de patiënt en het hulpaanbod van de behandelaar en richt zich op het koppelen van een patiënt aan een bepaalde behandelmethodiek, (bv. kortdurende motiverende interventie of cognitieve gedragstherapie met of zonder medicatie), additionele interventies (bv. een behandeling gericht op de stoornis in het gebruik van een middel aangevuld met een beroepsopleiding), of intensiteit van zorg (bv. ambulante of klinische behandeling). Empirisch onderzoek suggereert dat er geen evidentie is voor het indikeren van patiënten met behulp van specifieke patiëntkenmerken voor een specifieke behandelmethodiek of additionele interventies. Echter, er is wel enige evidentie voor indicatiestelling met behulp van bepaalde patiëntkenmerken naar een bepaalde intensiteit van behandeling.
Aan het eind van de jaren ‘90 hebben de meeste Nederlandse verslavingszorginstellingen zich gecommitteerd aan het kwaliteitsprogramma *Resultaten Scoren*. Een belangrijk onderdeel van dit programma was de standaardisering van de indicatiestellingsprocedure, inclusief een geprotocolleerde intake, probleeminventarisatie en expliciete beslisregels voor indicatiestelling naar een bepaalde intensiteit van behandeling. De beslisregels bestonden uit een aantal algoritmes, vormgegeven in een makkelijk toepasbare beslisboom. Omdat er bij aanvang van dit programma geen *evidence based* beslisregels voor het indikeren naar een bepaalde intensiteit van behandeling beschikbaar waren, zijn de beslisregels en daaruit voortvloeiende beslisboom voor indicatiestelling, op grond van expertopinies opgesteld, uitgaande van het *stepped care* model. Dit model beschrijft een rationele indicatiestellingsprocedure met de volgende elementen: (1) de indicatiestelling richt zich altijd op de te behandelen persoonlijke problematiek, (2) het te indiceren aanbod is *evidence based*, wat betekent dat de professional op de hoogte is van meest recente ontwikkelingen van wetenschappelijk onderbouwde interventies, (3) de geïndiceerde behandeling is die behandeling, die het minst intensief en minst belastend is voor de patiënt, maar waarvan verwacht mag worden dat het aanbod effectief is. Dit impliceert dat intensievere behandelingen worden geïndiceerd bij ernstiger problematiek of bij patiënten waarbij minder intensieve behandelingen geen resultaat hebben opgeleverd, en (4) als op basis van systematische evaluatie blijkt dat dit laagst mogelijke intensiteitsniveau van behandeling (herhaaldelijk) geen of onvoldoende resultaat oplevert, dan wordt overgegaan naar een zwaarder intensiteitsniveau.

Leidraad bij de indicatiestelling is de behandelingsgeschiedenis van de patiënt. Een stoornis in het gebruik van een middel is een naar chroniciteit neigende aandoening met periodes van abstinentie afgewisseld met periodes van (fors) gebruik. Verandering van middelengebruik vergt vaak een langerdurend herstelproces met verschillende behandelingstijdsduur. Patiëntkenmerken die op basis van evidentie gerelateerd zijn aan behandelresultaat en samen met behandelgeschiedenis bij indicatiestelling meegewogen dienen te worden, zijn: (1) mate van verslaving, (2) mate van psychiatrische comorbiditeit, en
(3) mate van sociale integratie. De beslisregels (inclusief de beslisboom) voor indicatiestelling, de geprotocolleerde intake en probleeminventarisatie zijn het centrale thema van dit proefschrift. Dit proefschrift beantwoordt de vraag of een geprotocolleerde intakeprocedure en beslisregels voor indicatiestelling toepasbaar en bruikbaar zijn en wat de voorspellende waarde is van de a priori opgestelde beslisregels voor indicatiestelling naar intensiteiten van behandeling in termen van behandelresultaat in de Nederlandse verslavingszorg tussen 2003 en 2007.

**Toepasbaarheid van een geprotocolleerde intake- en indicatiestellingsprocedure**

Ons eerste doel was het onderzoeken van de toepasbaarheid van een geprotocolleerde intake- en indicatiestellingsprocedure naar verschillende intensiteiten van zorg in twee Nederlandse verslavingszorginstellingen. Het onderzoeksdesign was een multi-center observationele follow-up studie. De onderzoeksgroep bestond uit alle 4.394 patiënten, verwezen naar de twee verschillende verslavingszorginstellingen in 2003. Bij intake werden de volgende zaken in kaart gebracht: (1) patiëntkenmerken, nodig voor een geprotocolleerde indicatiestelling, (2) de indicatiestelling volgens de beslisregels, en (3) het intensiteitsniveau van behandeling waarop de patiënt daadwerkelijk instroomde. Vervolgens vergeleken we de indicatiestelling naar intensiteitsniveau volgens de beslisregels met het intensiteitsniveau waarop de patiënt de behandeling daadwerkelijk gestart was na de intake- en indicatiestellingsprocedure. Ook hebben we de redenen voor de verschillen tussen aanbevolen intensiteitsniveau van behandeling en daadwerkelijk gestarte intensiteitsniveau van behandeling geëvalueerd.

De benodigde data voor indicatiestelling volgens de beslisregels waren slechts beschikbaar voor 2.269 van de 4.394 patiënten (51,6%) en de benodigde data voor de vaststelling van het intensiteitsniveau waarop de patiënt de behandeling daadwerkelijk startte waren slechts beschikbaar in 1.765 van de 4.394 patiënten (40,2%). Van deze 1.765 patiënten waren er slechts 1.073 (60,8%)
op het intensiteitsniveau van behandeling gestart dat in overeenstemming was met de beslisregels: 48,4% volgens de beslisregels en 12,4% volgens klinisch verantwoorde afwijkingen van de beslisregels. De voornaamste reden om een patiënt op een andere intensiteit van behandeling te laten instromen dan de beslisregels voorschreven, was omdat de intaker de mate van verslaving anders, met name ernstiger, inschatte dan volgens de beslisregels.

Op basis van deze resultaten concludeerden we dat een geprotocolleerde intake-en indicatiestellingsprocedure toepasbaar en bruikbaar is, maar ook dat de gebrekkige dataverzameling tijdens het intakeproces een serieuze belemmering vormde voor adequate implementatie. Het indiceren van patiënten op basis van de beslisregels was daardoor suboptimaal. Slechts 24,4% (60,8% van 40,2%) van de patiënten is de behandeling gestart op het intensiteitsniveau conform de beslisregels. Om tot optimale bruikbaarheid en toepasbaarheid te komen zouden een aantal verbeteringen doorgevoerd moeten worden: optimaliseren van de infrastructuur voor dataverzameling en opslag, betere monitoring en bewaking van de protocoltrouw van intakemedewerkers, onder meer het verzamelen van data tijdens de intakeprocedure en het daadwerkelijk indiceren naar intensiteit van behandeling in lijn met de richtlijnen.

**Voorspellende waarde van de beslisregels voor indicatiestelling naar intensiteiten van behandeling**

Het tweede doel van het onderzoek was de vaststelling van de voorspellende waarde van de beslisregels voor indicatiestelling naar een bepaalde intensiteit van behandeling gerelateerd aan behandelingsresultaat. Het bepalen van de voorspellende waarde was onderwerp in twee studies onder patiënten met een stoornis in het gebruik van alcohol. In beide studies zijn patiënten gestandaardiseerd toegewezen aan een bepaalde intensiteit van behandeling op basis van de volgende patientkenmerken: (1) behandeldgeschiedenis voor een stoornis in het gebruik van een middel, (2) mate van verslaving, (3) mate van psychiatrische comorbiditeit, en (4) mate van sociale integratie. Inclusiecriteria voor beide studies waren: (a) voldoende intakedata op basis waarvan een
indicatiestelling volgens de beslisregels berekend kon worden, (b) na intake, ingestroomd zijn op een bepaald intensiteitsniveau van behandeling, en (c) beschikbaarheid van follow-up gegevens. Vervolgens zijn de verschillen in behandelresultaat onderzocht tussen de groep patiënten die behandeling had gehad op het intensiteitsniveau conform de beslisregels en de groep patiënten die een behandeling had gehad welke niet conform de beslisregels was. Het behandelresultaat is vastgesteld aan de hand van het zelfgerapporteerde alcoholgebruik over een periode van 30 dagen voor follow-up.

Het eerste onderzoek richtte zich op de voorspellende waarde van de beslisregels voor indicatiestelling naar twee ambulante intensiteitsniveaus van behandeling in het jaar 2003. Onze eerste hypothese was dat patiënten die conform de beslisregels behandeld waren op een bepaald intensiteitsniveau, betere behandelresultaten zouden hebben dan patiënten die op een lager intensiteitsniveau ambulant behandeld waren. De tweede hypothese luidde dat patiënten die op een hoger intensiteitsniveau behandeld waren dan voorgeschreven door de beslisregels, een vergelijkbaar behandelresultaat zouden hebben als patiënten die conform de beslisregels behandeld waren. Patiëntgegevens van twee Nederlandse verslavingszorginstellingen zijn gebruikt.

Van ongeveer de helft (52,9%, \(n = 471\)) van de patiënten die voldeden aan de inclusiecriteria waren bruikbare follow-up gegevens beschikbaar, waarvan 427 patiënten gebruikt zijn voor de analyses. Slechts 21% van de patiënten was behandeld op het ambulante intensiteitsniveau dat de beslisregels voorschreven. Er was geen significant verschil in behandelresultaat tussen patiënten die op het intensiteitsniveau behandeld waren die de beslisregels voorschreven en patiënten die op een lager of hoger intensiteitsniveau behandeld waren (\(p = 0,43\)). Het percentage responders in de groep patiënten dat conform de beslisregels behandeld was, lag op 39,1%; bij de groep patiënten die op een lager intensiteitsniveau behandeld was dan door de beslisregels voorschreven was dit 45,2% en in de groep patiënten die op een hoger intensiteitsniveau behandeld was dan voorschreven, was dit 47,6%. Onze conclusie was dat slechts een kleine minderheid van de patiënten een ambulante behandeling had
gekregen conform de beslisregels voor indicatiestelling en dat een ambulante behandeling conform de beslisregels niet tot betere behandelresultaten hadden geleid.

De tweede studie naar de voorspellende waarde van de beslisregels voor indicatiestelling was bedoeld om de resultaten uit het eerste onderzoek te repliceren. Daarnaast werden de twee ambulante behandelniveaus uit het eerste onderzoek aangevuld met een derde behandelniveau, namelijk een klinische behandeling of dagbehandeling. Het onderzoek werd uitgevoerd tussen 2004 en 2007, bestond uit 1.273 patiënten en beperkte zich tot één van de twee verslavingszorginstellingen die deelnamen aan het eerste onderzoek. Onze eerste onderzoekshypothese was wederom dat patiënten behandeld op een intensiteitsniveau dat in lijn lag met de beslisregels, betere behandelresultaten hadden dan patiënten die op een lager intensiteitsniveau behandeld waren. De tweede onderzoekshypothese luidde dat patiënten die op een hoger intensiteitsniveau behandeld waren dan voorgeschreven door de beslisregels, een resultaat zouden hebben dat vergelijkbaar was met patiënten die conform de beslisregels behandeld waren. Opnieuw was slechts een kleine minderheid van de patiënten (22%) behandeld volgens de beslisregels, was 49% behandeld op een lager intensiteitsniveau dan voorgeschreven door de beslisregels en was 29% op een hoger intensiteitsniveau behandeld. De resultaten waren ook nu niet in overeenstemming met onze vooraf opgestelde hypothesen. De behandelresultaten van patiënten die op het intensiteitsniveau behandeld waren conform de beslisregels, waren gelijk aan de resultaten van patiënten die op een te laag intensiteitsniveau waren behandeld (38,3% versus 43,9% responders), terwijl patiënten die op een te hoog intensiteitsniveau behandeld waren significant betere behandelresultaten hadden dan patiënten die op een intensiteitsniveau behandeld waren conform de beslisregels (55,5% versus 43,9%). Op basis van deze resultaten, kwamen we opnieuw tot de conclusie dat het toewijzen van patiënten aan een bepaalde intensiteit van behandeling volgens expliciete beslisregels voor indicatiestelling niet automatisch tot betere behandelresultaten leidde. De bevinding dat patiënten die op een hoger intensiteitsniveau behandeld waren, een significant beter behandelresultaat
hadden dan patiënten die op het voorgeschreven intensiteitsniveau behandeld waren of minder intensief behandeld waren dan de beslisregels voorschreven, impliceerde ons inziens dat onze beslisregels voor indicatiestelling tot onderbehandeling leidde.

**Toegevoegde waarde van medisch begeleide detoxificatie op het behandelresultaat**

De derde onderzoeksvraag richtte zich op het vaststellen van de toegevoegde waarde van een intensief medisch begeleid ontgiftingsprogramma op een ambulante cognitief gedragstherapeutische behandeling bij patiënten met een ernstige stoornis in het gebruik van alcohol. In dit onderzoek werden de behandelresultaten vergeleken van twee groepen patiënten die ambulant behandeld waren voor hun alcoholgebruik: (a) een groep patiënten die voorafgaande aan hun ambulante behandeling medisch begeleid ontgift waren en (b) een groep patiënten die alleen ambulante behandeling ontvingen. Toewijzing aan een medisch begeleid ontgiftingsprogramma was niet gestandaardiseerd en gebeurde puur op basis van het klinisch oordeel van de behandelaar.

De analyses zijn gedaan op de gegevens van een cohort van 262 patiënten met een ernstige stoornis in het gebruik van alcohol. Het effect van het medisch begeleid ontgiftingsprogramma werd vastgesteld met behulp van logistische regressieanalyse. Om te controleren voor baseline verschillen tussen de twee groepen is gebruik gemaakt van een *propensityscore* als covariaat. Van de 262 patiënten volgden 82 patiënten (31,3%) voorafgaande aan een ambulante behandeling een medisch begeleid ontgiftingsprogramma. Bij follow-up was de proportie abstinente patiënten significant groter bij patiënten die voorafgaande aan de ambulante behandeling medisch begeleid ontgift waren dan bij patiënten die enkel ambulant behandeld waren: respectievelijk 32,9% en 18,9% (OR_{adj} = 3,48), wat betekent dat ongeveer zeven patiënten medisch ontgift moeten worden om bij follow-up één extra patiënt abstinent te hebben (*number needed to treat* = 7,1). Onze conclusie was daarom dat bij patiënten met een
ernstige alcoholverslaving een medisch begeleid ontgiftingsprogramma kan bijdragen aan een nog effectievere ambulante behandeling. De vraag of dat ook kosteneffectief is, is daarmee natuurlijk nog niet beantwoord.

**Sterke en zwakke kanten**

De onderzoeken die in dit proefschrift werden besproken hebben zowel sterke als zwakke kanten. Een belangrijk sterk punt van alle onderzoeken in dit proefschrift is dat er geen strikte inclusie- en exclusiecriteria waren voor deelname aan de onderzoeken. Alle gebruikte onderzoeksdesigns waren naturalistisch. Data, gebruikt in de analyses, waren verzameld als onderdeel van een standaard behandelproces. Hierdoor is de externe validiteit, de betekenis voor de dagelijkse praktijk van de zorg, hoog.

Een belangrijke beperking van de gepresenteerde onderzoeken is het hoge percentage missende gegevens. Van ongeveer 50% van de patiënten waren er niet voldoende gegevens beschikbaar, waardoor het onmogelijk was om de in de analyses geïncludeerde patiënten te vergelijken met de patiënten die van de analyses uitgesloten moesten worden. Er kan daarom niet worden uitgesloten dat er sprake is geweest van selectiebias. Een ander belangrijke beperking is dat de EuropASI Interviewer Severity Rating (ISR) gebruikt zijn als indicator voor de ernst van van de drie patiëntkenmerken die onderdeel uitmaakten van de richtlijn voor indicatiestelling, namelijk de mate van verslavingsernest, mate van psychiatrische comorbiditeit en mate van sociale integratie. Naast belangrijke methodologische tekortkomingen van de ISR als indicatie voor de ernst van een probleem, zijn er ook restricties voor het gebruik van de ISR in de dagelijkse zorg aan patiënten met een stoornis in het gebruik van een middel. De ISR’s geven namelijk slechts een globale inschatting van de ernst van een probleem terwijl meer specifieke, individuele patiëntgebonden gegevens mogelijk geschikter zijn bij indicatiestelling naar intensiteiten van behandeling.
**Algemene discussie en conclusie**

Op basis van onze negatieve resultaten zou geconcludeerd kunnen worden dat het niet meer geëigend is om patiënten met een stoornis in het gebruik van een middel te indiceren voor een bepaalde intensiteit van behandeling met behulp van beslisregels die gebaseerd zijn op het *stepped care* model. Deze conclusie mag gerechtvaardigd lijken, echter het *stepped care* model zelf is niet onderzocht maar enkel onze operationalisatie van het *stepped care* model. Het valt niet uit te sluiten dat deze operationalisatie niet optimaal was en dat aanpassing van de opgestelde beslisregels aangewezen is.

De fundamentele principes van *stepped care* zijn (1) de indicatiestelling richt zich altijd op de te behandelen persoonlijke problematiek, (2) het te indiceren behandelaanbod is evidence based, (3) de aanbevolen behandeling dient het minst beperkende te zijn voor de levensstijl van de patiënt maar er mag verwacht worden dat het aanbod effectief is wat betekent dat intensievere behandelingen worden geïndiceerd bij patiënten met ernstigere problematiek of bij patiënten die geen baat hadden bij eerdere behandelingen met een lagere intensiteit, en (4) als op basis van systematische monitoring van de behandelresultaten tijdens en na de behandeling blijkt dat dit laagst mogelijke intensiteitsniveau van zorg (herhaaldelijk) geen of onvoldoende resultaat oplevert, dan wordt overgegaan naar een hoger intensiteitsniveau (opschaling).

Het eerste principe van *stepped care* heeft zowel betrekking op het indiceren van een patiënt naar een intensiteit van behandeling op basis van individuele kenmerken maar ook op het herstelproces van een individuele patiënt gedurende de behandeling. Patiëntenkenmerken die van invloed kunnen zijn op de uitkomst van een behandeling kunnen worden verdeeld in drie categorieën: (1) fenotypische of klinische indicatoren, (2) genotypische indicatoren, en (3) endofenotypische indicatoren. In onze onderzoeken werden uitsluitend fenotypische patiëntkenmerken gebruikt. Met name genotypische kenmerken lijken bij de koppeling van patiënten aan bepaalde farmacologische behandelingen veelbelovend te zijn. Het is tot op de dag van vandaag echter onduidelijk welke patiëntkenmerken het best gebruikt kunnen voor koppeling...
van patiënten aan een bepaalde intensiteit van behandeling, naast de in onze beslisregels opgenomen patiëntkenmerken. Voor wat betreft het herstelproces van een individuele patiënt met een stoornis in het gebruik van alcohol, weten we dat dit herstelproces nogal divers is. Echter, een fundamentele aannames van onze richtlijnen is dat dit herstelproces lineair verloopt. In dit opzicht wijkt de door ons getoetste beslisregels af van het eerste principe van het *stepped care* model. Dit betekent dat er veel meer aandacht moet worden besteed aan tussentijdse aanpassingen op basis van wel of niet behaalde behandelresultaten en dat expliciete momenten van opschalen en afbouwen moeten worden ingebouwd in een longitudinale en dynamisch proces van indicatiestelling.

Het tweede principe van de *stepped care* gedachte heeft betrekking op bewezen effectieve behandelmethode. De effectiviteit van de specifieke behandelingen die in onze onderzoeken werden toegepast, zijn bevestigd in diverse andere onderzoeken. Ook zijn er ten opzichte van de tijd dat de hier besproken studies werden uitgevoerd nieuwe psychologische en farmacologische behandelingen voorhanden. Onze beslisregels voor indicatiestelling houden nog geen rekening met deze nieuwe effectieve behandelingen. Daarom dienen er nieuwe beslisregels voor indicatiestelling gemaakt te worden waar deze nieuwe psychologische en farmacologische interventies als onderdeel van de verschillende intensiteitssniveaus moeten worden opgenomen. Bovendien lijkt het nuttig ook beslisregels voor klinische ontgifting voorafgaand aan een ambulante behandeling te ontwerpen.

Het derde principe van het *stepped care* model is dat het geïndiceerde intensiteitsniveau het niveau is dat het minst beperkend is voor de levensstijl en middelen van de patiënt, terwijl het naar alle waarschijnlijkheid nog steeds effectief is. Dit houdt in dat intensievere behandelingen gereserveerd worden voor patiënten met ernstigere problematiek of voor patiënten die geen baat hadden bij eerdere behandelingen met een lagere intensiteit van behandeling. Het combineren van de ernst of complexiteit van de problematiek met zwaarte van het behandelingsintensiteit wordt ondersteund door al bestaande en nieuwe evidentie: residentiële of klinische behandelingen kunnen effectiever zijn voor patiënten met een ernstigere verslaving of een slechtere mate van
sociale integratie. Deze patiëntkenmerken zijn al onderdeel van de huidige richtlijnen voor indicatiestelling. Mogelijk dat de patiëntkenmerken, die een rol spelen bij indicatiestelling, op een andere wijze geoperationaliseerd dienen te worden dan nu het geval is.

Het laatste principe van het **stepped care** model luidt dat indicatiestelling een zelfcorrigerend proces is, wat inhoudt dat verandering van de indicatiestelling gedurende het behandelproces gebaseerd dient te zijn op behandelresultaten tijdens het behandelproces. Afhankelijk van de response van de patiënt gedurende de aanvankelijke fase van de behandeling, kan de oorspronkelijke indicatiestelling gecontinueerd of aangepast worden. Aanpassing kan betekenen dat de behandelmethode verandert of een andere behandelmethode toegevoegd wordt. Ook kan het intensiteitsniveau van de behandeling veranderen (intensiever of minder intensief). De belangrijkste voorspeller voor behandelmethode na afloop van de behandeling is het middengebruik in de beginperiode van een behandeling. Verschillende onderzoeken hebben aangetoond dat verandering van de oorspronkelijke indicatiestelling op basis van de response van de patiënt tijdens de beginfase van de behandeling de effectiviteit van een behandeling gericht op verandering van het middengebruik verhoogt. Deze bevindingen onderstrepen nog eens het belang van dit zelfcorrigerende principe. Behandelingsrichtlijnen voor vele andere chronische stoornissen, zoals hypertensie, depressie, diabetes, obesitas, en kanker, beschrijven expliciet dat de behandelmethode gedurende de behandeling de behandelmethode verandert of aangepast wordt. Aanpassing kan betekenen dat de behandelmethode verandert of een andere behandelmethode toegevoegd wordt. Ook kan het intensiteitsniveau van de behandeling veranderen (intensiever of minder intensief).

De belangrijkste voorspeller voor behandelmethode na afloop van de behandeling is het middelengebruik in de beginperiode van een behandeling. Verschillende onderzoeken hebben aangetoond dat verandering van de oorspronkelijke indicatiestelling op basis van de response van de patiënt tijdens de beginfase van de behandeling de effectiveit van een behandeling gericht op verandering van het middelengebruik verhoogt. Deze bevindingen onderstrepen nog eens het belang van dit zelfcorrigerende principe. Behandelingsrichtlijnen voor vele andere chronische stoornissen, zoals hypertensie, depressie, diabetes, obesitas, en kanker, beschrijven expliciet dat de behandelmethode gedurende de behandeling de behandelmethode verandert of aangepast wordt. Aanpassing kan betekenen dat de behandelmethode verandert of een andere behandelmethode toegevoegd wordt. Ook kan het intensiteitsniveau van de behandeling veranderen (intensiever of minder intensief).

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patiëntkenmerken (genotypisch, endofenotypisch, en fenotypisch) gerelateerd zijn aan de effectiviteit van specifieke behandelingen en als zodanig kunnen worden voor: (a) indicatiestelling bij aanvang van een behandeling en (b) het aanpassen van de oorspronkelijke indicatiestelling op basis van behandelresponse gedurende de behandeling. Zowel naturalistische als experimentele onderzoeksdesigns kunnen bijdragen aan het vergroten van de kennis, die gebruikt kan worden voor het herontwerpen van expliciete beslisregels voor indicatiestelling. Tegenwoordig is het gebruik om gedurende het behandelproces routinematig gegevens te verzamelen. Deze data kunnen zowel gebruikt worden voor evaluatie en eventuele aanpassing van de oorspronkelijke indicatiestelling bij een individuele patiënt (routine outcome monitoring) als voor wetenschappelijk onderzoek (routine outcome management).

Onderzoek kan zich richten op het vaststellen van patiëntkenmerken die voorspellend zijn voor resultaten, gerelateerd aan verschillende behandelmethoden of intensiteiten van behandeling. Ook kunnen deze data gebruikt worden voor de vergelijking van behandelverloop en behandelresultaat, gerelateerd aan zorgconsumptie tussen subcategorieën van patiënten met een stoornis in het gebruik van een middel. Quasi-experimenteel onderzoek kan gebruikt worden voor het vaststellen van de voorspellende waarde van beslisregels voor indicatiestelling zowel bij aanvang als tijdens de behandeling. Het uiteindelijke doel van de verschillende onderzoeken is het ontwerpen van een ondersteuningsstelsel voor klinische besluitvorming dat gebruikt maakt van expliciete beslisregels voor indicatiestelling bij aanvang maar ook tijdens de behandeling.

De conclusie van dit proefschrift is dat onze huidige beslisregels voor de indicatiestelling naar intensiteiten van behandeling aangepast moeten worden, waarbij de fundamentele principes van stepped care uitgangspunt moeten blijven. De beslisregels bevatten namelijk een aantal belangrijke ontwerpfouten. Op dit moment is er nog geen empirisch onderbouwd alternatief voor handen voor het stepped care model. Dit model als rationale voor een indicatiestellingsprocedure is nog steeds geldig en noodzakelijk vanwege de beperkte empirische informatie die beschikbaar is over indicatiestelling.
Vijftien jaar geleden startte in de Nederlandse verslavingszorg het kwaliteitsprogramma *Resultaten Scoren*. Dit programma heeft tot verschillende belangrijke verbeteringen van de kwaliteit van zorg geleid, die aansluiten bij de aanbevelingen van het Institute of Medine (1990) over een rationeel behandelsysteem voor stoornissen in het gebruik van een middel (een gestructureerde intake en assessment procedure en een geprotocolleerde indicatiestelling). De volgende stappen die gezet moeten worden om te komen tot een optimaal functionerend rationeel behandel- en zorgsysteem voor patiënten met een stoornis in het gebruik van een middel zijn: (1) het herschrijven van de huidige beslisregels voor indicatiestelling naar intensiteit van behandeling, waarbij gebruik gemaakt wordt van de nieuwe evidentie, (2) het standaard verzamelen van patiëntgegevens bij intake, gedurende en na afloop van een behandelepisode, en (3) het ontwerpen en bouwen van een database voor opslag van de verzamelde klinische data die gebruikt kunnen worden voor het opstellen van een nieuwe, empirisch gefundeerde beslisregels voor indicatiestelling voor toewijzing naar intensiteitsniveaus. Implementatie van deze stappen in de Nederlandse verslavingszorg maakt het mogelijk dat nieuw te ontwerpen beslisregels voor indicatiestelling voortdurend bijgesteld kunnen worden op basis van nieuwe klinische bevindingen met als mogelijk resultaat een voortdurende verbetering van het behandelingenresultaat en steeds grotere efficientie.
PART 4: Appendix

Dankwoord

Maarten J. M. Merkx
DANKWOORD

Ontelbare mensen hebben mij in de afgelopen jaren gevraagd “En, hoe staat het met je promotie?” Mijn standaardantwoord was: “Het einde nadert.” Ik ben er trots op dat ik nu kan antwoorden: ”Het is af!”. Het resultaat van vijftien jaar promotietraject is echter niet alleen mijn verdienste, het is een gezamenlijke inspanning van velen en deze personen verdienen dan ook een deel van de eer.


(Oud) collega’s van het Amsterdam Institute for Addiction Research. In de afgelopen vijftien jaar heb ik velen zien komen als promotiestudent en zien gaan als dr. Iedereen heeft het traject sneller afgerond of gaat het traject sneller afronden dan ik en jullie tempo is een voorbeeld voor me geweest. God zij dank is er één uitzondering. Edith, ik hoop en gun het je dat je jouw traject ook tot een goed einde brengt.

Een aantal mensen hebben op de achtergrond een niet te onderschatten rol gespeeld. Miles Cox, thanks for editing all my English writing. Marianne, dank voor alle hulp bij de administratieve afhandeling van dit project. En als laatste Debbie, dank voor het vormgeven van dit proefschrift.

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Pro en mijn collegae Suzan Oudejans en Mascha Spits van Mark Bench. Met jullie heb ik in de afgelopen jaren vele leuke en leerzame projecten gedaan, waardoor mijn promotietraject toch weer wat meer vertraging opliep.

Ook familie en vrienden, dank voor vijftien jaar nooit aflatende steun en ook vertrouwen dat ik het af zou maken. Jullie zijn ook een reden geweest dat ik er iets langer over gedaan heb. Ik wilde jullie absoluut niet verwaarlozen. Natuurlijk een speciaal woord van dank aan Martin en Loek, jullie hunkering naar een gepromoveerde vriend is vervuld.

En dan mijn paranimfen, Gijs Nolet en Yvonne Merkies. Gijs, onze vriendschap bestaat al sinds de brugklas. Dank voor alle gein, af en toe serieuze zaken en hulp bij schrijven van Engelse teksten. Yvonne, vanaf de statistiekcolleges in het tweede jaar van onze studie trekken we met elkaar op. Statistiek was toen niet aan ons besteed. Maar nu verheug ik me op ons eerste gezamenlijke artikel.

Lieve Boris, Ocke en Pim. Vaak hebben we het over mijn boekje gehad. Elke keer als ik vertelde dat het nu echt bijna af was, knikten jullie ietwat meewarig. Als ik jullie tot snelheid maan, zijn jullie niet te beroerd om mij te helpen herinneren aan het feit dat ik ook geen haast had met dit boekje. Ik ben blij dat ik vader ben van ons mannengezin.

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PART 4: Appendix

Portfolio

Maarten J. M. Merkx
PORTFOLIO

Name: Maarten J. M. Merkx
Institution: Academic Medical Centre, Department of psychiatry
PhD period: August 2001 – July 2016
Promotores: Prof. dr. Gerard M. Schippers and Prof. dr. Wim van den Brink
Copromotor: Dr. Maarten W. J. Koeter †

Publications in thesis


Other scientific publications


**Practically-oriented publications (in Dutch)**


gedragstherapie bij middelengebruik en gokken. Amersfoort, the Netherlands: Resultaten Scoren, Kenniscentrum Verslaving, & Perspectief Uitgevers.


**Gedragsverandering als je maar zeven minuten hebt.** (pp 213-225). (Nederlandse vertaling). Ouderkerk aan den IJssel, the Netherlands: Uitgeverij Ekklessia.


**TEACHING**

**Presentations and workshops**


*Feasibility and predictive validity of evidence based treatment allocation guidelines to levels*


Screening en assessment van problematisch alcoholgebruik. Vijfde Nationale congres Evidence Based Practice, Ede. December, 2011.


November, 2005.


**Supervising**


**PHD TRAINING**

**courses**


*Clinical data management* (2004). Course about management skills needed to safeguard the integrity and enhance the quality of data collected during clinical scientific research.

*Practical Biostatistics*. (2004). Course about basic principles of biostatistics, including frequently used statistical tests and analyses.
PART 4: Appendix

About The Author

Maarten J. M. Merkx
ABOUT THE AUTHOR


Maarten was van 1995 tot 1999 werkzaam voor Novadic-Kentron als inhoudelijk eindverantwoordelijke voor een klinische behandelafdeling. Tevens startte hij de opleiding tot BIG geregistreerd psychotherapeut, welke hij in 2003 heeft afgerond. Tijdens dit opleidingstraject heeft hij ook zijn BIG registratie GZ psycholoog behaald.

In 1999 maakte hij de overstap naar de Brijder Stichting, waar hij tot 2005 werkzaam was. Hij was functioneel behandelinhoudelijk leidinggevende van twee regio’s. Ook was hij projectleider Herontwerp waarin hij verantwoordelijk was voor het herontwerp van het gehele behandelingsaanbod van de Brijder. Uitgangspunten van het herontwerp waren gebaseerd op de uitgangspunten van het kwaliteitsprogramma “Resultaten Scoren”. Als projectleider Herontwerp was hij lid van het management team van de instelling. In dezelfde periode startte hij met onderzoek naar indicatiestelling in de verslavingszorg als buitenpromovendus bij het Amsterdam Institute for Addiction Research.

De afgelopen jaren heeft hij het afronden van het promotie onderzoek gecombineerd met werkzaamheden als zelfstandige. Hij verrichtte opdrachten op het gebied van Motiverende Gespreksvoering en Cognitieve Gedragstherapie bij problematisch middelengebruik. Hij is (co)auteur van meerdere behandelprotocollen waaronder de Educatieve Maatregel Alcohol (CBR, 2010), de gedragsinterventie Gedragsinterventie Alcohol en Geweld (SVG, 2011) en basisprotocol Cognitieve Gedragstherapie bij middelengebruik.
en gokken (Resultaten Scoren, 2014). Hij heeft onderzoek gedaan naar de bruikbaarheid en toepasbaarheid van Contingency Management gecombineerd met Cognitieve Gedragstherapie voor middelengebruik in de ambulante forensische (verslavings)zorg in opdracht van Kwaliteit Forensische Zorg.

Sinds 2012 is hij betrokken bij Habit Pro, een kleine onderwijsinstelling dat zich bezig houdt met onderwijs en training van Motiverende gespreksoefening, Kortdurende Motiverende Interventies en Cognitieve Gedragstherapie gericht op verandering van problematisch gewoontegedrag. Ook werkt hij als (hoofd) behandelaar en praktijkopleider bij Grip Psychologen.

Hij is bestuurslid geweest van de sectie Verslavingspsychologie van het Nederlands Instituut Psychologen en sinds een aantal jaren bestuurslid van de sectie verslaving van de Vereniging voor Gedragstherapie en Cognitieve therapie.