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## Neuroscience education for health profession undergraduates in a call-center for drug abuse prevention<sup>☆</sup>

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Reactive or proactive telephone services for mental health information are an effective way of providing resources to a widespread population. In Brazil, a nationwide toll-free telephone counseling service gives advice to the community based on scientific concepts and epidemiological data aimed at the prevention of psychoactive drug abuse. The drug call-center offers guidance and information on the characteristics of psychoactive drugs and their reaction in the body, abuse prevention, and resources available to the community. These services complement the brief interventions that are performed when necessary. Specifically, the counseling provided involves a motivational interview, cognitive therapy and relapse prevention. Professionals can also utilize this service to obtain evidence-based information for use in their work.

The call-center is a university extension program to the community and results from a partnership between the Brazilian government (SENAD) and Universidade Federal de Ciências da Saúde de Porto Alegre, which is a

university specialized in health sciences. The individuals performing telephone interventions at the call-center are undergraduates pursuing degrees in health professions and graduate students pursuing masters and doctorate degrees. Graduate students act as counselors in the call-center and as immediate supervisors of undergraduate students during their training in the call-center, and had already received extensive education in brief intervention and neuroscience. The training to achieve competency in administering these interventions relies upon knowledge of the neurobiology of drug abuse. All individuals were trained in neurosciences (basic and applied neuro- and behavioral science) and in motivational brief intervention prior to starting these telephone activities as counselors.

Inadequate clinical exposure to addiction problems and a lack of focused teaching of addiction behavior are common in most health profession programs. It is pressing to assess and revise the undergraduate and graduate curriculum on the subject because of the escalation of substance abuse, the need for resources, the role of medical and other health professions, and the relationship between drug abuse and acquired immunodeficiency syndrome (AIDS), violence and many other serious disorders. Typically, most individuals feel insufficiently prepared to deal with substance use dis-

orders after graduation. In an effort to address this challenge, the trainees we recruited were undergraduate and graduate students.

The objective of this paper is to describe the education methods offered to students working at the call-center and present some results of the different training stages as well as an overall evaluation of the neuroscience training. The learning objectives of neuroscience teaching in a drug of abuse prevention center relate to teaching of therapeutic competencies of undergraduates planning to enter the medical and health professions with an emphasis on therapeutic decision-making.

Training of the students consisted of courses on state-of-the-art knowledge of the biopsychosocial causes and consequences of drug use, abuse, and dependence, and on the evidence-based treatment of addictive behaviors. Training also focused on teaching brief interventions for drug abuse, and how to enroll patients (clients) in hospitals and treatment facilities for illicit drug and alcohol dependence. During training, the students working at the call-center practiced brief motivational intervention with a focus on the translation of scientific facts into everyday language emphasizing consequences of continuous drug use.

The training model used was adapted from the Medical Education Model for

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the Prevention and Treatment of Alcohol Use Disorders (Fleming and Murray, 1998; Murray and Fleming, 1996). The interdisciplinary training model was based on the following educational principles: (a) repetition and reinforcement of major ideas, themes, and skills; (b) group integration and linking of ideas throughout the course; (c) continuous supervision; (d) learner-centered teaching strategies; (e) initial skills-based small-group practice sessions utilizing role-play and simulated or real cases; (f) additional practice sessions in the call-center under close supervision; and (g) periodic testing and feedback (as described in Manwell et al., 2006).

Experienced substance abuse educators and researchers taught the courses. The course trainers included local and out-of-state educators, psychologists and clinicians, university faculty, and drug researchers. The trainers were experts in small-group facilitation, role-playing, and learner-centered teaching methods. The instruments and research procedures were designed for and used in previous undergraduate training projects for medical students and other undergraduates in a similar setting. The effectiveness of the undergraduate training model was examined by analyzing subjective and objective data collected from tests and evaluation checklists used by tutors during the training sessions. The number of participants for each phase of training was considered, as well as the participants' subjective evaluations of the course, their scores in written evaluations and the contribution of the course to development of skills and knowledge.

## 1. The training procedures

The training was a continuous effort since 2005 to prepare undergraduates in health profession courses to deal with drug use/abuse issues in the context of neuroscience and it was designed to be the first contact for most young students with the subject of neuroscience of drugs and to include prospective individuals who would like to broaden their knowledge on the subject. The courses were preceded by the recruitment of students and collection of individual baseline information. Students were offered the

opportunity to enroll in the beginners' crash-course and immediately after to enroll in the other two courses when motivated and if reaching sufficient grading during evaluation. Each stage of training was a course on its own, but the progression to a more advanced phase required that the previous had already been attended.

The educational intervention consisted of three different phases or stages of training, where each stage had aims of its own: (I) a 5-day crash-course (40 h total) in neurobiology of drug use, drug pharmacology and treatment basics, from which students who volunteered to be evaluated and scored greater than 50% on a written test were invited to receive additional training in (II) a 20–40 h on-site motivational interviewing and brief intervention training course. The most skilled students in motivational interviewing received a scholarship who were still motivated to progress for (III) neuroscience on-duty continuous feedback training, where practice in the call-center under close monitoring was allowed and further training in neuroscience of drug abuse was pursued and had a minimum duration of 4 months.

### 1.1. Stage I—crash-course (40 h)

The themes pertaining to the drugs of abuse area, discussed through lectures and small-group seminars, were:

- (a) Brain morphology and physiology, neurogenetics.
- (b) Nerve cells and neurotransmission.
- (c) Behavioral medicine.
- (d) Introduction to psychopharmacology and neurotoxicology.
- (e) Pharmacology, toxicology and effects of marijuana, inhalants, cocaine, nicotine, and ethanol.
- (f) Individual differences in effects.
- (g) Pharmacological treatment bases.

Each theme was presented as a scientific review of the topic area and each crash-course developed all these themes. Supplemental written materials were handed out for each of the modules. Each participant was given a training manual. For the evaluation of students' achievement after the crash-course, a test

with 30 multiple-choice items, with 4 distractors, was administered. Only the students who were interested in pursuing more in depth training were required to be tested. The minimum requirement to continue to the next phase was 50% correct.

### 1.2. Stage II—motivational interview skills training

Immediately after the crash-course the students who were willing to continue and achieved sufficient scoring started the on-site training during 1 month (20 h per week) in small groups consisting of:

- (a) Brief intervention.
- (b) Motivational interview.
- (c) Stages of change.
- (d) Epidemiological research methods.
- (e) Information technology.
- (f) Diagnostic scales.

From this point on, the training always followed the principles proposed in context learning: setting, feedback, repetition and responsibility (Coles, 1998). All students received instructional material for motivational interview training (Miller and Rollnick, 2002). Motivational interviewing is a directive, client-centered counseling style for eliciting behavioral change by helping clients explore and resolve ambivalence. The technique is based on the Stages of Change Model (Prochaska et al., 1992), with the goal of increasing internal motivation for the client to stop using drugs (Gerbert et al., 2003; Miller and Rollnick, 2002).

The training focused on interactions with callers using motivational interviewing, which included open-ended questions, affirmations, reflective listening and summaries. Students practiced boosting client's motivation and adhering to the five general principles of motivational interviewing: expressing empathy, developing discrepancy, avoiding argumentation, rolling with resistance, and supporting self-efficacy. The ability to deal tactfully with clients using oral and written communication skills was emphasized. Practice with the phones and computers available in the call-center provided information technology

training, which aided in the comprehension of technology solutions, practice management, transcription, and patient management systems.

Specific software was created to assist the counselors and is routinely used in the call-center. This software included general client information, and patient questionnaires such as the University of Rhode Island Change Assessment Scale (URICA), The Contemplation Ladder Scale, The Fagerström Tolerance Questionnaire, questions from the National Household Survey on Drug Abuse (NHSDA) and the 8 Question Client Satisfaction Questionnaire (CSQ-8). The URICA assesses motivation for change by providing scores on four stages of change: pre-contemplation, contemplation, action and maintenance. Clinicians may use the URICA to evaluate an individual's level of motivation for change and use this information to help guide treatment approaches. Subscale scores can be used to track shifts in attitudes related to the specific stages of change (McConaughy et al., 1983; Amodei and Lamb, 2004). The Contemplation Ladder Scale was designed as a continuous measure of readiness for behavioral change (Biener and Abrams, 1991). The Fagerström Tolerance Questionnaire is a measure of nicotine dependence (Fagerström, 1978; Fagerström and Schneider, 1989). The NHSDA evaluates the use, time and quantity of drug used (SAMHSA, 1999). The CSQ-8 is a response to several problems and issues that currently cloud the measurement of consumer satisfaction in health and human service systems (Attkisson and Zwick, 1982; Kurtz, 1990; Larsen et al., 1979).

During this hands-on practice, all students were continuously directed to the study of neurobiology of motivation, the rewarding properties of drugs and their reinforcing effects, the brain circuitry disrupted by abused drugs, and the brain circuitry previously found to be involved in self-control, from biochemical, functional neuroimaging, genetic, and treatment research.

To educate the students for the recognition of substance abuse problems and to develop skills for appropriate interventions themes were presented through

simulated case discussions and exercises using role-playing. The setting was the call-center. Standardized patient protocols were used to assess interviewing competency and to measure screening, brief-counseling and motivational interviewing skills (Stimmel, 1998). In addition to the cases described previously, we also used a group of cases reflecting past problems seen in the drug call-center.

The evaluation of interview skills was performed using the Behavior Change Counseling Index (BECCI). The BECCI is an instrument designed for trainers' scoring of the practitioners' use of the Behavior Change Counseling scale in consultations and is used while the simulated patient interview is under way. The scale is composed of 11 items that evaluate motivational interview skills. Each item, scored from 0 ("not at all") to 4 ("a great extent"), indicated the degree to which the action described was executed. A student was considered proficient to progress to other training levels if he or she obtained at least 70% of the maximum score (Lane et al., 2005). Thirty additional actions and skills regarding software and equipment use (information technology application) were evaluated through a yes/no checklist.

### 1.3. Stage III—neuroscience focal point (80 h per month)

After the second training stage, students who were accepted to work in the call-center as counselors participated in on-duty continuous training for the conveying of neuroscience content through information technology, in addition to the motivational intervention. At this time, the students were under supervision for all calls, in order to establish an empathic and collaborative relationship with the client to enhance the client's motivation to change drug-related behaviors. The calls were used for drug-related neuroscience and interviewing education using real-life cases. At the on-duty continuous feedback training (4 months, 20 h per week), all themes presented in the two previous courses were studied in depth. These discussions focused mainly on neuroscience and brief motivational interventions through real-life situations,

according to the cases enrolled through the call-center phone. Additional cognitive skills were then practiced, such as:

- Evidence-based interventions.
- Cognitive therapy.
- Neurobiology of motivation.
- Neurobiology of drug abuse.
- Relapse prevention.
- Family support.
- Pharmacotherapy and drug abuse treatment.
- Abuse and dependence diagnostic criteria.

The third stage evaluation was designed to verify if the students could excel achieving in-depth knowledge in drug abuse intervention and neuroscience knowledge while practicing in the call-center. To systematically measure the motivational brief intervention skills in the call-center the BECCI scales and competencies checklists (empathy, ethics, listening, verbal communication, problem resolution) were rigorously applied at the depth of the supervisors who were counselors already. The students were evaluated at the beginning of this phase and thereafter, monthly, by supervisors while they answered real-life calls, and were monitored for proper use of motivational interview and intervention skills, the ability to convey neuroscience and drug information to clients, information technology abilities and personal interactions with staff members. Based on these continually applied evaluations, the students received feedback about their performance and reaching a score of 80% or higher was the objective of the continuous training in the call-center. This score was aimed as the cut-off at this stage because it is the minimum grade in our graduate scoring system to be classified as very good. Multiple-choice tests, also aiming to evaluate in-depth graduate level knowledge in neuroscience and drugs effects were given at the end of the third stage of training and the data was used to correlate with the interventions skills acquired during training. The tests evaluated knowledge in neuroscience at the depth of post-graduate training.

## 2. Results from students testing and completion of courses

The educational interventions described herein were held between January 2005 and March 2007. There were from 70 to 80 students enrolled in each one of the beginners' crash-courses offered. Seven similar educational interventions, the same themes presented all times, took place by the end of 2007.

In 2 years, 468 university students from health-related programs at different universities in the region enrolled in and successfully completed (at least 75% attendance) one of the 40-h crash-courses. The students were from the following disciplines: psychology 35%, biology 18%, nutrition 8.7%, biomedicine or pharmacy 11%, social services 8.7%, medicine or nursing 5.6%, physical education or pedagogy 5.6%, occupational therapy 5.6%, physiotherapy and speech therapy 5.6%. None of them had been exposed to more than 4–6 h of lectures on drugs of abuse in their previous regular academic activities. Even for those students who did not follow through the three-stage instruction program, the crash-course differed from all other training on drugs the students had experienced in their academic lives because it expanded their academic training in drug abuse by 6–10 times.

Approximately 34% (160) of the crash-courses attendees continued to be interested in intensifying their training and completed the multiple-choice written test; 148 students achieved a passing score of 50% correct or more (mean score 74.7%). Among the group that passed the test, a total of 88 students from different areas enrolled in the second stage on-site motivational interviewing course. Of the 88, the top 50 individuals, who showed at least 70% proficiency in motivational interviewing, received scholarships to continue on to the neuroscience training.

After these students completed 4 months in the third stage of training, a mean score of 68% in the intervention skills evaluation and a mean score of 60% regarding advanced neuroscience knowledge was demonstrated. It must be recalled that the tests applied were at the level of graduate training to students who were at the undergraduate

level and these scores were estimated to be a fraction of 80% of graduate achievement, meaning that these scores were the equivalent to 75–85% of the scores presented in the previous phases. A positive correlation ( $r=0.61$ ;  $p<0.05$ ) was demonstrated between brief motivational intervention skills acquired during the third stage of intervention training and neuroscience knowledge. One could propose that the call-center educational program increased neuroscience knowledge of students because there were no lectures or specific training in molecular biology, physiology of reward, neuropharmacology, neurotoxicology during this third stage and the students would have to study and acquire information on the subject depending on the demand from questions from the call-center.

On average, students involved in this training evaluated the crash-course as "very good," and stated that they would repeat the theoretical training if given the chance. Also, the percentage of students who would recommend the program to their colleagues was high. The individual feedback that students trained for intervention gave indicates that students evaluated the scientific nature of the training as very good, mainly due to the opportunity to receive training in neuroscience. Most students expressed their enthusiasm at the level of neuroscience knowledge acquired, and many voluntarily expressed interest in future graduate training in neuroscience.

## 3. Conclusions

College and university education in most countries should include more programs aimed at educating future health care professionals on how to deal with substance abuse disorders using state-of-the-art techniques to convey evidence-based research results. The training in neuroscience for undergraduates attending a health profession course described here indicates that the current model can enhance skills and behaviors when addressing drug use problems from a neurobiological point of view.

The number of faculty in professional schools with expertise and interest in drug abuse should be increased, especially since there are no graduate

programs in drug addiction in Brazil. This model is proposed as an effective way to train individuals who plan on staying in academia on substance abuse research as well as future professionals looking to work with patients who abuse drugs.

The key elements for success incorporated in the training included recruiting students who already had basic training in anatomy, physiology and biochemistry, using standardized patient evaluations to measure changes in skills, giving students feedback on their evaluation scores to alert them to deficiencies and heighten their pursuit of more knowledge, giving on-site training based in context learning and the reinforcement of major ideas, themes, and skills, and using learner-centered teaching strategies in small group settings. The complexity and diversity of activities and elements included in training have also been shown to motivate interest in drug abuse knowledge and improve the number of future professionals who are qualified to work or research in the area.

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