The effect of motivational interviewing on the intradialytic exerciser: a pilot study

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Smitham, L., & Lawn, S. (2010) The effect of motivational interviewing on the intradialytic exerciser: a pilot study. *Ren Soc Aust J, 6*(3). 106-113

Submitted March 2010 Accepted May 2010

Abstract

Chronic renal failure is a complex condition in which a plethora of psychological and physiological complications may occur and for which haemodialysis is one treatment option. Patients at Hampstead Dialysis Centre, South Australia, are offered the option to exercise whilst undergoing dialysis (intradialytic exercise) with the assistance of dedicated exercise physiologists, as it may ameliorate some of the ubiquitous symptoms of their renal condition. The objectives of this study were to determine whether the provision of motivational interviewing (MI) would increase the uptake of intradialytic exercise in patients who did not exercise at all or who exercise at minimal levels. MI is a patient-centered method for enhancing intrinsic motivation to change. Quantitative and qualitative data was collected from eight patients. A single case experimental design was used, given the small sample and absence of a control group. Perceived usefulness of the intervention for patients was elicited from the exercise physiologists via in-depth interviews at the conclusion of the study. A high dropout rate occurred and *p* values were not significant. Despite the inability to make generalizations, there were some noteworthy trends, particularly the link between overall exercise behaviour, lower DASS scores and higher exercise self determination (BREQ-2).

Key Words

Motivational Interviewing, haemodialysis, intradialytic exercise, chronic renal failure

Introduction

The South Australian Chronic Disease Action Plan (SA 2009) is designed to target early illness intervention, secondary illness prevention and disease management strategies, including kidney disease, with an emphasis on lifestyle/ behavioural modification, such as exercise. Thirty minutes of physical activity on most days, as a preventative measure and following diagnosis of renal failure is recommended (Kidney Health Australia, 2009). Greater benefits may be accomplished if the exercise occurs concurrently with dialysis (intradialytically) as it may result in up to a 20% increase in the removal of urea (King Van-Vlack et al, 2006).

Chronic renal failure (CRF) is an insidious disease which may be undetected for years, by which time up to 90% of kidney function may be lost (Kidney Health Australia, 2009). CRF may contribute to, or complicate other chronic conditions, including neurological, cardiovascular, haematological, respiratory, gastrointestinal and skeletal-muscular conditions (American Nephrology Nurses' Association, 2006). The prevalence of psychological disorders such as depression in chronic kidney disease may predict mortality outcomes (Finkelstein et al, 2000). Patients with end stage renal failure face a variety of acute and longer term stressors related to loss of normal psychosocial function, impairment of occupational roles and fear of death (Kouidi, 2006). Demand for renal replacement therapy is increasing as the population ages and as prevalence of the highest risk factor, diabetes mellitus, increases (Australian Institute of Health and Welfare, 2009). The most common treatment option is haemodialysis (ANZDATA, 2007), entailing presentation to a specialized centre three times weekly for technological, life saving treatment.

Clinical significance of exercise in chronic renal failure

Programmed exercise may be an adjunct to routine dialysis treatment to delay possible physical deterioration (Knap et al, 2005), facilitate waste product removal, (Farese et al, 2008) and improve quality of life as well as extending survival (Kouidi, 2006). Other potential benefits

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are improvement in the quality of life, strength and flexibility parameters as well as biochemical improvements, including reduction in serum phosphate levels (Bennett et al, 2006). Maintenance dialysis patients can suffer from profound muscular weakness, and even modest intradialytic exercise can improve muscle function and physical performance significantly (Storer et al, 2005). However, positive outcomes are not synonymous: a brief West Australian intervention found no improvement in physiological status, satisfaction or health-related quality of life (McMurray, 2008). The authors established that exercise was not well tolerated and programme adherence varied significantly. Studies of the psychological effects of exercise in renal patients from the last 25 years indicate that exercise is directly related to a reduction in depression and anxiety (Carney et al, 1983; Kouidi et al, 1997; Suh et al, 2002; Ouzouni et al, 2009). However, few patients with chronic renal failure are prescribed exercise.

Barriers to exercise

Goodman et al (2004) ascertained that the most salient barrier to exercise in the dialyzing population is a lack of motivation rather than health related impairment. Another barrier is poor awareness by dialysis staff of patients' physical functioning or need for physical activity and their consequent lack of encouragement to patients to exercise (Painter et al, 2004). Utilization of one common strategy, advice giving, was scrutinized in several meta-analyses (Eden et al, 2002; Lawlor & Hanratty, 2001) that found no evidence to support the efficacy of giving advice in primary care settings to increase physical activity. They concluded that giving advice is not efficacious in sustaining physical activity levels. Hillsden et al (2002) concluded that giving advice to exercise may create resistance and irritation in the recipient and that brief negotiation of 20-30 minutes is likely to be more efficacious.

Motivational interviewing and physical health care

MI has been used to support behaviour change in the management of a variety of physiological and psychological conditions (Arkowitz et al, 2008). It is a "directive, client- centered counseling style for eliciting behavior change by helping clients to explore and resolve ambivalence" (Rollnick & Miller, 1995, p.325). It acknowledges the importance of a person –centered approach to worker-patient interaction as evidenced by the four core MI principles: express empathy, support self-efficacy, roll with resistance and develop discrepancy between current and future behaviour (Miller et al, 1999). MI is also important in Prochaska and DiClemente's (1983) transtheoretical stages of change model, with MI aligning to the contemplation stage, providing the mechanism for supporting behaviour change from one stage to the next.

Common themes of meta-analytic reviews of MI in health care (Rubak et al, 2005; Britt et al, 2003; Dunn et al, 2001; Hettema et al, 2005; Knight et al, 2006; Martins & McNeil, 2009), include the need for evaluation of methodology, examination of the theoretical basis, a determination of what specifically is efficacious, what client groups would benefit most from interventions, and the need for clinical competencies and training for clinicians delivering MI. Issues of intervention fidelity are raised by Resnicow et al (2006) who delineate three main concerns related to MI: conceptualization, delivery and assessment, and recommend trials with a control group to increase internal validity. This critique is supported by Emmons et al, (2001) who argue that clinicians delivering MI need increased precision when describing the technique and that a distinction needs to be drawn between counseling which adheres to the 'spirit' of the method and counseling which does not, but is described as MI. Mesters (2009) argues that clinicians have positively responded to MI training but continue to underestimate its complexities and find suppressing previous counselling behaviours difficult.

Counseling specific to exercise and dialysis

Literature specifically describing the application of exercise counseling to patients with chronic renal failure is sparse. Fitts et al (1999) have contended that exercise coaching and rehabilitation counseling improve the quality of life in this client group. However, their specific counseling and coaching methodology variables of most importance for change are difficult to determine. Another study (Van Vilsteren et al, 2004) found that counseling and an exercise programme of low to moderate intensity were effective in improving behavioural change, physiological status and health-related quality of life. The counseling was based on three models: the transtheoretical model, MI and health counselling. However, specific MI techniques were not evident and counselling techniques employed were likely to be contrary with the 'spirit' of MI, for example, formulation of exercise targets could be construed as persuasion. Clinicians' experience of MI was not stipulated and internal validity concerns existed in determining which of the three counseling techniques affected the dependant variable of motivation to exercise.

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Integrating exercise in the Renal Unit

Intradialytic exercise does not appear to be risky: in a review of seventeen published trials of intradialytic exercise programmes, no serious adverse effects as a result of exercise were found despite the plethora of complications in chronic renal failure (Singh et al, 2005). The authors recommended routine incorporation of intradialytic exercise into clinical practice, arguing that an integrated exercise programme requires committed, encouraging staff, careful assessment and individual programmes incorporated into care plans (Kutner, 2007; Bayliss, 2006; White & Grenyer, 2006). Therefore, dialysis patients are ideally placed for incorporation of exercise into their treatment days as it would capitalize on their time, produce increased physiological benefits and help prevent complications of the disease (Singh et al, 2005).

Methods

The aim of the study was to determine whether MI promotes intradialytic exercise in the dialysis population, given that some patients are ambivalent about exercise despite education, encouragement, variety of exercise, goal setting and services of exercise physiologists.

The research hypothesis was that MI would positively affect the uptake of intradialytic exercise, particularly those who under-exercise or who do not exercise. It was anticipated that behaviour change would occur after the administration of specific MI techniques.

Recruitment

A purposive sample of thirteen patients was recruited via direct request and advice from an exercise physiologist and Clinical Service Consultant. Participants represented 25% of the total population of patients at the centre. One candidate declined participation and 12 remaining candidates voluntarily agreed to participate. Patients who could not speak English, were illiterate, cognitively impaired and irregular attendees were excluded given this would compromise their understanding and interaction with the MI process. Consents, initial measures, participant information sheets were administered at the first interview. Participants had medical clearance to exercise from their treating team and were offered the option to be interviewed in a private area at the Centre. Inducements were not offered and ethics approval was given by the Royal Adelaide Hospital Ethics Committee and the Flinders Clinical Research Ethics Committee. Two staff in-service sessions prior to study commencement provided an explanation of the researcher's presence and reassurance workload would not increase subsequently.

Design

A single case experimental design, with multiple baselines, was utilized in order to rule out a spontaneous ('placebo') effect occurring (Barlow et al, 2009). The effect of MI was assessed on each participant individually. The small number of participants ruled out the possibility of using a control group and as no other dialysis centre in South Australia has an established exercise programme, a control group was unable to be recruited from alternative sources.

Interventions

Interviews occurred on 6 occasions (15-25 minutes each); the first five interviews occurred a fortnight apart, the sixth interview occurred four weeks later. The first three interviews were baselines during which no intervention occurred. Demographic information, non dialysis exercise patterns and observations about frequency of exercise in the unit and over the previous three months were collected. All interviews occurred whilst the participant dialysed, in their normal treatment environment, to capitalise on their time. The large treatment room and space around participants facilitated privacy. The intervention was administered on the fourth and fifth interviews. The carefully replicated interventions were administered by one "MI informed" (Resnicow et al, 2001) researcher, Masters level student, to preserve intervention fidelity.

Interventions were:

- 'Values priorities': interviewer-assisted discussion about the most important facets of a participant's life, from which a specific statement of discrepancy between values and exercise behaviour was formulated.
- 'Importance and confidence of changing': rated as a percentage plus identification of health goals and looking at obstacles to achieving them.
- 'Decisional balancing: pros and cons of exercise': implemented as a written exercise utilizing a four way chart, highlighting aspects of exercising and not exercising.
- The 'Change plan' worksheet: utilized where participants indicated they were at the appropriate stage to maintain exercise or were at a stage to change (to avoid encountering resistance which is counterproductive)
- Information on exercise was offered at interview four, consisting of recommendations of the South Australian Chronic Disease Action Plan (SA Health, 2009) and specific benefits of intradialytic exercise. The offer of information prior to dissemination gave the client an opportunity to decline it.

Outcome Measures

Quantitative data was collected from:

- Observation of exercise patterns at each interview, in order to identify any changes in exercise behaviour.
- The Exercise Regulations Questionnaire (BREQ) (Markland *et al,* 2000) validated by Murcia *et al* (2007): a 19-point Likert scale questionnaire, designed to measure self- determination in exercise, with five separate subscales which measure amotivation, external regulation, introjected regulation, identified regulation and intrinsic regulation. Scores high in amotivation/ external regulation indicate less self determination in exercise. Scores orientated toward intrinsic regulation indicate increased self determination. Administered at baseline, six and 12 weeks.
- The Depression and Stress Scale (DASS): a set of 42 questions designed to measure three self-reported states: depression, anxiety and stress, utilized in order to identify negative emotional states which may account for lack of engagement in exercise. Administered at baseline, six and 12 weeks. Higher scores correspond to greater levels of anxiety/stress.
- The 'importance and confidence of changing' worksheet (Miller, 1999), a specific MI tool administered to identify and measure the importance of behavioural change and confidence to implement change.

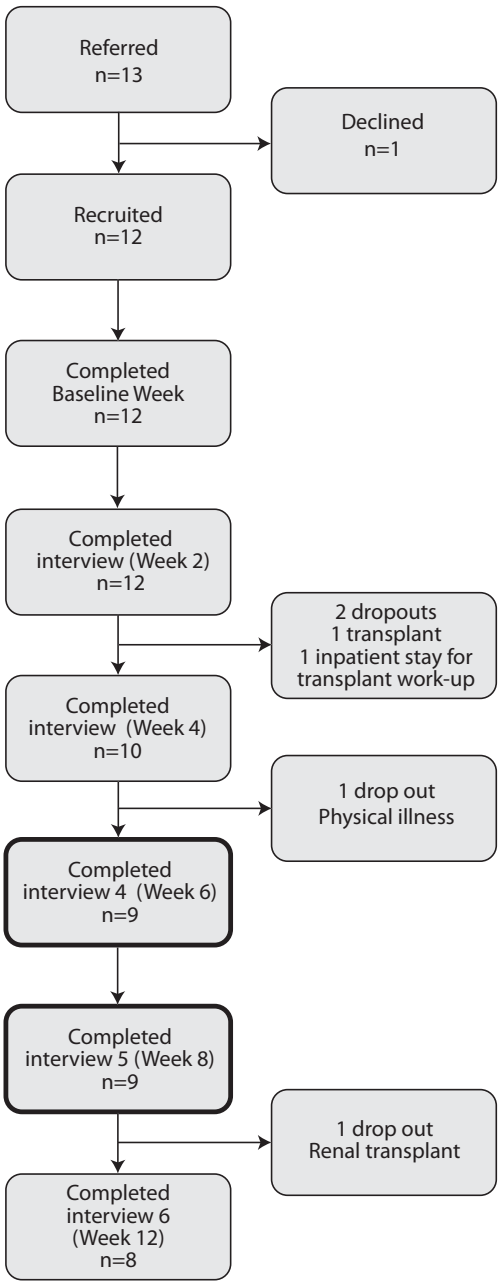
Qualitative data was obtained from:

- Discussions emanating from implementation of MI strategies (e.g., to determine statements of resistance).
- An audio-taped, closed group, interview with three exercise physiologists who implement the exercise programme, to gain insights about treating this client group and motivational methods utilized.

Data analysis

Initial data analysis was carried out to check for data quality including allowable ranges and errors. Univariate analyses were performed on all variables to clarify data structure. Continuous data from outcome measures are presented as median and interquartile ranges (IQR, range from the 25th to the 75th percentile). To assess for any differences in distributions of continuous data across repeated measures, Friedman's and Kendall statistics were calculated. The two tests are equivalent and one p-value is provided for both. These non-parametric tests are an alternative to repeated measures analysis of variance (ANOVA) however do not require assumptions about the distribution of the data. They were used to determine differences in treatments across multiple test attempts and to measure the degree and significance of the correspondence between two rankings, accordingly. A Type 1 error rate of alpha=0.05 was used in all analyses to test for statistical significance. Statistical analysis was performed with assistance from a statistician at Flinders University using Stata 11.0 (StataCorp, 2009) software.

Table 1: Participant Flow Chart



Results

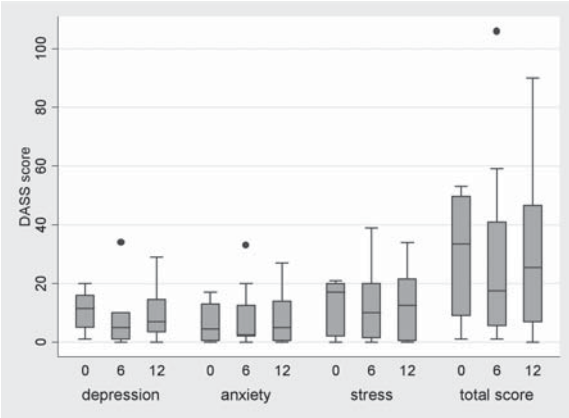
The final cohort (allowing for 4 dropouts – See Table 1) consisted of n=5 males and *n=3* females, M *age*= 51.5 years with an age range of 21 to 70 years. Two participants were Aboriginal. Average length of treatment was 4.4 years. Living arrangements were: three participants living alone, two with partners, two with 'other' person, one in an aged care facility.

Table 2. Summary of psychometric scores presented as median and IQR (25th-75th percentile)*

Measure		Baseline	6 weeks	12 weeks	P value[a]
DASS	Anxiety	4.5(0.5-12.5)	2.5(2-12.5)	5(0.5-14)	0.67
	Stress	17(2-20)	10(1.5-20)	12.5(0.5-21.5)	0.80
	Depression	11.5(5-16)	5(1-10)	7(3.5-14.5)	0.12
	Total	33.5(9-49.5)	17.5(5.5-41)	25.5(7-46.5)	0.52
BREQ-2	Amotivation	0.5(0-1.5)	0.13(0-1.88)	0.63(0-1.38)	0.75
	External	0(0-0.25)	0.125(0-1.875)	0.13(0-0.5)	0.38
	Introjected	0.83(0 1.5)	0.50(0.17-1.16)	0.66(0.17-1.16)	0.80
	Identified	2.13(1.382-.63)	2.63(1.5-3.38)	2.75(2-3.5)	0.57
	Intrinsic	2.25(1.88-2.63)	2.5(1.99-3.5)	2.88(2.38-3.13	0.97
Confidence (%)		82.5(50-90)	80(72.5-90)	67.5(50-75)	0.17
Importance (%)		75(60-92.5)	67.5(50-97.5)	80(65-97.5)	0.97

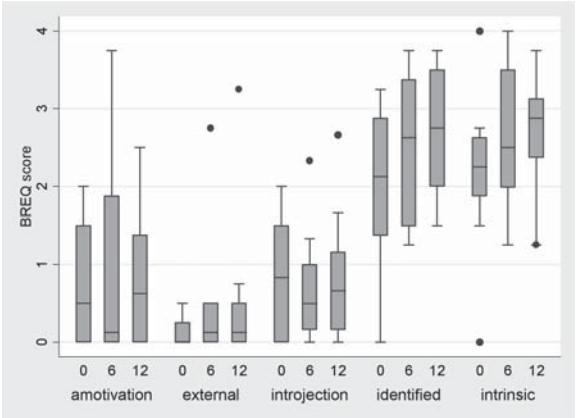
*Abbreviations: DASS, Depression anxiety and Stress Scale; BREQ-2, Behavioural Regulation in Exercise Questionnaire [a]p- value for both Kendall and Friedman statistics

Figure A: Depression, Anxiety and Stress Scale (DASS) scores by time (weeks)*



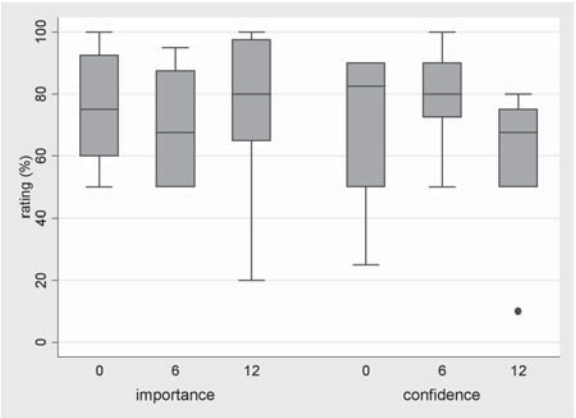
*Box plots indicate median, interquartile range (IQR), range of the data within 1.5*IQR, and outliers displayed as point markers. Higher scores indicate greater negative affectivity.

Figure B: Behavioural Regulation in Exercise Questionnaire (BREQ-2) scores by time (weeks)*



*Box plots indicate median, interquartile range, range of the data within 1.5*IQR, and outliers displayed as point markers. Higher scores indicate improvement.

Figure C: Confidence and importance scores by time (weeks)*



*Box plots indicate median, interquartile range, range of the data within 1.5*IQR, and outliers displayed as point markers. Higher scores indicate improvement.

Measures

Table 2 presents median values (IQR) and *p*-values for Friedman and Kendall statistics. There was no evidence to reject the null hypothesis that distributions were the same across repeated measures for all outcome measures at an alpha level of 5%. Figures A, B, C present box plots of distributions for each measure by time.

Overall exercise behaviour did not increase as a result of the administration of MI in this cohort: one participant reported commencement of regular intradialytic cycling on the fifth and sixth interviews. Another participant who engaged in a set routine each treatment session did not change exercise behaviour. Other participants declined the option to exercise intradialyticaly or exercised randomly.

Qualitative results

All participants prioritized health as either quite important or very important. Family or social contact was also prioritized highly. The decisional balance worksheet revealed all participants identified positive benefits of exercise. Participant beliefs regarding the benefits of not exercising revealed that two participants stated fatigue was a rationale for not exercising, one participant responded that they did not like pressure to exercise, and two participants did not want the stress of exercising. The costs of exercising were elicited: five participants believed that exercise caused them to feel fatigued, and three did not identify any costs of exercise. The costs of not exercising were also elicited: six respondents identified costs such as muscle weakness, boredom and weight gain, and three identified negative effects on their emotional state, for example, feeling depressed or guilty.

Change plan worksheets were completed by 50% of participants. Seven parameters such as identifying necessary changes, reasons for change, steps to implement change, ways others may assist, recognition of successful strategies, potential impediments and alternative strategies were completed in entirety. Routine non dialysis day activities included golf, walking, shopping, gardening, house work and socializing: six participants nap on non-treatment days.

Stage of change statements were conceptualized according to the framework of Prochaska and Di Clemente (1983). Statements of resistance included being too tired for intradialytic exercise, performing exercise external to the unit, inability to exercise due to physiological health issues, not wanting to lose weight, never previously having had to engage in intradialytic exercise and the need to rest. Pre-contemplation statements included imparting the knowledge that exercise is important and then countering with alternative reasoning. An example of contemplation to change exercise behaviour was the hope that they would develop physically soon. Statements of the action stage were not identified. Statements of behaviour maintenance were unequivocal and included rating intradialytic exercise as extremely important and with the intention to continue. All participants accepted the offer of information on exercise recommendations and benefits of intradialytic exercise. Participants were asked to rate overall importance of change to exercise behaviour and confidence to do so, according to one of four combinations: four rated 4 (high importance, high confidence): one rated 3 (high importance, low confidence), three rated 2 (low importance and high confidence).

Various themes were gleaned from the exercise physiologists: they perceived their roles as supportive, educative and practical, with emphasis on encouraging exercise. An awareness of barriers to exercise was elicited, as were attempts to eliminate or ameliorate those barriers. Reduced motivation was evidenced by patients sleeping, saying an outright 'no' to the offer of equipment or accepting the offer of a machine and then not exercising in the absence of the exercise physiologists. Subtle forms of resistance were not determined. They reported being cognisant that good rapport is integral to encouraging exercise and are flexible in their approach to both exercise and rapport building (new clients are allowed to adjust/ they accept that patients may not exercise all of the time). The exercise physiologists have utilized a variety of creative measures to motivate patients extrinsically, for example, 'Tour de Hampstead', 'Exerciser of the month', by delivering advice and engaging in socialization to facilitate rapport.

Discussion

Evidence which supports a causal link between MI and intradialytic exercise was not established in this study: there was little change to exercise behaviour from baseline to the conclusion of the study. Two participants exercising the most intradialyticaly at 12 weeks and who exercised routinely on non-dialysis days demonstrated overall lower DASS scores which lends support to the findings of others (Carney et al, 1983; Kouidi et al, 1997; Suh et al, 2002; Ouzouni et al, 2009) regarding the psychological benefits of exercise in renal disease. These two participants also had high exercise behaviour self-determination (BREQ-2). Examination of individual BREQ-2 sub scales reveals that self determination increased over the 12 week period for all but one participant, however, exercise frequency did not increase accordingly which may indicate that a longitudinal study is worthwhile.

Overall DASS scores were unexpected, with 50% of participants recording parameters in the normal/mild range, which does not explain lack of exercise engagement. The outlier for these measures (see Figure A) lives in supported accommodation and self reports sedentary daily activities and sporadic intradialytic exercise. This participant demonstrated higher levels of amotivation (BREQ-2) than any other participant and less confidence in exercise behaviour change.

Seven participants had a high level of confidence they could change exercise behaviour, possibly due to the knowledge that exercise is readily available and had higher levels of self determination (BREQ-2). All participants valued health significantly and expressed beliefs about positive benefits of exercise and negative effects of not exercising. Many activities described (e.g., cleaning, feeding animals) do not meet criteria for sufficient physical activity which is '30 minutes of moderate physical activity on most days of the week' (SA Health, 2007), possibly providing the platform for educative dialogue in alternative circumstances.

The language of change plan worksheets, completed by four participants, was orientated toward specific achievements and goals of maintaining exercise

behaviour with evidence of commitment and willingness, particularly in the two participants who demonstrated higher exercise levels. As not all participants completed this worksheet, possible improvements to the study may have included identifying participant stage of change, in order to modify and individualize interventions.

Limitations

Several limitations were encountered, including the very small sample size, comparable high drop out rate, lack of control group, and the short time frame for the study. All of these aspects pose a threat to the validity of this study and the impact it may or may not have on clinical practice which means generalization of findings is not possible. Specific further limitations were the study design: the interview -administered measures may have caused participants to respond in socially desirable ways, including baseline phase (possibly mediated by interview administration in participants' natural treatment environment). Having one researcher facilitated protocol adherence but the significant number of interviews performed by one individual was onerous. Staff information sessions held prior to the commencement of the study yielded anecdotal evidence that patients become liable to irritability and fatigue if substances (e.g., analgesics or alcohol) are dialyzed out and that patients prefer a treatment routine. Interviews therefore occurred as soon as practicable after treatment commenced. Another limitation is the lack of comparative exercise programmes. The long term intradialytic exercise programme in which the study was based is innovative. Using an imprecise measure such as rating importance and confidence of changing exercise behaviour yielded little quantitative data but initiated dialogue of qualitative value suggesting exploration of exercise orientated language may be worthwhile to determine what variables influence their decision to exercise, or psychosocial interaction variables which may occur when one exerciser is exposed to another. Future research could focus on MI skills acquisition by exercise physiologists, as they are likely to have greater rapport and potential for opportunistic interventions.

Whilst no complications arose during the study, there was no indication that MI was efficacious. Optimistically, the study may facilitate an understanding of what counseling is pertinent for this cohort and at the least, promote awareness of language indicating change or resistance talk.

Conclusion

Interventions such as intradialytic exercise may address key behavioural and biomedical risk factors (South Australian Chronic Disease Action Plan, 2009). Proactive integration of exercise orientated behaviour in the disease process is ideal, and implementation of MI interventions may encourage adherence. The aim of this study was to determine if changes to the uptake of intradialytic exercise through the administration of MI would occur. MI is a strategy designed for an understanding of a person's motivations, orientated toward facilitating patient empowerment and the behavioural change necessary for improved physical health outcomes.
The limited number of potential candidates for the study and attrition of recruited candidates was a shortcoming. The results of this pilot study are inconclusive and inferences from the data cannot be made, however, the lack of positive results does not provide justification to avoid further study in this field. Trends in quantitative data indicate individual benefits of exercise. Qualitative data yielded interesting participant perspectives and highlighted the importance of rapport with care-givers. Evaluation of MI on other essential health parameters such as adherence to diet, fluid intake and medication in this client group could be made. Future research needs to answer questions utilizing a classic research design, utilizing a larger cohort and establishment of a longitudinal study. Chronic renal failure is a complex condition in which adherence to health orientated behaviour predicts better outcomes and for which MI may be a facet of care.

Acknowledgements:

The authors would like to thank Mr David Smith, Flinders Human Behaviour and Health Research Unit, Flinders University for his advice and support with statistical analysis of the data.

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