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Effect of Progressive Muscle Relaxation on Anxiety Among Patients Undergoing Haemodialysis

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ABSTRACT

Anxiety is common among people who receive maintenance haemodialysis, yet it is often unrecognised and rarely treated with anything other than reassurance or sedative medicines. Progressive muscle relaxation, a structured routine of tensing and releasing muscle groups in sequence, is cheap, can be taught by nurses and can be practised during a dialysis session, which makes it an obvious candidate for supportive care. This narrative review asks what the published literature allows us to say about its effect on anxiety in this population. It draws on work about the burden and causes of anxiety in kidney failure, the physiology of stress, the evidence for relaxation training in other groups, and psychosocial trials carried out in dialysis units, and it reports no new data. The indirect evidence makes a modest benefit plausible, and the safety of the technique is not in doubt. Direct evidence in haemodialysis is thin: trials tend to be small, unblinded and short, measures of anxiety overlap with symptoms of kidney failure, and attention from staff is seldom separated from the technique itself. The review concludes that the practice is reasonable to offer as a supplement to usual care, that the size of its effect is not established, and it sets out what a convincing trial would need to include.

Keywords: Progressive muscle relaxation; Anxiety; Haemodialysis; End-stage kidney disease; Nursing care; Non-pharmacological intervention; Narrative review

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Article Class: Narrative Review

1. Introduction

Haemodialysis keeps a person alive, and it also reorganises the week around a machine. Treatment commonly takes several hours, three times a week, for as long as a transplant or death does not intervene. Patients live with fluid and

dietary limits, vascular access that can fail, fatigue that lingers after each session, and a future that is hard to plan. It is not surprising that low mood and worry travel with the treatment. Symptom surveys of people on dialysis find emotional symptoms among the most frequent and



the most troubling (1, 2).

Anxiety deserves more attention than it receives. Depression has been studied far more often in kidney disease, and its links with hospitalisation and death are well described (3, 4). Anxiety has a shorter literature, but structured interviews in dialysis units suggest that anxiety disorders are common and often missed (5, 6). A unit with needles, alarms and hours of enforced stillness can be an anxious place for reasons that have little to do with the illness itself.

Progressive muscle relaxation, first described in the 1930s as a way of teaching people to recognise and release tension, is one of the simplest responses on offer. The patient tenses a group of muscles for a few seconds, lets go, and attends to the difference, moving through the body in a set order. It needs no equipment and carries little risk, and a nurse can teach it in a short session. Whether it reduces anxiety in people on haemodialysis, and by how much, is the question this review takes up. The aim is a fair account of what is known, and of what is merely repeated.

The title of this article reads like a single trial, and it should be said at the outset that none is reported here. No patients were recruited, no scores were collected and no unit or district is described. What follows is a narrative review of published work. Where direct evidence in dialysis patients is thin, we say so, and we lean on evidence from related populations only with the caveats that borrowing requires.

2. Literature Review

2.1 Anxiety in People Receiving Haemodialysis

Estimates of how many dialysis patients are anxious vary widely, and the variation is informative. Studies differ in how they define anxiety, whether they use questionnaires or interviews, and which

patients they include. A review of depression in chronic kidney disease found very large differences between studies depending on the method used to assess it (7), and the same pattern holds for anxiety. Narrative reviews of anxiety and depression in end-stage kidney disease conclude that both are common, that they overlap, and that both are under-detected and under-treated (8).

Measurement is a real difficulty, and Table 1 sets out the commonly used instruments. Many questionnaires ask about sleep, appetite, fatigue, palpitations and restlessness. In a person with kidney failure these symptoms can arise from uraemia, anaemia or fluid shifts as readily as from worry, so scores may rise for reasons that are not psychological. The Hospital Anxiety and Depression Scale was designed to avoid somatic items (9, 10), which is an advantage, though its performance in people with kidney failure has been examined and judged only partly satisfactory (11). This is one reason the same technique can look impressive in one report and unremarkable in the next.

Table 1. Instruments commonly used to measure anxiety, and cautions when applied to dialysis patients.

Instrument	How it is completed	Caution in dialysis
Hamilton scale	Clinician rating after interview (12)	Somatic items overlap with uraemic symptoms
HADS	Patient self-report, no somatic items (9, 10)	Validation in kidney failure is mixed (11)
GAD-7	Brief patient self-report (13)	Built for primary care, not dialysis
Beck inventory	Patient self-report (14)	Many items are bodily symptoms (11)

Note: Qualitative summary. Cut-off scores are deliberately not given because they differ between settings and validation studies.

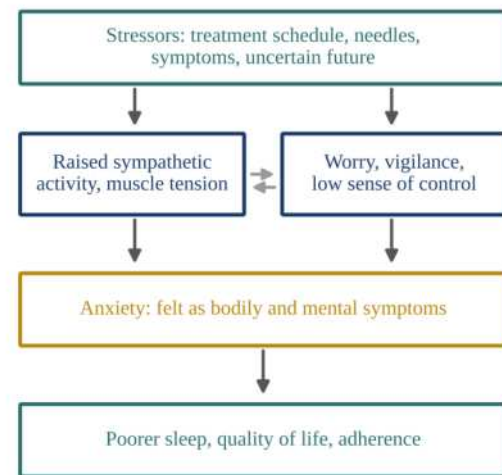


The practical consequence is that a trial which reports a fall in anxiety score needs to be read with the instrument in mind. A change in somatic items could reflect better dialysis adequacy or a different timing of the questionnaire relative to the session. A clinician-rated scale reduces some of these problems and adds others, because the rater usually knows which patient received the intervention (12). The point is not that a trial is poor, only that its result travels less far than its abstract suggests.

2.2 Why Dialysis Provokes Anxiety

The causes are many and they interact. Pain and symptom burden, including itching, cramps and poor sleep, reduce quality of life and travel with distress (15, 16). Lower quality-of-life scores predict hospitalisation and death (17, 18), so psychological state is not a side issue to be handled after the physiology has been sorted out. Reviews of the psychosocial side of kidney failure describe loss of role, dependence on a machine and a clinic schedule, and uncertainty about the future as the recurring themes (19, 20).

Biology contributes too. People with chronic kidney failure show raised sympathetic nerve activity, an observation made in the early 1990s and later confirmed with direct recordings in dialysis patients (21, 22). The stress response involves coordinated autonomic and hormonal changes, regulated by the brain regions that also process threat and uncertainty (23). A patient who is already physiologically primed, and who is lying beside an alarming machine, has less margin before ordinary apprehension becomes anxiety. Figure 1 sketches how these influences might feed one another and where a relaxation routine could plausibly interrupt the loop.



Relaxation training might act on muscle tension and arousal (left) and on the sense of control (right); schematic, not data

Figure 1. Proposed route from dialysis-related stressors to anxiety, and the points at which relaxation training might act (schematic, not data).

The scheme is a hypothesis, not a finding. Each arrow in it has some support from the studies cited, but no single study has traced the whole path in dialysis patients, and the figure should not be read as a causal model. That is a modest claim, and it is the one the evidence will currently bear.

2.3 Progressive Muscle Relaxation: Method and Proposed Mechanisms

In its original form, the technique took many sessions and a great deal of practice. Later versions shortened it by grouping muscles into a handful of larger sets and by dropping the tensing phase for some groups, and a quantitative review of these abbreviated forms found that they retained much of the benefit (24). A typical session now lasts a few minutes to half an hour, may be led by a nurse or by a recording, and is followed by home practice where that is possible. In a dialysis chair, the access arm is usually left out of the exercise.

Several mechanisms have been proposed. The simplest is that deliberate release of muscle tension reduces the bodily signals that the brain interprets as threat. A second



is that the routine works as a form of distraction and a structured focus of attention. A third involves the physiological stress systems: experimental work on abbreviated relaxation found changes in salivary cortisol, though in a small, healthy sample (25). A critical review of the theory suggests that the technique works for anxiety but that we understand less well why, and that its effect may be partly shared with other relaxation methods (26).

A recent comparison of progressive muscle relaxation, deep breathing and guided imagery found that all three shifted self-reported and some physiological states towards relaxation, which fits the view that the techniques share an active ingredient (27). A study of abbreviated relaxation in stressed students reported benefits that depended on the comparison condition (28). The picture is one of an intervention that works in a general sense and whose specific advantages over its neighbours are unproven. Read this way, the absence of an effect in a small trial is not evidence that there is none.

2.4 Other Non-Drug Approaches in Dialysis Units

Medicines for anxiety are not an easy option in kidney failure. Reduced clearance, interactions with the many drugs patients already take, and sedation in people prone to falls all complicate prescribing, and systematic reviews of antidepressants in advanced kidney disease conclude that trial evidence is limited (29, 30). This is a large part of the argument for non-drug care.

Psychological treatment has been tried in dialysis units with encouraging results. A group cognitive-behavioural programme reduced depressive symptoms in a Brazilian trial (31), and a larger trial of a brief psychosocial intervention delivered during dialysis improved depression and

quality of life (32). Cognitive-behavioural treatment for sleep disturbance in dialysis patients was linked to lower inflammatory markers (33), and a randomised trial of acupressure reported lower anxiety, depression and stress scores (34). In the wider literature, mindfulness-based and cognitive-behavioural therapies reduce anxiety in other populations (35, 36). Relaxation training is lighter than these in training time and cost, which is its main attraction, but it is also less studied in this particular setting.

3. Materials and Methods

3.1 Scope of the Review

This is a narrative synthesis. Its question is whether progressive muscle relaxation reduces anxiety in adults receiving maintenance haemodialysis. We included work on the burden and causes of anxiety in kidney failure, on the physiology of stress, on relaxation training in other groups, and on psychosocial and complementary interventions tested in dialysis units. Peritoneal dialysis, children and transplant recipients were outside its scope.

3.2 Literature Assembly

No formal systematic search was carried out, and no search strategy, database list or screening flowchart is claimed. Sources were identified from the authors' knowledge of the field, from the reference lists of key reviews, and from informal searching of widely used biomedical databases. We cite works published up to and including 2022. A narrative approach of this kind is a legitimate way to organise a large and uneven literature (37), but it is open to selection bias in a way that a registered systematic review is not, and reporting guidance for systematic reviews (38) was used only as a reminder of what a reader would want to know.



3.3 Appraisal Framework

Each source was read with a short set of questions in mind, listed in [Table 2](#). They follow the logic of established risk-of-bias tools for randomised trials ([39](#), [40](#)) and of trial reporting standards ([41](#)), simplified so that they could be applied to mixed material without numerical scoring. The review itself was checked against the elements of a published scale for narrative reviews, which asks whether the rationale, literature search, referencing and presentation of evidence are adequate ([42](#)). None of these steps is difficult, but each is easy to skip when a unit is busy.

Table 2. Questions used to appraise each source drawn on in this review.

Question	Why it matters	Guidance
Was allocation random and concealed?	Prevents selection of keener patients	RoB tools (39 , 40)
Who rated anxiety?	Unblinded raters flatter the technique	RoB tools (40)
Was there an attention control?	Time with a nurse relaxes on its own	Trial reporting (41)
Was the dialysis setting described?	Timing and noise change what is feasible	Trial reporting (41)
Was the review itself transparent?	Readers can judge selection and bias	Narrative review scale (42)

Note: Adapted in spirit from published risk-of-bias and reporting guidance; applied narratively, not scored.

Judgements were qualitative. We did not extract effect sizes, did not pool results and make no statistical claims. Sources were weighed by design and by closeness to dialysis practice, so a modest trial in a dialysis unit counted for more here than a larger one in students, though neither was treated as decisive. Where a source was cited for a number we could not verify, we left the number out. Reviews of this kind are more useful when they say where the

evidence stops than when they smooth it over.

4. Results

4.1 What the Dialysis-Specific Evidence Looks Like

Small trials of relaxation methods in dialysis units have been published, usually from single centres, usually with a few dozen participants, and usually with follow-up measured in weeks. We do not tabulate them one by one, because several reports describe randomisation, blinding and outcome measurement too briefly for the questions in [Table 2](#) to be answered with confidence. What can be said of the group is general. Most compare the technique with usual care, which leaves the effect of attention untested. Most rely on self-report, and almost none can blind the patient to what he or she is doing.

The psychosocial trial cited earlier recruited enough participants to analyse depression, quality of life and fluid adherence together ([32](#)), and the acupuncture trial used a comparison condition and standard anxiety measures ([34](#)). Neither tested progressive muscle relaxation, and they should not be read as if they did. They do show that a randomised design is feasible in a dialysis unit. Such differences are small one session at a time, but they can accumulate over months of treatment.

4.2 Indirect Evidence from Other Populations

Meta-analytic evidence for relaxation training in anxiety is reasonably consistent in direction. A ten-year review of relaxation trials for anxiety concluded that the techniques reduced anxiety, with effects that were generally comparable to other psychological approaches in the studies reviewed ([43](#)). The abbreviated form of progressive muscle relaxation performed about as well as longer forms in



the behavioural medicine studies pooled by an earlier review (24).

These findings come with strong reservations. The trials were conducted in people with anxiety disorders or stress, in outpatient or student settings, not in a reclining patient on a machine. Control conditions varied from waiting lists to other active treatments. The sensible reading is that relaxation training is a credible intervention for anxiety in general, not that it has been shown to work in people receiving dialysis. These points apply with equal force to any supportive intervention in a dialysis unit, not only to this one.

4.3 Physiological and Mechanistic Plausibility

The biological case is coherent. If raised sympathetic tone is part of the picture in kidney failure (21, 22), a technique that dampens arousal is at least aimed at a relevant target. The cortisol work offers some evidence that abbreviated relaxation changes a stress marker (25), and the comparison of relaxation techniques found shifts in physiological states of relaxation as well as in self-report (27). None of these studies involved dialysis patients, and a plausible mechanism does not establish a clinical effect; we treat it as supporting evidence only.

4.4 Feasibility and Delivery

Practical questions are easy to underrate. Treatment sessions offer a captive and otherwise idle period, which is an obvious opportunity, and trials of in-session psychological intervention show that delivery during dialysis is acceptable to many patients (32). Yet noise, shared space, interruptions for observations and discomfort from needles and cannulation all limit what can be done. Figure 2 maps the strands of evidence against the main questions of this review, and Figure 3

shows where in the week the routine might be taught and practised.

	Is need real?	Is it safe?	Is a route plausible?	Does it work here?
Dialysis surveys	direct	none	none	none
Relaxation reviews	none	partial	partial	weak
Physiology studies	weak	weak	partial	none
Dialysis trials	weak	partial	weak	weak

Qualitative reading of the cited literature; schematic, not data

Figure 2. Qualitative map of how directly each strand of evidence addresses each question (schematic, not data).

The main findings are drawn together in Table 3. In short, the need is documented, the intervention is safe and cheap, the route is plausible, and the direct test is missing in any form that would satisfy the questions we asked of it. A nurse reading a trial report needs an answer to a plain question: would this work on my ward?

Table 3. Strands of evidence bearing on relaxation training for anxiety in haemodialysis.

Strand	What it can show	Main limit
Anxiety in dialysis patients	Need is real (5, 6, 8)	Says nothing about treatment
Reviews of relaxation training	Benefit in other groups (24, 26, 43)	Different people and settings
Physiological studies	A plausible route (21, 22, 25)	Small, short, indirect
Psychosocial trials in dialysis	Feasible in the unit (32, 33, 34)	Different techniques
Mindfulness and CBT reviews	Non-drug options work (35, 36)	Heavier on training time

Note: Judgements are the authors' qualitative reading of the cited literature, not a formal grading.

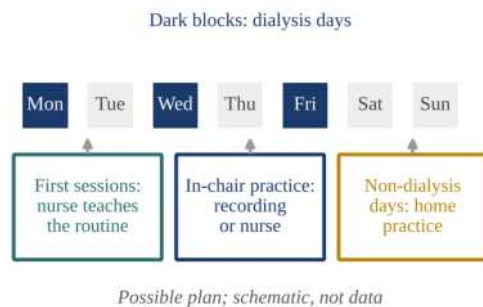


Figure 3. Possible places to teach and practise relaxation across a dialysis week (schematic timeline, not data).

5. Discussion

5.1 Interpretation

The central finding is a conditional one. Progressive muscle relaxation is likely to help some anxious dialysis patients a little, and unlikely to harm them, but the best-supported size of that benefit is unknown. Physiology and trials in other groups point the same way. Trials in dialysis units are too small, too brief and too unblinded to turn that expectation into a measured effect. The sensible position is neither to dismiss the practice nor to promise results.

A second point concerns what the technique competes with. Anxiety in dialysis often has identifiable drivers, among them pain, poor sleep, inadequate information and fear of the needle. A patient whose worry is driven by an unresolved cramp problem will not be helped much by relaxation exercises alone. Teaching the routine may also help simply by giving the patient something to do and a sense of control, which does not depend on muscle physiology at all. Nothing in this reading argues against offering relaxation training; it argues for measuring what happens when it is offered.

Third, attention is an ingredient. A nurse who sits with a patient to teach a routine is

also offering company and an opening to mention other worries, and trials against no contact at all cannot separate these elements. A benefit that vanishes when nursing time is counted is not a benefit a ward manager will see.

5.2 Limitations

The limits of this review are plain. It is narrative, it did not follow a formal search, and its selection of sources reflects the authors' knowledge and access. We did not appraise individual dialysis trials of relaxation in detail, because the information needed to do so was often not reported, and a systematic review would be better placed to do it. Most of the supporting evidence comes from populations other than dialysis patients. We have kept numerical claims out of the text so that none could be wrong, and the cost of that restraint is that the review cannot tell the reader how large any effect is.

The wider literature also has weaknesses that this review inherits. Anxiety instruments overlap with somatic symptoms of kidney failure. Intervention descriptions are frequently too brief to replicate. Studies come from different health systems and cultures, so a result from one unit cannot be assumed to hold in another. A patient who has had time to learn the routine behaves differently from one who has just been handed a leaflet.

5.3 Directions for Future Work

The most useful next step is a properly designed randomised trial in haemodialysis patients. It would register its outcomes in advance, use an anxiety measure validated in kidney failure, include an attention-matched control such as a neutral listening or education session, and describe the technique, the person delivering it and the setting well enough for another unit to copy. Follow-up should run beyond the



end of the programme to see whether any effect lasts. Analyses should report the size and precision of the effect and not only a significance test.

A second priority is a registered systematic review of existing relaxation trials in dialysis. A third is work on delivery: whether recorded or nurse-led teaching is better, how many sessions are needed, and how to adapt the routine for patients with limited mobility. Cost and nurse time should be recorded alongside outcomes. It is a habit worth keeping even when the answer is expected.

6. Conclusion

Progressive muscle relaxation is a reasonable, low-risk supportive measure for anxious patients on haemodialysis. The literature we reviewed does not establish how large its effect on anxiety is in this population, because direct trials are small, short and rarely controlled for attention, and because the instruments used overlap with symptoms of kidney failure. Indirect evidence and physiological reasoning make a modest benefit plausible.

For units that wish to offer the technique, the practical message is encouraging rather than discouraging: it can be taught briefly, practised in the chair, and recorded alongside the patient's own account of how they feel. For researchers, the opportunity is a well-designed trial that finally separates the exercise from the attention that comes with it.

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9. Conflict of Interest

The authors declare no conflict of interest.

10. Author Contributions

V.S. conceived the review and wrote the sections on anxiety in kidney failure and on dialysis care. N.P. wrote the sections on relaxation methods and nursing practice. S.K. wrote the sections on appraisal and study design. All authors revised the manuscript and approved the final version.

11. Ethics Statement

This is a review of published literature. No patients or participants were involved and no ethical approval was required.

12. Data Availability

No new data were generated. All sources are cited in the reference list.

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