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Dedicated patient optimization program delivers effective complex intervention improving the lives of vulnerable HD patients

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Background and Aims: Hemodialysis (HD) delivery is failing many patients due to a lack of available evidence/dialysis-based interventions (previously only studied as single interventions in isolation) to improve outcomes; and the industrialization of institutional-based HD imposing a ‘one size fits all’ approach. To respond to the needs of the most vulnerable patients we have instituted a patient optimization program (POP) to support our Renal Program, fully leveraging our research level assessment tools to provide an individualized appreciation of challenges before delivering an equally individualized complex intervention. The aim was to improve subjective experience [symptoms/health related quality of life (HRQoL) measures] and objective evidence of HD related harm.

Method: Patients who had suboptimal tolerability to HD were identified and referred by the clinical team (after best efforts to address concern as part of standard care). To understand the patients’ individual challenges, a series of physiological, hemodynamic, and HRQoL assessments were completed. Based on these findings, a series of complex foundational (common to all patients treated) and patient specific interventions were applied, and impact rigorously evaluated. HRQoL/symptoms were measured using the dynamic patient reported outcome measurement tool LEVIL [2-4 weeks leading up to the program (baseline) and continually thereafter]. Comprehensive physiological assessment period was two weeks in length (six HD treatments) and included continuous beat to beat hemodynamic monitoring, intradialytic echocardiography (assess myocardial stunning) and objective volume assessment using ultrasound and bioimpedance. The first session was delivered mirroring routine prescription (establish primary response), subsequent treatments were delivered implementing a variety of foundational, patient/disease specific interventions in a staged manner.

Results: To date 13 patients have completed the program, referred for a variety of reasons [refractory hypotension (5/13), intradialytic hypotension (2/13) and poor HRQoL [symptoms—cramping, headache, pruritus, insomnia (8/13)]. Complexes of challenges were present in 9/13. All patients had multiple components of dialysis altered. POP was associated with a marked improvement in a range of subjective and objective outcomes. Subjectively, HRQoL improved by 10% [composite LEVIL scores 69.5 ± 15.5 at baseline, 76.5 ± 17 after POP participation (p 0.03)], energy by 18% [64.7 ± 16.2, 76.5 ± 6.4, p 0.01], general wellbeing by 11% [76.5 ± 6.6, 85.2 ± 4.2, p 0.02], and post-dialysis recovery improved from 13.3 ± 16.1 hours to only 2 ± 1.9 hours (p 0.02). Objectively, intradialytic weight gain decreased by 36% [2333.3 ± 1151.8 ml at baseline to 1483.3 ± 591.3 ml, p 0.03], systolic blood pressure improved by 12% [94.9 ± 28.5 mmHg at baseline to 106.2 ± 30 mmHg post optimization p < 0.0001 (despite midodrine being discontinued in 8/13 patients previously dependent on it)]. Tolerability of HD improved [cardiac output 6.4 ± 0.1, 6.5 ± 1, p 0.002 and intradialytic systemic vascular resistance response 15 ± 23.6% at baseline to 48.7 ± 53%, p < 0.0001]. Improvement in hemodynamic tolerability led to a reduction in HD induced myocardial stunning larger than reported with any previously applied single intervention; regional wall motion abnormality fell from 5.6 ± 2.4 at baseline (severe stunning) to only 1.2 ± 1.3 (p 0.02) over the two-week program. 2/13 patients who had previously been declined transplantation were accepted and need to repatriate from satellite facilities to in-centre was avoided.

Conclusion: For the first time, we have created an opportunity for the most challenging patients who have failed conventional best efforts. We have successfully demonstrated the impact of delivering a complex intervention (with a degree of treatment personalization) targeting physiological failure in the most vulnerable HD patients. POP improved HRQoL (principal impact measure), hemodynamic stability and treatment tolerability. Having demonstrated the effectiveness of this approach, we now focus on solutions to up-scale this success.
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