NEPHROLOGY
GUIDELINE

INCREMENTAL HAEMODIALYSIS PRESCRIPTION AT AUSTIN HEALTH

Staff this document applies to:

- Nephrologists
- Renal Registrars
- Nephrology and Dialysis Nursing Staff

Related Austin Health policies, procedures or guidelines:

Haemodialysis Prescription

Nursing Guidelines for Haemodialysis Treatment

Purpose:

- To describe the process for Incremental Haemodialysis prescription at Austin Health
- To enable an Incremental Haemodialysis option for appropriately selected patients with end stage kidney disease at Austin Health

Key Points:

- Incremental Haemodialysis involves adjusting the haemodialysis prescription according to the patient's level of residual kidney function (RKF)
- Any patient managed with Incremental Haemodialysis must be willing and able to perform regular timed urine collections
- Any patient managed with Incremental Haemodialysis must be willing to have their haemodialysis prescription increased when necessary, according to their RKF level

Introduction:

Incremental Haemodialysis involves adjusting the haemodialysis prescription according to the patient's level of residual kidney function (RKF)[1]. This contrasts with the standard haemodialysis (HD) prescription, which assumes that RKF is zero or negligible. With Incremental Haemodialysis (HD) patients with more RKF may have a lower HD dose, whereas patients with less RKF require a higher HD dose.

Advantages and Disadvantages of Incremental Haemodialysis:

Possible advantages of Incremental Haemodialysis

- Shorter time on haemodialysis for patients with sufficient RKF
- Possibly fewer haemodialysis access (AVF) complications
- Possibly slower decline of remaining RKF[2]
- Fewer haemodialysis side effects

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- Quality of life[3]

Possible disadvantages of Incremental Haemodialysis

- Inconvenience of performing regular timed urine collections
- Regular changes to haemodialysis prescription
- A higher risk of inadequate (i.e. not enough) haemodialysis for optimal health

Patient Suitability:

Suitable patients for Incremental Haemodialysis

- Must have reviewed the Information Brochure "Haemodialysis Prescription Options at Austin Health"
- The plan for Incremental Haemodialysis must be approved in consultation with their nephrologist
- Must be willing and able to perform regular timed urine collections
- Must be willing to have their haemodialysis prescription increased when necessary, according to their RKF level

Patients not suitable for Incremental Haemodialysis

- Absent Residual kidney function – Urea Clearance (KRU) ≤ 2 ml/min
- Severe cardiac failure
- Poor control of fluid, blood pressure or phosphate
- Malnutrition
- Patients with poor adherence to medications, dietary advice and other aspects of health care
- Patients unable or unwilling to perform regular timed urine collections
- Patients who are medically unstable

Measurement of Residual Kidney Function:

For patients doing Incremental Haemodialysis Residual Kidney Function must be measured at least

- Monthly for the first 3 months
- Every 2 months for the first year
- Every 3 months indefinitely while the patient remains on Incremental Haemodialysis, defined by doing < 12 hours of haemodialysis per week, with the dialysis dose adjusted according to the RKF
- When there is clinical evidence of a change in RKF e.g. a decline in urine output

Measuring RKF involves sending off the following three specimens to Austin Health pathology, as per European Best Practice Guidelines[4]. Note – specific pathology forms have been developed by the Austin Pathology for each of these three specimens.

  - A post-dialysis serum/plasma sample from the dialysis run (1st run of the week) at the start of the timed urine collection for measurement of serum urea
  - A timed urine collection starting at the end of 1st dialysis session of the week and continuing until the start of the 2nd dialysis session of the week for measurement of:
    - Urine volume
    - Urine urea concentration

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- (NB: Must record the start date/time and finish date/time on the pathology request form)

- A pre-dialysis serum/plasma sample from the dialysis run (2nd run of the week) at the end of the timed urine collection for measurement of serum/plasma urea

The bloods samples are taken directly from the dialysis circuit in the usual way that is done for measuring dialysis adequacy. Measurement of RKF is not needed if the patient is anuric (< 200 mls urine between dialysis treatments). Anuric patients are regarded as have zero or negligible RKF and are not suitable for Incremental HD. Urine is collected over the whole interdialytic period, for measurement of urine volume and excretion of urea. From this the residual urea clearance (KRU) is calculated.

If the above is not logistically feasible, an alternative is a 24-hour urine collection, performed in the 24 hours prior to a dialysis session, with bloods taken at the beginning of that dialysis session.

Dialysis Prescription and Monitoring of Adequacy:

At Austin Health for patients doing Incremental HD the minimum recommended treatment times are:

- KRU ≤ 2 ml/min: Incremental HD not appropriate – full HD prescription (minimum ≥ 4 hrs three times a week, default = 4.5 hours three times a week)
- KRU 2-3 ml/min: Minimum 3 hours three times a week
- KRU 3-8 ml/min: Minimum 4 hours twice a week
- KRU ≥ 8 ml/min: Consider coming off haemodialysis

In addition, close monitoring is required to confirm adequate clearance targets are met, with adjustment of treatment times as required.

If the patient is unable to provide timed urine collections for the measurement of RKF the KRU will be assumed to be ≤ 2 ml/min.

When Incremental HD is practiced the total weekly (RKF + dialyser) stdKt/V[5, 6] should be determined at least

- Monthly for the first 3 months
- Every 2 months for the first year
- Every 3 months indefinitely while the patient still has RKF ≥ 2 ml/min
- When there is clinical evidence of a change in RKF e.g. a decline in urine output

Patients on incremental haemodialysis require a total weekly (RKF + dialyser) stdKt/V ≥ 2.0[5].

To minimise the risk of failing to achieve a total weekly stdKt/V ≥ 2.0, the target total weekly stdKt/V is ≥ 2.2.

RKF StdKt/V can be calculated from readily available peritoneal dialysis adequacy calculators, by entering the peritoneal clearance as zero. See http://www.kt-v.net/

Dialysis StdKt/V can also be calculated by a freely available online calculator at http://www.hdcn.com/calcf/ley.htm

The European Best Practice Guidelines have suggested estimates for integrating dialysis dose with residual clearance to achieve a target stdKt/V (see Table below)[4].

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Table 1. Comparison of dose measures for differing dialysis schedules and renal function

Renal function	Dialysis prescription	Time (h)	Dialysis dose (per session)		Total clearance, renal + dialysis (per week)		
GFR (ml/min)	Frequency (per week)		eKt/V	spKt/V	stdKt/V	SRI	EKRc (ml/min)
8	No dialysis	–	0	0	2.0	2.0	8.0
5	2	4	1.2	1.4	2.4	2.3	13.4
3	2	6	1.8	2.2	2.3	2.2	14.4
2	3	3	0.9	1.1	2.3	2.0	12.1
0	3	4	1.2	1.4	2.2	2.0	12.9
0	3	8	2.4	2.9	3.1	2.5	21.2
0	Alternate day	4	1.2	1.4	2.6	2.6	15.2
0	6	2	0.6	0.7	2.8	2.3	13.8
0	7	2	0.6	0.7	3.3	3.3	16.2
0	7	8	2.4	2.9	8.1	8.1	55.1

In each case, V is 40 l, and dialyser clearance is 236 ml/min. For the dialytic schedules, fluid weight gain is 1 l/day.

K/DOQI guidelines have recommended that the minimum session single pool Kt/V can be reduced in patients with urea clearance (KRU) of > 2mL/min/1.73m2, but twice weekly HD is not recommended unless KRU> 3 mL/min/1/73m2[5].

Other clinical assessments regarding the adequacy of haemodialysis treatment include assessments of nutrition, phosphate, fluid control and blood pressure.

Audit and Quality Control:

A database of all patients being managed with Incremental HD will be kept by the Renal Anaemia and CKD CNC, primarily for monitoring of the dialysis adequacy data.

The data will be reviewed in a monthly meeting including:

- The supervising nephrologist
- The Renal Anaemia and CKD CNC
- The dialysis registrar

At this meeting dialysis prescriptions will be reviewed and adjusted as required, with changes recorded in the SMR and communicated to the treating nephrologist

Author/Contributors:

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Legislation/References/Supporting Documents:

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3. Kalantar-Zadeh, K, Unruh, M, Zager, PG, Kovesdy, CP, Bargman, JM, Chen, J, Sankarasubbaiyan, S, Shah, G, Golper, T, Sherman, RA, Goldfarb, DS: Twice-weekly and incremental hemodialysis treatment for initiation of kidney replacement therapy. *Am J Kidney Dis,* 64**:** 181-186, 2014.

4. Tattersall, J, Martin-Malo, A, Pedrini, L, Basci, A, Canaud, B, Fouque, D, Haage, P, Konner, K, Kooman, J, Pizzarelli, F, Tordoir, J, Vennegoor, M, Wanner, C, ter Wee, P, Vanholder, R: EBPG guideline on dialysis strategies. *Nephrol Dial Transplant,* 22 Suppl 2**:** ii5-21, 2007.

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