Hyperglycaemia Post-Kidney Transplantation: Blood Glucose Monitoring and Insulin Prescribing Habits

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Background

Glucocorticoids are incorporated into both induction and maintenance regimens for the prevention and treatment of renal transplant rejection.[1-3] Currently, methylprednisolone and prednisolone are included in the *Renal Transplant Immunosuppression Protocol* published by the Central and Northern Adelaide Renal and Transplantation Service. Patients of low, moderate and high immunological risk of organ rejection will receive methylprednisolone 500mg, intravenously pre-operatively and 250mg post-operatively, in addition to a minimum of six weeks of treatment with oral prednisolone. Prednisolone doses are highest in the first six weeks post-transplantation, with a recommended initial dose of 30mg per day during the first week, decreasing by 5mg weekly down to a maintenance dose of 5mg daily by week six. Despite their pivotal role, glucocorticoids have been well documented for causing impaired glucose metabolism.[2, 5-7] The pattern of hyperglycaemia is most notable on afternoon blood glucose testing and may be observed in the immediate post-operative period. Derangements in glucose metabolism adversely affect graft and patient survival, due to the potential of allograft failure and by promoting cardiovascular disease. Identification and optimisation of glycaemic control, ideally while patients are still hospitalised, may have significant long-term benefits.[4] Due to the limited literature on the management of prednisolone-induced hyperglycaemia in post-kidney transplantation, there is currently no local treatment protocol.

Aim

To characterise the monitoring and insulin prescribing habits in the management of hyperglycaemia in the first six weeks post-kidney transplantation.

Methods

All patients (*n*=133) admitted at the Royal Adelaide Hospital for a kidney transplant between January 2016 and March 2017 were assessed. The study cohort (*n*=43) were identified through the renal transplant database. Data was obtained through electronic record databases including Oacis Clinical Care Suite® and iPharmacy®. Additionally, patient medical records were accessed to gain information not available on the previously mentioned databases. Patients who experienced ≥1 elevated blood glucose readings (>10 mmol/L) or prescribed insulin at any point in time during the initial six weeks post-kidney transplantation were included in the study. Patients were excluded from the study if the kidney transplantation procedure was not performed, or if no insulin was prescribed during the initial six weeks post-kidney transplantation. The data collected and analysed on the study cohort included; blood glucose level monitoring and insulin prescribing habits in the first six weeks post-kidney transplantation.

Results

43 patients experienced one or more episodes of hyperglycaemia during the initial six weeks post-kidney transplantation, while 60.4% (*n*=26) of these patients were prescribed insulin. ***Table 1*** summarises the monitoring of blood glucose levels in the first six weeks following kidney transplantation; ***Table 2*** summarises insulin prescribing habits in the first six weeks following kidney transplantation. ***Graph 1*** illustrates the average number of readings documented during inpatient admission.

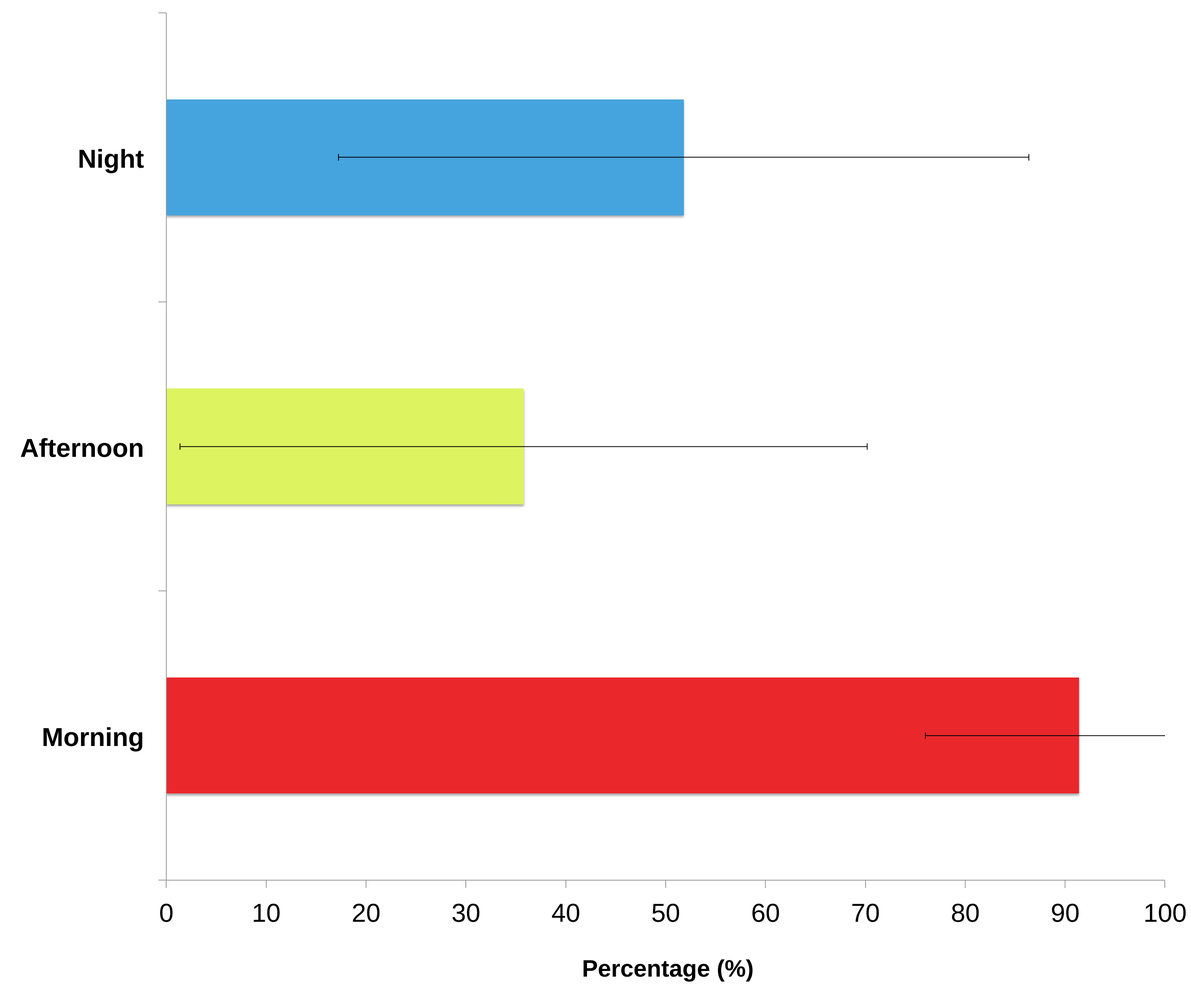
TABLE 1. BLOOD GLUCOSE MONITORING POST-KIDNEY TRANSPLANTATION

Parameter	Mean Value
Time of first documented reading	3.02 hours
Time of first documented elevated reading	19.09 hours
Value of first documented elevated reading	12.75 mmol/L
Readings above recommended range	32.26%

TABLE 2. INSULIN PRESCRIBING HABITS POST-KIDNEY TRANSPLANTATION

Parameter	Mean Value
Time of insulin commencement	2.92 days
Time recommencing pre-prescribed insulin	1.25 days
Initial daily dose of insulin	28.99 units 0.36 units/kilogram
Time of first insulin dose adjustment	2.38 days
Total number of insulin dose changes	9.24

GRAPH 1: AVERAGE NUMBER OF READINGS DOCUMENTED DURING INPATIENT ADMISSION



Conclusion

The results indicate that there is room for improvement in the monitoring of blood glucose levels, and in the prescribing habits of insulin in the immediate six weeks post-kidney transplantation. Improved monitoring of blood glucose levels, with a focus on the afternoon and night time readings, could improve insulin prescribing. Hyperglycaemia undermines the benefits of transplantation by decreasing allograft survival, patient survival and quality of life. It is vital that clinicians address this issue as soon as it presents − especially while the patient is still admitted in hospital.[3-6] Ultimately, a multidisciplinary approach that includes pharmacists, nurses and medical officers will be essential to improve monitoring of patients' blood glucose levels and individualising patient's insulin regimens, leading to better management of hyperglycaemia in this patient demographic.

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