Title

An integrated chronic disease nurse practitioner clinic: Service model description and patient profile

Running head: ICDNP profile

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ABSTRACT

Background: One common cluster of chronic conditions — chronic kidney disease, diabetes mellitus and heart failure — places a significant burden on the Australian healthcare system. In combination, these conditions complicate treatment, increase rates of hospitalisation and carry a poorer prognosis for survival. Current health services are organised around single conditions, making coordination of care more difficult and adding complexity to patients' lives.

Aims: To describe an integrated model of care provided by nurse practitioners for patients with multiple chronic diseases.

Methods: A prospective, longitudinal study of patients with two or three chronic diseases attending a community-based nurse practitioner clinic. On entry to the clinic demographic and clinical data were collected from patients and health records (n = 121). At six months a subgroup (n = 70) also reported their satisfaction with the clinic.

Findings: Over 18 months the clinic provided 925 appointments to patients aged between 27-90 years. Most (79.2%) had chronic kidney disease as one of their diagnoses. At baseline, blood pressure and glycosylated haemoglobin targets were achieved by 66.4% and 83.2% respectively, although only 7.1% had a healthy-range body mass index. After six months of attendance, there was high overall patient satisfaction with the new service (98.7%).

Discussion: Nurse practitioners can reform healthcare delivery through innovative person-centred models of care, breaking down the siloes of treatment for chronic disease.

Conclusion: In the current and growing context of multi-morbid chronic health conditions, integration of care within and across organisations is required to meet future health care demands.

Keywords: Nurse practitioner, advanced practice, multi-morbidity, integrated care, healthcare reform

SUMMARY OF RELEVANCE

Problem or Issue: Evidence on models of care for people with multiple chronic diseases in Australia is scarce.

What is Already Known: Healthcare service delivery models are disease-focused which results in people with multi-morbidity attending numerous specialist medical appointments that tend to be on different days and in various locations.

What this Paper Adds: We provide a description of an integrated chronic disease outpatient clinic which is delivered by nurse practitioners specifically for those with a combination of chronic kidney disease, diabetes and heart failure.

INTRODUCTION

There is a pressing need for new models of care for people living with multiple chronic diseases such as chronic kidney disease (CKD), diabetes mellitus (DM) and heart failure (HF). According to recent global estimates, approximately 497 million have CKD (Mills et al., 2015), 381 million have DM (Guariguata et al., 2014) and 26 million people have HF (Ambrosy et al., 2014). In Australia, chronic disease is the leading cause of death and there is a rising burden of multi-morbidity (Australian Bureau of Statistics, 2016). Approximately 29% of adults were diagnosed with CKD, DM or cardiovascular disease (CVD) in 2011-12 (Australian Institute of Health and Welfare, 2014a). Of this population, 7.2% had at least two of these three chronic diseases. People with CKD, DM or CVD (including HF) accounted for approximately 1.8 million non-dialysis hospitalisations between 2012 and 2013—22% with a combination of these conditions (Australian Institute of Health and Welfare, 2014b).

The prevalent cluster of CKD, DM and HF is a clinical conundrum for practitioners (Aguilar, 2016) due to shared risk factors and interactions during treatment (for a review see Caughey et al., 2008). For example, a reduced estimated glomerular filtration rate (eGFR) in CKD increases overall risk of coronary events (Calhoun et al., 2014). In a recent review, Vanholder et al. (2017) argue that "almost all chronic disorders impact each other in various ways" (p. 399) and that CKD can be either the beginning or end point of the interactions between many chronic diseases. Thus, with such a high prevalence of chronic disease and multi-morbidity in the community (particularly older adults; Fabbri et al., 2015), it is necessary for healthcare services to move from individual disease siloes for treatment to an integrated chronic disease model. In Australia, a 2016 government inquiry identified the need for integrated treatment models for chronic disease management such as a one-stop location which focuses on the

whole person rather than each disease (House of Representatives Standing Committee on Health, 2016).

Nurse Practitioner-led Services

In Australia, nurse practitioners (NPs) are highly qualified registered nurses who are authorised to practice autonomously at an advanced level (such as in chronic disease care). This role includes, but is not limited to: collaborating with other clinicians to assess and interpret disease diagnoses; planning and implementation of treatments; and referral of patients to other clinicians (Australian College of Nurse Practitioners, 2017). Nationally and internationally NPs have been shown to deliver safe and cost-effective healthcare (see for example Allen, Himmelfarb, Szanton, & Frick, 2014; Cashin, Theophilos, & Green, 2016; Craswell et al., 2018; Jennings et al., 2015). Due to the growing burden of chronic disease, across Australia there are an increasing number of nurse practitioner-led clinics conducted in public hospital outpatient departments or community healthcare centres although these clinics tend to align with the medical specialty model of service delivery. Nevertheless, nurse practitioner-led services are delivering on the triple aim of healthcare transformation—enhancing patient experience, improving population health and reducing costs—while building future workforce capacity for integrated care (Coleman et al., 2017; Craswell et al., 2018; Douglas et al., 2018). This paper describes a novel, community-based Integrated Chronic Disease Nurse Practitioner (ICDNP) clinic and profiles the patient characteristics and clinical targets at entry to the clinic. It also reports on patient satisfaction with the clinic after six months of attendance.

Integrated Chronic Disease Nurse Practitioner Clinic

Prior to the clinic's inception, the NPs observed a group of patients with CKD, DM or HF arriving on different days to attend different outpatient clinics. Some of these patients commented on the burden of frequently coming to the hospital to see one specialty team at a time. The ICDNP clinic became a strategy that brought together NPs with specialty expertise to collaborate at the point of care for patients with comorbid chronic diseases. The clinic primarily operates as a horizontal integration of specialist services that focuses on the health of individual patients rather than on the organisational departmental structure (i.e. traditional disease-siloes). Some vertical integration also occurs as the clinic NPs coordinate care between specialist medical teams, general practitioners and various allied health staff (e.g. dietician, podiatrist). There is also some in-reach when patients are admitted into an acute inpatient ward. The ICDNP clinic receives referrals for patients with two or more chronic diseases from cardiology (HF), endocrinology (DM) and nephrology (CKD) departments. Rather than situate the clinic in a hospital outpatient department, it is conducted off the main hospital site in community health centres located in the southern suburbs of Brisbane, which are home to a rapidly growing and multicultural population. Holding the clinic at these locations enables collaboration with/referral to site allied health staff. In this model of care, the traditional community-based secondary healthcare delivery is extended through the incorporation of specialised care for people with multimorbidities.

The flow of patients with CKD, DM and HF into and out of the ICDNP is complex, largely due to the processes in the Queensland healthcare system and the way public hospital NPs are required to function. At this hospital, the NPs provide different types of clinics: solo (focused on a single chronic disease) and integrated (multi-morbidity) clinic. The ICDNP clinic is conducted weekly with the goals of providing early detection and intervention for chronic disease through a holistic management approach and reducing patients' hospital presentations

and admissions. The NPs provide comprehensive patient assessments and collaborative care planning and patient education based on a self-management model (Lorig, Sobel, Ritter, Laurent, & Hobbs, 2001) which includes recommendations regarding lifestyle modifications. Figure 1 depicts the in/outflow from the clinic, waiting time and occasions of service.

[insert Figure 1 here]

Patient In-flow

Patient referral into the ICDNP clinic varies between each specialty department. Initially, all patients are referred by general practitioners to hospitals for medical specialist outpatient review usually related to one chief presenting problem (CKD, DM or HF). At this point, disease-specific (cardiac or endocrine) medical specialists triage new referrals with some patients seeing a medical specialist prior to the NP-HF or NP-DM clinic or some proceeding direct to the solo NP clinic. In the renal department, the majority of new patients with CKD are triaged directly to the NP-CKD clinic. Nurse practitioners also refer patients from their solo NP clinics to the ICDNP clinic. Lastly, some inpatients are also referred to the solo NP clinics. Since the ICDNP clinic commenced, 180 patients have been referred and 121 were seen in the clinic. The remaining 59 referred patients were: transferred to another facility or service; discharged for not attending; unable to be contacted, declined treatment against medical advice; or deceased prior to first appointment.

Patient Out-flow

Patients are discharged from the ICDNP clinic to: i) their referring general practitioner (if stable; these patients can be directly referred back to the clinic if required); ii) (single) chronic disease medical specialist (due to increasing complexity/instability); iii) solo chronic

disease NP specialty clinic; or iv) another facility. Over the period the ICDNP clinic has been operational, a total of 89 patients have been discharged. Of this total, 30 patients completed treatment, 32 were transferred to another service or facility, 7 died, 19 failed to attend or have been lost to follow-up, and one declined treatment.

Service Provision

Patients are reviewed at the ICDNP clinic with varying frequency of appointments. In total, there have been 925 occasions of service (OoS) provided. Those with advanced HF (New York Heart Association [NYHA] III-IV) may require weekly review or home visits as this group of patients is at high risk for emergency department presentation and admission to hospital largely due to fluid overload. Frequent review can minimise severe alterations in hydration status and ensure timely referral to hospital-in-the-home for continuous diuretic infusions. Those newly diagnosed or with unstable type 2 DM may require phone reviews once or twice weekly if insulin adjustment is occurring or monthly review if new medications are initiated. If glycosylated haemoglobin (HbA1c) is stable, then 3 monthly reviews are conducted. On average, those with CKD are seen 3-4 monthly (depending on kidney function level). Those with advanced stages of CKD are reviewed more frequently due to increased complexity associated with reduced kidney function. In addition, those patients recovering from acute kidney failure have more frequent follow-up to titrate medications.

The primary advantage of the clinic is that patients are reviewed at one appointment by one or more NPs, thereby streamlining and coordinating management, especially regarding medication treatment and self-management support. Other advantages for patients are that the clinic is patient-centred (not disease-centred) so that early detection and intervention can

occur. The clinic is easily accessible by public transport and there is ample free carpark space available.

At each appointment, a patient is comprehensively assessed including review of clinical laboratory results. Abnormal results are immediately treated (in some cases, in consultation with a medical practitioner). Patients continue to attend the clinic regularly to: achieve clinical stabilisation (including making necessary medication adjustments); receive self-management support; and receive education about lifestyle modification, chronic diseases, and medications. Behavioural change strategies such as motivational interviewing are used to increase adherence with complex treatment regimens.

Communication among health professionals is crucial because these patients have many healthcare providers. The NPs create a bridge between various individuals (including medical specialists and general practitioners) and other members of the multidisciplinary team. Explicit action plans are prepared for teams (electronic hospital records) and also communicated in letters to general practitioners. Phone calls and emails are regularly used to facilitate timely communication. Within the scope of practice, referral by a NP can also be made to other medical specialists (e.g. vascular surgeon, ophthalmologist), and allied health professionals including psychologists, dietitians, and podiatrists.

METHODS

Design and Participants

A longitudinal, prospective health service evaluation informed by the Donabedian (2003) Quality of Care Framework (structure, process and outcome) was used to examine the effectiveness of the ICDNP clinic in delivering coordinated services. We have described the

organisational structure and process of operation of the ICDNP clinic. What follows are the patient characteristics on entry to the clinic, the occasions of service, and patient satisfaction for the period June 2014 to December 2016. Patients eligible for the clinic were adults (≥18 years) with a diagnosis of CKD (stages 2-5) and/or diabetes (type 1 or type 2), and/or HF (NYHA categories II-IV). We excluded patients from completing interviewer-administered questionnaires if they were: distressed, unable to speak English, cognitively impaired, or unable to give informed consent for completing questionnaires (as determined by treating clinicians). Clinical data was available for all patients from healthcare records.

Data Collection

Outcome measures included clinical information from healthcare records and patient-reported outcomes (collected from a subgroup who consented to complete these questionnaires, *n* = 70). Clinical information included: body mass index (BMI); blood pressure (BP); glycosylated haemoglobin level (HbA1c); creatinine; albumin:creatinine ratio (ACR); estimated glomerular filtration rate (eGFR); cholesterol; lipoprotein levels; and whether patients were prescribed a beta blocker medication, angiotensin-converting enzyme inhibitor (ACEi), or angiotensin-II receptor blocker (ARB). Patient-reported demographic characteristics were collected at entry to the clinic. From the outpatient electronic management system, waiting time for first appointment, number of appointments as well as missed appointments (did not attned) were extracted. Patient satisfaction with the clinic cannot be measured at the first appointment and was therefore measured after six months of clinic attendance. We used the Patient Satisfaction with NP Care for Presenting Problem questionnaire (NP-Satis) developed by Gardner et al. (2010). This 16-item questionnaire specifically captures satisfaction with the care provided by a NP and, in this study, it displayed high reliability (Cronbach's $\alpha = 0.93$).

Ethical Considerations

Ethical approval for the study was obtained from (Deidentified for review) hospital and university ethics committees (HREC/xxxx – deidentified for review). Approval was also gained under the Department of Health (Public Health Act; QCHO/009321/RD0006294) for clinical data to be collected from the hospital records of all patients who attended the clinic. Funding for the study was from an unrestricted grant from the hospital operating the clinic. After an appointment at the ICDNP clinic, patients were directed to a private room where the study was explained and written consent obtained by a research (non-clinical) team member. Completion of questionnaires was voluntary, and all participants were informed that they could withdraw from the study at any time, and that their data would remain confidential and stored securely.

Data Analysis

Data were analysed using IBM SPSS Statistics version 24 (IBM Corp., Armonk, NY, USA). Descriptive statistics (frequencies, percentages, medians, means, and standard deviations) were generated for patient characteristics, occasions of service, patient-reported outcomes, and achievement of clinical targets as defined by national guidelines (Johnson et al., 2013). All chronic diseases included the clinical targets of: BP < 140/90 mmHg (except for patients with diabetes, microalbuminuria, or proteinuria, whose BP target was adjusted to 130/80 mmHg); and BMI between 18.5 kg/m^2 and 25 kg/m^2. Targets for DM and CKD were: cholesterol < 4.0 mmol/L, low-density lipoprotein (LDL) level < 2.5 mmol/L; high-density lipoprotein (HDL) levels > 1.0 mmol/L and 1.3 mmol/L for males and females, respectively; albumin-creatinine ratio (ACR) of < 2.5 mg/mmol and 3.5 mg/mmol for males and females, respectively; HbA1c of < 7%; and prescription of an ACEi or ARB. Lastly, the clinical target

for HF was the prescription of a beta blocker medication. A *p*-value <0.05 was considered significant.

RESULTS

Demographic Characteristics

Clinical data were collected from 121 patients (78 males and 43 females) aged 27-90 (*M* = 66.4, *SD* = 11.2), just over half of whom were born in Australia (53.8%), and including 17 patients (14.1%) of Indigenous Aboriginal or South Sea Islander descent. Fifty-two patients presented with a primary diagnosis of CKD (43%), 29 (24.0%), with DM, and 40 (33.0%) with HF. The majority of patients (92; 76.0%) presented with two of the three diagnoses, and the remaining 29 presented with all three (see Table 1 and Figure 2 for a further breakdown of diagnoses and demographic characteristics).

The overall sample could be divided into consenting and non-consenting (to questionnaires) subgroups. Between subgroups, no significant differences were found on: frequencies of primary and secondary diagnoses; age; gender; country of birth; Indigenous or South Sea Islander status; marital status; or smoking status (all *p*s > 0.05). A higher percentage of the consenting subgroup spoke English at home (92.6%), compared to the non-consenting group (7.4%; $\chi^2(3) = 9.30$, $p = 0.03$). This was to be expected, as it was an inclusion criteria for the questionnaires that participants understood English. As such, the results from the consenting subgroup were considered to be representative of the clinic population.

[insert Table 1 here]

[insert Figure 2 here]

Occasions of Service

Throughout the data collection period, the ICDNP clinic conducted 925 occasions of service (i.e., consultation appointments between NP/s and patient). Table 2 provides the ICDNP clinic occasions of service, waiting times and attendance patterns. The mean time waiting for a first appointment was 15.3 days (SD = 11.5). The duration between appointments was shorter for those with a primary diagnosis of HF (58.4 days) compared with either DM or CKD (77.9 and 83.6 days respectively). There were slightly more CKD occasions of service provided which reflects the higher number of patients with CKD attending the clinic. The number of missed appointments (did not attend [DNA]) increased with more occasions of service. In 2015 and 2016, these DNA rates ranged from 6-7% of the appointments that were scheduled to occur. There were no instances of patients leaving the clinic without being seen by a NP.

[insert Table 2 here]

Clinical Targets

Table 3 details clinical target achievement for each chronic disease at entry to the clinic. Of the 104 patients diagnosed with DM, most patients were currently at BP (62.1%) and LDL targets (89.1%). The number of patients at target for overall cholesterol (50.0%) and HDL (42%) were quite low in comparison to LDL (73.5%). The majority of DM patients (71.2%) presented with microalbuminuria or proteinuria, thus less than 30% were reaching the ACR clinical target. The average HbA1c level of DM patients was high (*M* = 9.0%, maximum = 17.5%) with 16.8% of patients reaching target. Lastly, very few patients (2.4%) were at target (normal) BMI. The overall mean BMI was 35, categorising these patients as obese. The 96 patients who were diagnosed with CKD showed similar BP results to patients with DM,

and similarly presenting as clinically obese. Cholesterol, lipoprotein and ACR levels were also very similar to those of DM patients. A majority of patients (82.4%) were in CKD stages 2, 3A or 3B regardless of underlying primary chronic disease. Clinical data were available for 71 patients with HF, and showed slightly greater achievement of BP (75.7%) and BMI (12.2%) targets at entry to the clinic. However, the average BMI (M = 32.39) still classified them as clinically obese. The majority of HF patients were prescribed a beta blocker (91.3%) to delay the progression of HF. When assessing all patients, clinical data showed that 88.4% were prescribed an ACEi/ARB medication.

Overall eGFR was also explored, with 61.3% of all patients attending the clinic showing eGFR levels that were < 60 mL/min/m^2 (CKD Stage 3A or worse). Excluding patients who had been diagnosed with CKD, the remainder (n = 25; 20.7%) showed an eGFR range of 11-96 mL/min/m^2 at entry to the clinic. At least six (24.0%) of these patients showed impaired kidney function, with eGFR at < 60 mL/min/m^2 or ACR results greater than normal (i.e., microalbuminuria or proteinuria). Fifteen patients (60.0%) showed eGFR function of > 60 mL/min/m^2, but showed abnormal ACR values. Only two of the patients without a diagnosis of CKD showed normal ACR values and eGFR > 60 mL/min/m^2.

[insert Table 3 here]

Patient Satisfaction

After attending the clinic for six months, 31 participants completed the patient satisfaction questionnaire, with results indicating a very high level of satisfaction with care. Ninety-six percent of patients reported that their reasons for seeing the NP had been fully resolved and that the NPs definitely contributed to this outcome. Almost all participants reported that they

were highly satisfied with the treatment (93.5%) and quality of care (87.1%) they received from the NPs. Almost all participants indicated that the NPs always: listened carefully to their health concerns (96.8%); explained things in a way that was easy to understand (90.3%); and allowed enough time during consultations (87.1%). The majority of patients (83.9%) also felt very comfortable with confiding in the NPs and expressing their health concerns (see Supplementary File 1 for further details).

DISCUSSION

There is currently a dearth of literature reporting the implementation and evaluation of NP-led services for people with chronic diseases, especially those designed to take over clinical management of patients with two or more of these diseases within the same service. Due to the frequent co-occurrence and overlap in treatment guidelines, it is important that more effective and integrated models of care are developed for patients with multiple chronic diseases.

NP-led services are a viable option to reform health service delivery (Cashin et al., 2016) that can achieve positive patient outcomes (Crawell et al., 2018). While there have been some studies of multi-morbidity and integrated care, these studies have been largely focused on integration between organisations (e.g. hospital and primary health care; Bower, 2014; Damery, Flanagan & Combes, 2016). Acute hospitals are largely supply-orientated whereby structures are typically arranged into medical specialties (Minkman, 2012), whereas moving towards a patient-centred perspective allows for reformation of an acute-care system better suited for the growth in patients with multiple chronic diseases. Indeed Stewart et al. (2016) propose reform to HF nurse-led services, whose patients are known to have substantial multi-morbidity and require frequent monitoring to avoid acute fluid overload necessitating

emergency department presentation. The innovativeness of the ICDNP clinic is that the individual is placed at the centre of attention rather than managing CKD, DM, and HF as separate diseases by clinical (and mostly siloed) focused specialty teams, and, secondly, the clinic extends specialised care for these patients into the community.

Clinical target achievement by the patients was variable at their time of entry to the clinic, which in some respects identifies the challenges faced by all clinicians who are applying clinical practice guidelines to achieve recommended targets in patients who have multiple chronic diseases (du Vaure et al., 2016). The challenges for this specific group of patients will be supporting adherence to treatment and monitoring for effects of polypharmacy. As patients at this clinic are predominantly overweight or obese, there is a need for increased focus on lifestyle modifications and interventions to promote weight loss and maintenance. This has potential to improve achievement of BP, HbA1c (in those with diabetes) and cholesterol targets, and it will be important to track changes in the longer term as patients receive support at the clinic. It is also especially important that, while chronic disease management ought to be focused on working towards achieving clinical targets, clinician judgement about individual patient response and safety takes precedence. In those with substantial vascular changes due to chronic disease multimorbidities such as the patients in this clinic, vigorously lowering BP to achieve a clinical target, for example, may induce postural hypotension and increase the risk of falls. For this reason, the NPs acted responsively to both prescribing practices and clinical targets.

Due to the novelty of this approach, it is unsurprising that structural barriers have been encountered in both implementing and evaluating the service. At this stage, the process of referral of patients into the clinic is unnecessarily complex and confusing for clinicians, but

this is continually being refined with the goal of a more seamless process in the near future as the model is more established and accepted. Limitations in terms of administrative support available in this service both made effective management of patient appointments more difficult for clinicians and made evaluation more challenging. Despite these structural barriers, we found that patients attending the ICDNP clinic reported very high levels of satisfaction with their care and rarely missed appointments, which is consistent with previous studies into NP-led clinics (Randall et al., 2017). The high levels of satisfaction may have also been due to the person-centred approach taken such as the location of the clinic which afforded ease of accessibility to public transport and parking, phone consultations/follow-up, and that patients could easily rebook appointments. However, the extent to which cost savings of integrated care can be demonstrated is uncertain (Damery et al., 2016) and warrants much longer investigation to follow up the often inevitable long-term consequences of these chronic diseases.

Limitations

We have described the structure and operation of one ICDNP clinic and the characteristics of a highly selected group of patients on entry to this clinic. This patient group is likely to be more stable compared to those who require frequent monitoring by specialist medical practitioners, although they are more challenging to discharge to general practitioners. Further limitations are that we are unable to report on the clinical targets and who was managing patients prior to entry into the ICDNP clinic, and at this time there is a small number of patients to characterise. Longituidinal research of the clinic is necessary. Nevertheless, and with the increasing numbers of patients with multi-morbidities who require specialist medical and/or nursing care, the benefits from innovative service delivery models that afford better collaboration of clinicians at the point of care ought to be pursued.

CONCLUSION

The arrangement of healthcare delivery needs reforming to focus on the growing burden of multiple and often interconnected chronic diseases. Services need to be integrated both within and across organisations to provide healthcare which is truly person-centred. The model of care reported here shows great potential as an effective way to streamline and simplify appointment-burden for patients with a focus on achieving optimal patient outcomes. As such, it is important to continue to evaluate processes and outcomes at this clinic through health service research techniques, in order to ascertain whether services such as these might meet this need more widely.

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Table 1

Demographic Characteristics of Patients Attending the ICDNP Clinic

Characteristic	Frequency, *n* (%)
Age (*n* = 121) *M* = 66.4, SD = 11.2	
≤40	3 (2.5)
41-50	6 (5.0)
51-60	26 (21.5)
61-70	41 (33.9)
71-80	35 (28.9)
≥81	10 (8.3)
Gender (*n* = 121)	
Male	78 (64.5)
Female	43 (35.5)
Country of Birth (*n* = 117)	
Australia	63 (53.8)
New Zealand	18 (15.4)
UK	14 (12.0)
Other	22 (18.8)
Main Language Spoken at Home (*n* = 121)	
English	112 (92.6)
Other	9 (7.4)
Indigenous/South Sea Islander (*n* = 121)	
No	104 (86.0)
Indigenous Aboriginal	2 (1.6)
South Sea Islander	15 (12.4)

Marital Status (*n* = 119)	
Married	69 (57.5)
Single	13 (10.8)
Divorced	21 (17.5)
Defacto	8 (6.7)
Widowed	8 (6.7)
Smoking Status (*n* = 76)	
Non-Smoker	22 (28.9)
Ex-Smoker	39 (51.3)
Current Smoker	15 (19.7)

NB. Not all demographic details were obtainable for all patients.

Table 2

ICDNP Clinic Occasions of Service

	Mean (SD) or n (%)
Average Number of Days Waiting for First Appointment (Range: 4-27), Mean (SD)	15.3 (11.5)
Average Number of Days Between Appointments, Mean (SD)	73.0 (44.3)
Primary Diagnosis: Diabetes	77.8 (53.1)
Primary Diagnosis: CKD	83.6 (44.9)
Primary Diagnosis: HF	58.4 (34.1)
Occasions of Service, n (%)	
NP Diabetes	262 (28.3)
NP CKD	269 (29.1)
NP HF	187 (20.2)
NP Unspecified (i.e., DM/CKD/HF/Candidate)	207 (22.4)
Did Not Attend appointment, n (%)	60 (6.1)

Table 3.

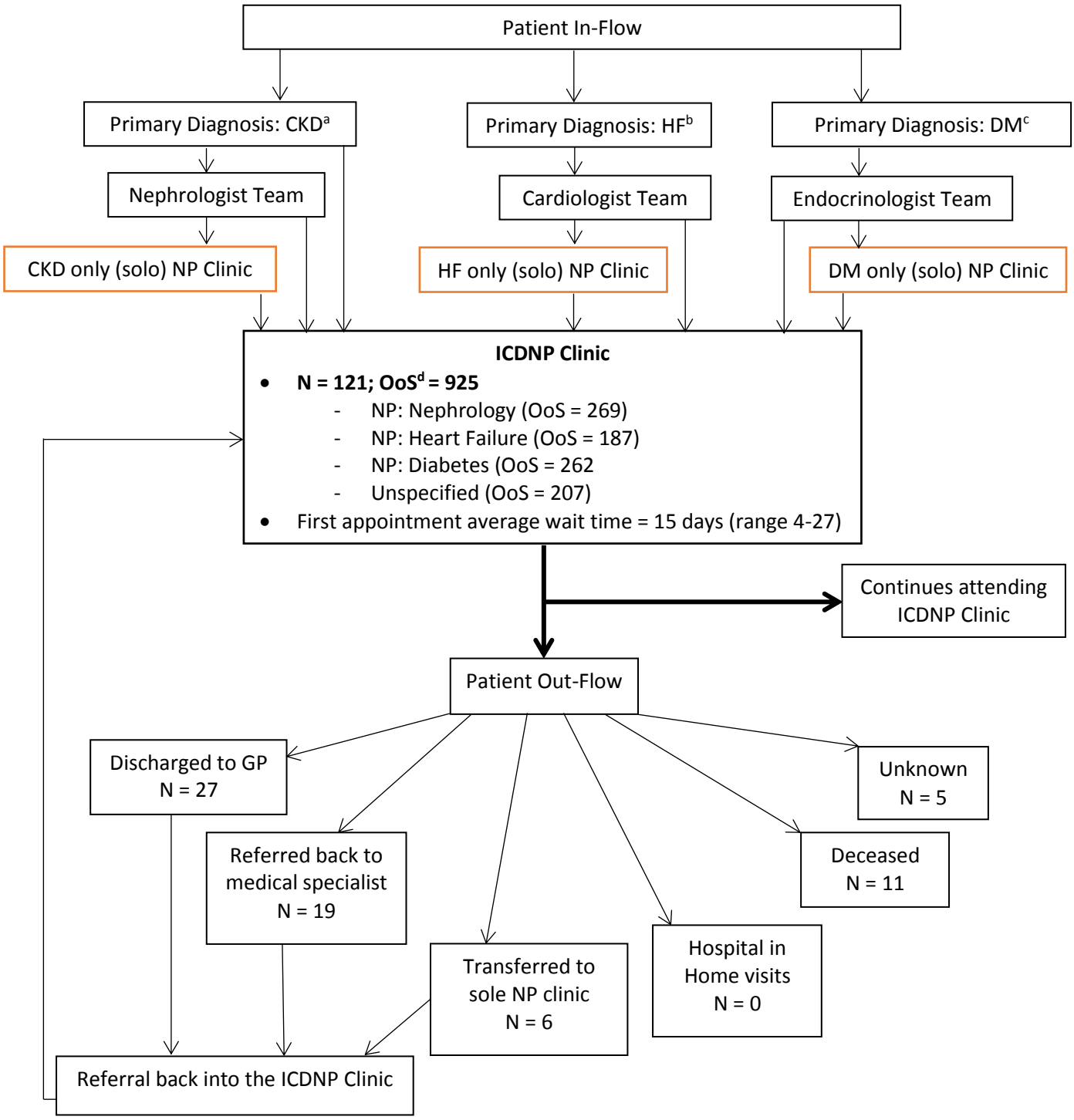
Clinical Targets at entry to ICDNP Clinic

	Overall		Diabetes		CKD		HF	
Clinical Outcome; Target Range	*M (SD)*	At Range or Target (%)	*M (SD*)	At Range or Target (%)	*M (SD*)	At Range or Target (%)	*M (SD*)	At Range or Target (%)
BP (mmHg)[a]		67.5		62.1		69.8		75.7
Systolic	124.1 (18.1)		126.6 (17.4)		123.5 (18.1)		120.3 (19.2)	
Diastolic	67.9 (12.7)		68.7 (12.4)		66.8 (12.6)		68.0 (13.3)	
BMI (kg/m^2)	34.3 (7.0)		35.0 (6.8)		34.7 (6.5)		32.4 (7.7)	
Underweight; < 18.5		1.0		1.2		0.0		2.0
Normal; 18.5 – 24.9		5.1		2.4		3.5		10.2
Overweight; 25 – 29.9		22.4		21.4		23.3		30.6
Obese; > 30		71.4		75.0		73.3		57.1
Cholesterol (mmol/L); < 4.0	4.1 (1.2)	51.3	4.1 (1.1)	50.0	4.1 (1.3)	49.2	4.0 (1.2)	60.5
LDL (mmol/L); < 2.5	2.01 (1.17)	73.5	1.97 (1.09)	73.9	1.95 (1.16)	73.8	1.95 (1.26)	73.9
HDL (mmol/L); > 1.0 (males) or > 1.3 (females)	1.2 (0.6)	44.1	1.2 (0.6)	41.8	1.8 (0.5)	42.9	1.6 (0.6)	41.9
ACR (mg/mmol)[b]	65.8 (126.9)		74.0 (133.3)		68.4 (130.7)		N/A	
Normal		33.3		28.8		33.3		N/A

Microalbuminuria		33.3		33.3		31.9		N/A
Proteinuria		33.3		37.9		34.8		N/A
HbA1c (%); < 7	9.0 (2.3)	16.7	9.0 (2.3)	16.8	9.1 (2.3)	13.8	8.7 (2.4)	18.2
eGFR (mL/min/m^2)	53.5 (20.7)		54.5 (21.3)		49.6 (18.7)		56.7 (21.3)	
Stage 1; > 90		8.4		9.7		3.2		10.1
Stage 2; 60 – 89		30.3		31.1		27.4		36.2
Stage 3A; 45 – 59		19.3		19.4		18.9		20.3
Stage 3B; 30 – 44		32.8		29.1		41.1		24.6
Stage 4; 15 – 29		8.4		9.7		9.5		7.2
Stage 5; < 15		0.8		1.0		0.0		1.4
β-Blocker medication		74.7		N/A		N/A		91.1
ACEi/ARB medication		88.4		91.3		85.4		85.9

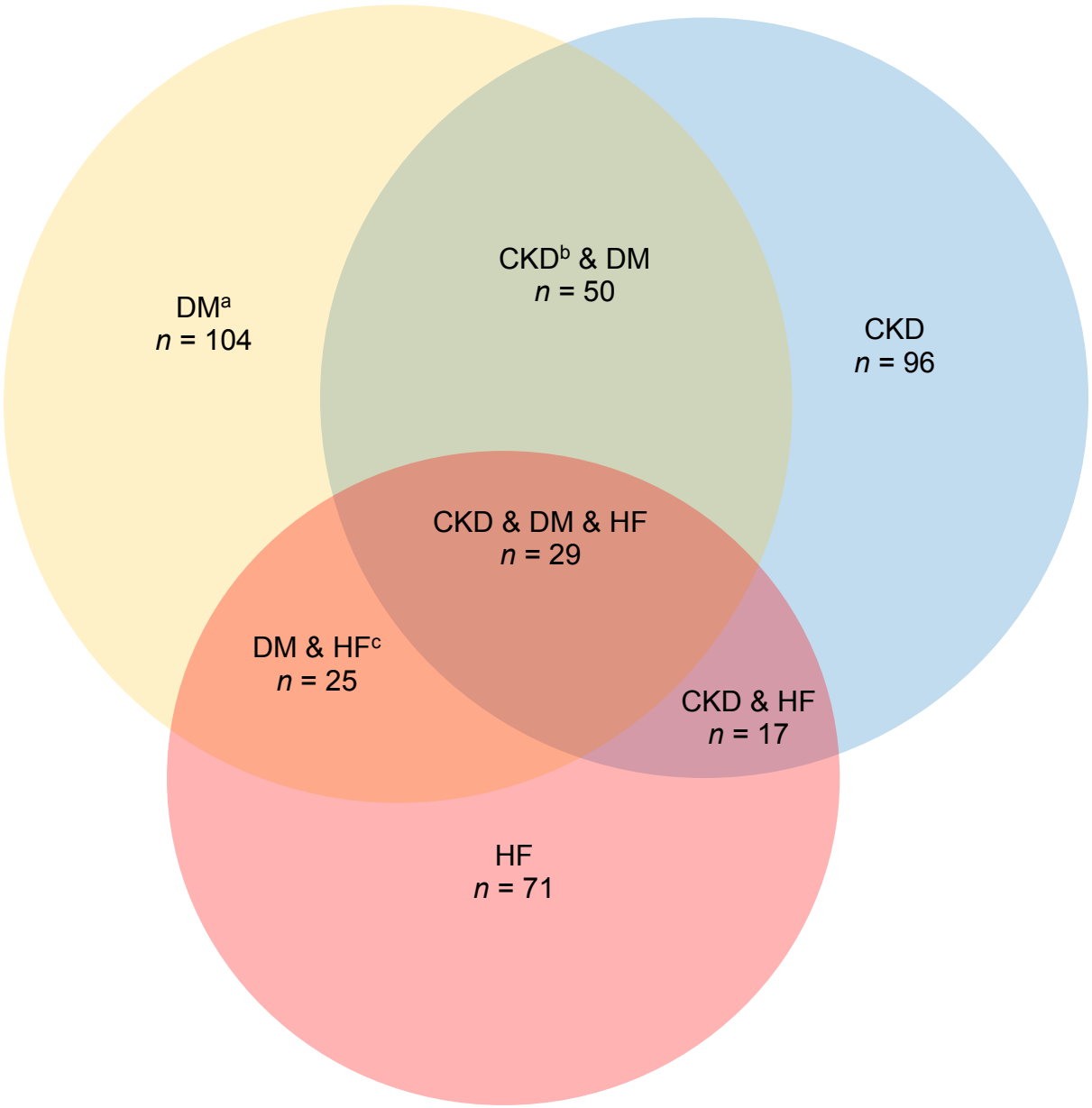
NB. Clinical data is reported for all patients for whom it is available. There is overlapping patient data as a result of comorbidities between chronic diseases.
[a]Target blood pressure is 140/90mmHg, except for patients with diabetes or proteinuria whose target is 130/80mmHg.
[b]Normal ACR levels are less than 2.5mmol/L and 3.5mmol/L for males and females, respectively. ACR levels between 2.5 – 25mmol/L and 3.5 – 35mmol/L for males and females, respectively, correspond with microalbuminuria. ACR levels over 25mmol/L and 35mmol/L for males and females, respectively, correspond with proteinuria

Figure 1. ICDNP Clinic Flow



[a]Chronic kidney disease
[b]Heart failure
[c]Diabetes mellitus
[d]Occasions of service

Figure 2. Diagnoses of clinic attendees (*N* = 121)



NB. Clinician-determined primary diagnoses: CKD *n* = 52; DM *n* = 29; HF *n* = 40.
[a]Diabetes mellitus
[b]Chronic kidney disease
[c]Heart failure