An integrated nurse practitioner approach to improving management for individuals living with complex multiple chronic diseases

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Introduction

Chronic disease affects 80% of Australians over the age of 45 years and accounts for 70% of national healthcare costs.[1, 2] The Australian Institute of Health and Welfare 2014 data reports that in 2011-12, 3.7 million Australians aged 18 and over had one or more cardiovascular diseases such as hypertension, coronary heart disease, stroke or heart failure.[3] A further 917,000 had diabetes although 1% (700,000) of the adult population had unreported biomedical signs of diabetes. In addition, approximately 10% (1.7 million) Australian adults had biomedical signs of chronic kidney disease (CKD).[3] Overall one in four Australian adults had cardiovascular disease (CVD), diabetes or CKD, 1.2 million had at least two of these conditions, and 182,000 had all three conditions.[3] These three chronic diseases often have similar underlying causes and share common risk factors as well as prevention, management and treatment strategies.

The management of multiple chronic conditions is one of our biggest healthcare challenges globally today. In public hospitals there are often lengthy waiting periods for an outpatient clinic appointment to see a specialist, and once at the clinic individuals frequently wait several hours due to medical staff being called away to attend to inpatient priorities.[4] There are also challenges with limited parking and/or long distances to walk from public transport to the clinic. If a person has multiple chronic conditions, treatment between speciality clinics can become complex with multiple medication changes (prescription and non-prescriptions) leading to adherence issues and an increased risk of adverse effects associated with polypharmacy.[5, 6] The growing burden of chronic disease underscores the need for a change in care provision.

A new model for the management of chronic disease

In Australia there are several-Nurse Practitioner (NP) clinics for individuals living with chronic disease. NPs have a Masters qualification and are authorised to practise autonomously, to order and interpret diagnostic investigations, to prescribe medications

within their specific scope of practice, and refer to other clinicians.[7] These NP clinics unfortunately are often structured similarly to the medical model where people are seen within a siloed disease-specific approach to care.

In 2014 a novel community based integrated NP clinic was commenced for individuals with at least two chronic conditions. Chronic conditions included are diabetes, CKD, or heart failure (HF). The aim of the clinic is to provide person centred care, reduce clinic waiting times, integrate care into one clinic appointment and reduce the potential confusion that can arise when advice is received by multiple healthcare providers. People are seen in an outreach community-based clinic by NPs with expertise in diabetes, CKD or HF. The clinic is operated once a week and wherever possible those attending are seen by the same team of NPs at every appointment. The focus in the clinic is a comprehensive assessment, supporting self-management, (including education about lifestyle modifications), and medication review and adjustment. Collaboration with general practitioners and disease-specific speciality teams occur. The NPs use nationally accepted clinical guidelines and targets? (Australian Diabetes Society, Australia Heart Foundation and Kidney Health Australia) to set individual and meaningful goals with each individual.[8,9,10] Care planning is a collaborative process with the individual and takes into account their needs and wishes. Clinics are offered at multiple community sites thereby reducing the travel distance to appointments. Parking is generally easier offsite from the hospital and appointments are usually on time, minimising waiting time.

Case study

To illustrate an example of the care provided in the integrated clinic, a case study of a 65 year old lady, 'Marian', with type 2 diabetes, CKD and HF is presented (see **Table 1** for clinical information). **Figures 1 and 2** indicate changes in health-related quality of life (QOL) scores (measured by SF-36[11]) and heart failure knowledge (measured by Dutch Heart Failure Knowledge scale[12]) between her first clinic appointment (baseline) and two years later.

Marian was overwhelmed when she first attended the clinic, and was frightened by her diagnosis of HF and CKD. She was trying to keep her blood glucose levels tightly controlled thinking this would reduce her risks of long term complications associated with cardiovascular disease and renal failure. Consequently she had an episode of severe hypoglycaemia which required medical assistance. Over a period of 12 months she gradually gained 9kg with her maximum weight being 110kg.

Marian was provided with support and self-management education and slowly regained her confidence in the ability to self-manage her multiple health conditions. As her HF medications were titrated, her exercise tolerance and kidney function improved. Her insulin doses were reduced and she was supported to think more broadly about the benefits and risks of tight glycaemic control, with more understanding of the risks of hypoglycaemia. The Australian Diabetes Society guidelines for the individualisation of HbA1c recommend that in the instance of recurrent severe hypoglycaemia, HbA1c targets can be relaxed, noting that severe hypoglycaemia is associated with significant morbidity and mortality.[13] In people with

multiple co-morbidities tight glycaemic control is not recommended, and in the case of Marian it took considerable counselling and coaching over many months to convince her to re set her goals regarding glycaemic control.

Weight loss was Marian's main priority, and initiating Exenatide was suggested.[14]When Exenatide was commenced her insulin dose was reduced by 20%. In collaboration with her endocrinologist a low dose of Metformin XR was introduced.[15] Metformin is associated with a significantly lower incidence of cardiovascular events and mortality compared to other hypoglycaemic agents and metformin associated lactic acidosis is rare.[15]A dose of 2000mg is possible with an eGFR of 30 -39ml/min. As her eGFR was 30ml/min we commenced her on 500mg titrating up to 1000mg over 4 weeks. She was advised to cease this if she had any vomiting or dehydrating illness.[15] Plasma lactate was measured as a precautionary measure to ensure that she did not develop lactic acidosis. A low dose of Glipizide was commenced as a third agent as she was initially hyperglycaemic after ceasing basal-bolus insulin and commencing Metformin XR and Exenatide. Glipizide was chosen due to the short half-life and reduced risk of hypoglycaemia.[16] Substantial education was provided to Marian with regard to the potential risks of hypoglycaemia, particularly as reduced renal function can impair the metabolism and excretion of sulphonylureas. Marian was advised that hypoglycaemia is more likely to occur when caloric intake is reduced or activity is increased.[16]

Over the next 17 months Marian reduced her weight by 30kg and maintained the weight loss through use of Metformin XR, Exenatide, healthy diet and increased activity. Glipizide was ceased and she no longer experienced any hypoglycaemia. She diligently attended HF exercise classes, her NYHA (New York Heart Association) class improved to class 1 and her kidney function improved to CKD stage 3B.

Marian was extremely happy with her weight loss and increased exercise tolerance. She became more confident playing with her grandchildren and gardening as she no longer had the constant fear of hypoglycaemia. Her Minnesota HF score improved from 73 to 24. The Minnesota HF questionnaire measures the effects of symptoms, functional limitations and psychological distress on a person's QOL using a six–point, zero to five Likert scale to measure how each of 21 facets prevent them from living as they desire. The higher the score, the greater the impact on the individual's QOL.[17] The reduction in Marian's score demonstrates how her QOL has improved over the last 2 years (**Figure 1**). While some domains decreased or remained the same, there was been improvements in physical domains (physical functioning, role limitations due to physical health problems, and bodily pain). When surveyed regarding her satisfaction with the clinic, Marian reported she was highly satisfied with the care provided by the NPs. She stated that the NPs always:

- Explained things in a way that was easy to understand
- Gave clear instructions about what to do to take care of health concerns
- Knew all the important information about her health history
- Spent time with her and gave her the help she need to make lifestyle change

Marian also reported that she felt very comfortable talking to the NPs about any issues.

Implications for practice

The integrated clinic combines the knowledge and skills of three NPs into one appointment and is held in settings outside of the hospital which has multiple benefits for the individuals who attend including:

1. Timely referral and symptom management
2. Reducing the number of outpatient appointments
3. Providing holistic management for people with highly complex comorbid chronic conditions
4. Providing early detection and intervention
5. Reducing hospital presentations, admissions and length of stay
6. Delivering a person centred model in a more convenient setting
7. Improving client outcomes

Conclusion

It is evident that the care of people with comorbid, complex chronic conditions takes longer particularly as these conditions do not resolve and tend to worsen over time. When multiple chronic conditions are present it can be overwhelming for the person concerned. Motivated and engaged individuals are more likely to follow treatment recommendations, including lifestyle modifications which are focused on reducing the burden and progression of these diseases. Ideally primary health care is the setting to manage those with chronic conditions, however when healthcare becomes more complex and speciality knowledge is required, an outpatient integrated chronic disease model can be more suitable than siloed medical services.

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Table 1:

	First Presentation	Two Years Later
Medical History	● Initially admitted through cardiology following NSTEMI and subsequent heart failure	
	● Type 2 diabetes	● Type 2 diabetes
	● Hypertension	● Hypertension
	● Dyslipidaemia	● Dyslipidaemia
	● LV Systolic dysfunction EF 15 -20% with poor prognosis	● LV Systolic dysfunction EF 15 -20%
	● HF NYHA class 111-1V	● HF NYHA class 1
	● CKD stage 4 with nil albuminuria	● CKD stage 3B with nil albuminuria
Medications	● Glargine (Lantus) 28 units	● **Glargine and Aspart replaced with Exenatide (Byetta) titrated to 10mcg bd**
	● Aspart (Novorapid)10 units with meals	● **Metformin (Diabex XR) 1g commenced**
		● **Glipizide (Minidiab) 5mg daily commenced**
	● Carvedilol (Dilatrend) 6.25 mane 12.5mg nocte	● Carvedilol (Dilatrend) 6.25 mane 12.5mg nocte
	● Perindopril (Coversyl) 2mg bd	● Perindopril (Coversyl) 2mg bd **increased to 4mg bd then replaced with Sacubitril/valsartan(Entrestro)**
	● Nicorandil (Ikorel) 5mg bd	● Nicorandil (Ikorel)5mg bd
	● Clopidogrel 75mg daily	● Clopidogrel 75mg daily
	● Aspirin 100mg mane	● Aspirin 100mg mane
	● Digoxin (Lanoxin) 62.5mcg mane	● Digoxin (Lanoxin) 62.5mcg mane
	● Atorvastatin 40mg nocte	● Atorvastatin 40mg nocte
	● Frusemide (Lasix) 80mg mane 40mg 2pm	● Frusemide (Lasix) **decreased to 20mg**
	● Vit D, Calcium and magnesium supplements	● Vit D, Calcium and magnesium supplements
Investigations	● HbA1c 7.0 %	● HbA1c 7.6%
	● eGFR 30mls/min/1.73m^2	● eGFR 42mls/min/1.73m^2
	● Creatinine 157	● Creatinine 129
	● Lipids TC 4.5, Trigs 3.1, HDL 1.0, LDL 2.1	● Lipids TC 4.2, Trigs 1.1 HDL 1.2 LDL 2.1
Examination	● Wt 96kg Ht 157cm BMI 38.95kg/m^2 (her weight peaked at 110kg before commencing Exenatide	● Wt 80kg Ht 157cm BMI 32.5kg/m^2
	● Blood pressure 104/60mm/Hg sitting 122/70mm/Hg standing	● Blood pressure 120/60mm/Hg sitting 116/60 mm/Hg standing
	● HR 64 bpm	● HR 78 bpm

	● Lungs bilateral air entry, nil creps ● HS 1 & II no murmur detected ● JVP Not elevated ● Oedema nil	● Lungs bilateral air entry, nil creps ● HS I & II no murmur detected ● JVP Not elevated ● Oedema nil
Quality of Life	● Very scared ● Aiming for tight glycaemic control ● Multiple hypoglycaemic episodes ● Significantly reduced quality of life ● Minnesota HF score: 73	● Increased exercise tolerance ● Has recommenced playing music ● Takes grandchildren to school ● No hypoglycaemic episodes ● Significantly improved quality of life ● Minnesota HF score: 24

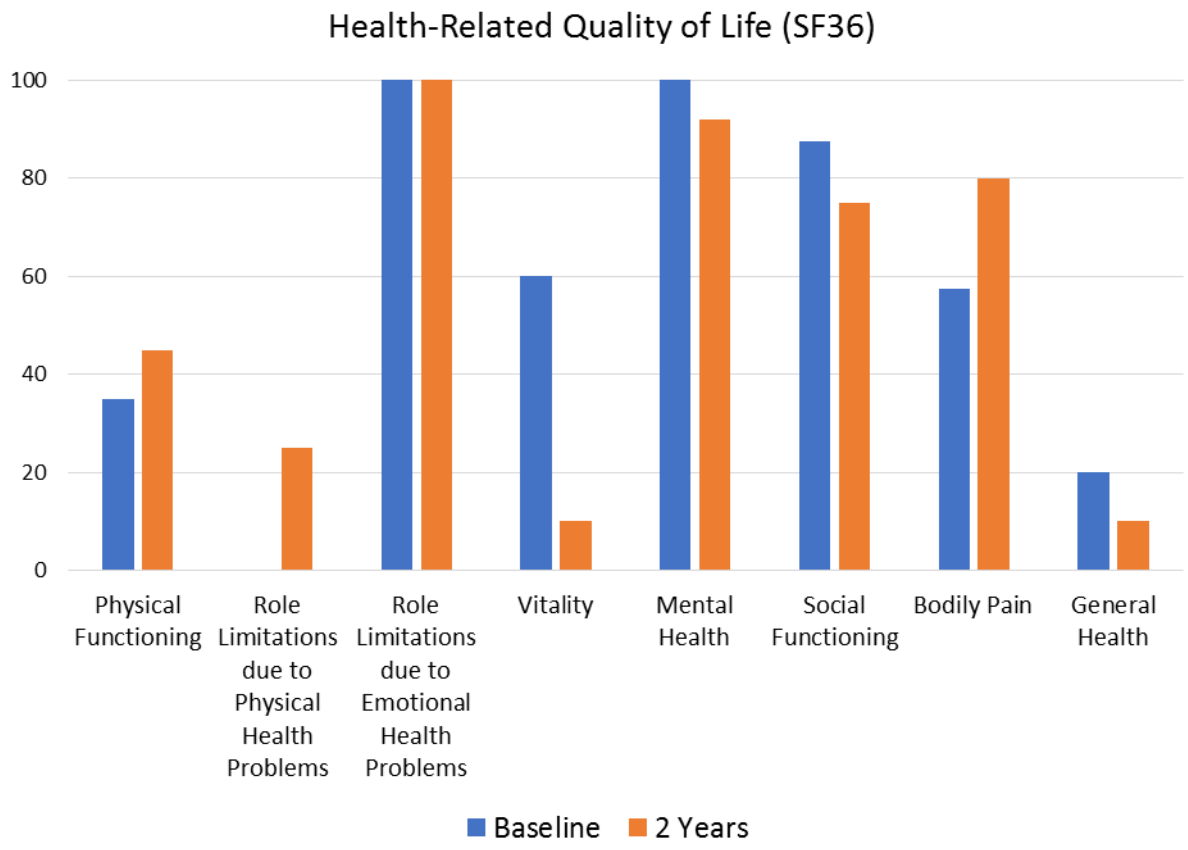
Health-Related Quality of Life (SF36)
100
80
60
40
20
0
Physical Functioning
Role Limitations due to Physical Health Problems
Role Limitations due to Emotional Health Problems
Vitality
Mental Health
Social Functioning
Bodily Pain
General Health
Baseline
2 Years

Figure 1

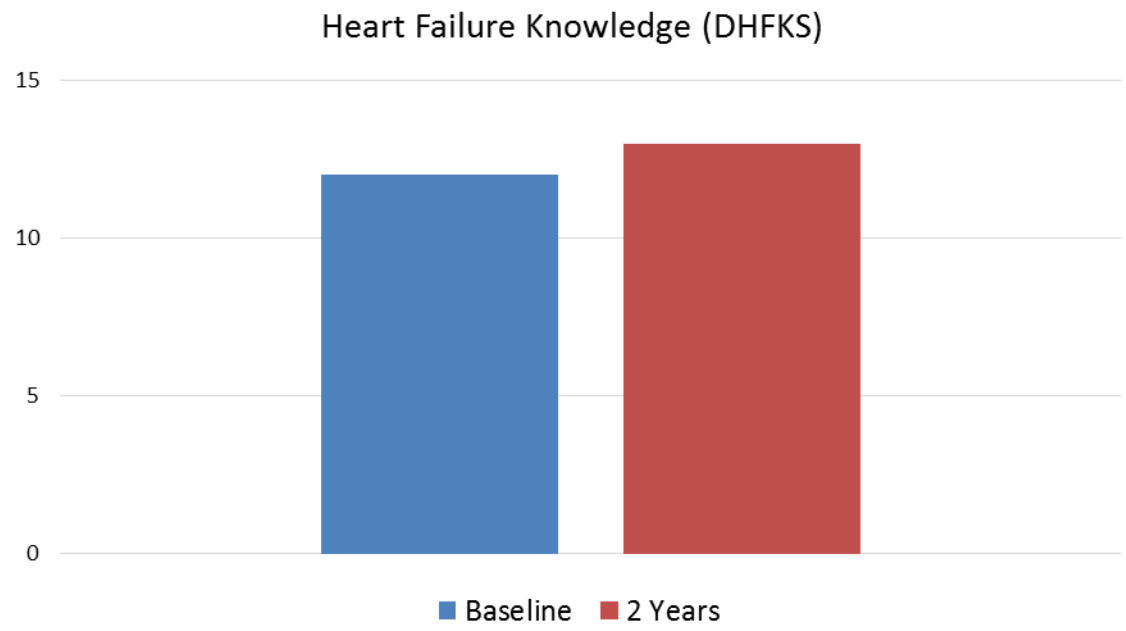

Figure 2