

RESEARCH ARTICLE

Nurse practitioner work patterns: A cross-sectional study

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Abstract

Aim: The aim was to determine how nurse practitioner (NP) roles are translated into clinical practice across Victoria, Australia. This paper reports details about NP work patterns and scopes of practice across multiple clinical settings and geographic locations.**Design:** A quantitative survey design was used. A data abstraction tool, based on previous work, was adapted for this study.**Methods:** All NPs in one state of Australia were eligible to participate in the study and invited to complete an online survey about their NP practice. A previously developed data collection tool, capturing practice patterns of NPs, was adapted for online use in REDCAP. The data were exported, and descriptive statistics were analysed using SPSS.**Results:** Participants were mostly female, with males accounting for 25%. Findings indicate several NPs working in outpatient settings, community settings and forensic care. Patterns of practice—prescribing and ordering diagnostics—are associated with clinical context and model of care of the NP work.

KEYWORDS

clinical practice, diagnostic techniques and procedures, nurse practitioners, referral patterns, therapeutics

1 | INTRODUCTION

Internationally, there is considerable published literature reporting development of the nurse practitioner (NP) role in various health-care systems. The NP has become recognized as an important addition to the healthcare team since the first roles emerged in the United States in the 1960s (Ford, 2015). Internationally, the impetus for the introduction of the NP role has often resulted from medical workforce shortages in geographically disadvantaged and underserved communities (Poghosyan & Liu, 2016). The NP role has evolved in most countries, augmenting healthcare services globally

for several decades (Foster, 2016). Implementation of the NP role has had a positive impact on the quality of health service provision (Gagan et al., 2014) and is now integral to most universal health systems (Scanlon et al., 2018).

In comparison to our international colleagues, there is limited large-scale NP literature in the Australian context. NP roles have been incorporated into the Australian healthcare system since the first endorsement in 2000. Though slow to be realized as integral to the Australian healthcare workforce (Lowe et al., 2013; Scanlon et al., 2018), there are now 2,069 NPs nationally, a number increasing annually (NMBA, 2020). As with international development of NPs,

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Australia has developed a dynamic and flexible model of care, capable of adapting to changing community healthcare needs. NP models have been attributed to the provision of safe and effective healthcare delivery across several health service gaps (Fox et al., 2017) and are reported to practise in a variety of clinical settings including hospitals, community outreach, rural and remote health (Centre for International Economics, 2013; Lowe et al., 2013) private practice (Helms et al., 2015) and primary care (Kelly et al., 2017; Leask & Tennant, 2019).

In Australia, the NP title is protected and the role is defined as:

A nurse practitioner is a registered nurse endorsed as a nurse practitioner by the NMBA. The nurse practitioner practices at an advanced level, meets and complies with the *Nurse practitioner standards for practice*, has direct clinical contact and practices within their scope under the legislatively protected title "nurse practitioner" under the National Law (NMBA, 2020).

The Australian NP role has consistently demonstrated improved patient outcomes (Driscoll et al., 2016; Fong et al., 2017; Lowe et al., 2011;), high levels of patient satisfaction (Carter et al., 2015; Fox et al., 2017) and deliver safe, high quality care (Tori, 2020) and is cost-effective (Driscoll et al., 2019). The Australian NP role addresses the shortage of health practitioners in several specialist, acute areas and is evolving to lead integrated services in primary healthcare environments in rural communities (Barracough et al., (2016).

The potential advantages of using NPs to address healthcare needs of Australian communities in many geographic regions and specialty clinical practice areas (Carter et al., 2015) are underestimated. Descriptive data of Australian NP services by national census in 2009 and 2011 provided insight to the demographics, employment profiles and patterns of clinical practice attended by NPs (Anne, Della Phillip, Middleton Sandy Gardner Glenn, 2009; Middleton, Gardner, Gardner, & Della, 2011). A study by Middleton et al. (2016) reported on NP profiles from longitudinal census data, indicating ongoing barriers to full scope of practice (SOP) limiting the work of NPs due to a lack of supportive policy. These sentinel papers provide insight into NP practice throughout Australia.

Despite sentinel research, there is still a lack of recognition or acceptance of the autonomous role of NPs, according to the most recent report on Victorian NP evaluation (DHHS, 2015), a situation also reported internationally (Poghosyan & Liu, 2016; Schirle et al., 2018; Torrens et al., 2020). Clifford, Lutze, Maw, Jennings (2019) believe a lack of understanding about Australian NPs contributes to the gap in understanding the value of the NP service. Whilst large-scale studies have been reported internationally (Chattopadhyay et al., 2015) to date, many Australian evaluations of NP models have been on small scale or individual service models limiting their ability to highlight the larger scale value of the NP role (Jennings et al., 2017). Whilst information continues to support NP clinical practice context, little is known of the organizational supports despite a national study conducted in 2018 (Scanlon et al., 2018).

This paper describes NP work patterns, the extent to which extensions to traditional registered nurse (RN) practice (such as prescribing or ordering diagnostic tests) are used and insight into the context of practice across the NP multiple settings. The information gathered in this project will add to existing knowledge about NPs, providing an opportunity to compare and contrast NP roles with other jurisdictions—both nationally and internationally.

In Victoria, Australia, there are approximately 500 NPs (NMBA June 2020) exceeding one and rivalling the next biggest state by population (NMBA 2020). The Department of Health and Human Services (DHHS, 2015) established the Victorian Nurse Practitioner Program (VNPP) to support the development of NP roles into the health system. According to DHHS (2015), the core components of the VNPP were as follows:

- NP model development grants.
- Nurse Practitioner Candidate (NPC) support packages.
- The Victorian NPC Mentoring pilot.
- NP scholarships.
- Publication grants.
- NP collaborative groups (communities of practice).

The overall aim of the study is to explore the practice patterns and profile of NP roles throughout Victoria, to determine the sustainability and translation of NP models of practice into clinical practice and to inform the future direction of DHHS support of the NP role in Victoria.

2 | Method

A quantitative survey design was used. This paper reports on the results collected with a data abstraction tool, based on previous work by Gardner, Gardner, Middleton and Della (2010) and adapted for online use with REDCAP™ (Obeid, et al. 2012) in this study.

A convenience sampling method was used, and all endorsed NPs and candidates in the state of Victoria, Australia, were eligible to participate in the study. There were a total of 339 NPs at the time of data collection.

Several recruitment strategies were used through third-party organizations to provide invitations to participate. The Victorian Collaborative Groups—a key component of the VNPP—were central to the recruitment of participants via email communication to their member databases, with information on how to participate. This was further supported by third-party email communication from Department of Health and Human Services (DHHS) to their database of known NPs, as well as through the Australian College of Nurse Practitioners (Victorian chapter members) via the Chapter Chair.

Due to the intricacies of locating NPs across the state, the data collection remained open for a six-month period from April–September 2018. Participants were offered a \$50 incentive payment on completion of data for ten patient encounters.

A previous study by Lowe et al. (2018) reports on the adaptation of a tool developed by Gardner, et al. (2010) for online data collection using REDCap™ (Obeid, et al. 2012). The current work refines the tool further to collect more detailed information related to patient encounters. The changes to the tool relate specifically to the types of tests requested during patient encounters as well as the types of therapeutic interventions used.

2.1 | Statistical analysis

Descriptive statistics were used to report participant demographics and other key information about the NP roles. The questionnaire allowed for participants to nominate "other" when required, but this category necessitated some form of qualifying statement. Where these were evident, the free-text data were exported to a spreadsheet and reviewed for similarities. Qualitative thematic analysis enabled organization of the data and to identify commonalities across respondents (Cresswell, 2012).

3 | RESULTS

A total of 136 clinicians participated in the patient encounter component (part 3) of the study, a response rate of approximately 40%. The total number of patient encounters included for analysis was 819.

3.1 | Demographics

Most NPs (approximately 75%) were female with the remainder identifying as male. Length of time working as an RN ranged from 5–46 years and as an NP the range was from one (1) month–26 years. Most (approximately 70%) identified working in a hospital setting - with the remainder choosing another type of workplace category. Those NPs that worked in hospital environment indicated the following specific to their workplace

Patient demographics included an age range from a day 4 neonate–a 100-year-old. There were more male patients ($N = 422$)

compared with female patients ($N = 395$) captured during the patient encounters.

A variety of patient problems/diagnoses were provided in the open-ended questions. The reported patient problems have been thematically linked using a body systems approach to showcase the expansive role of the NP and are represented in Figure 3.

The results indicate a variety of medical diagnoses are managed by the NPs across the many models of practice described. The diagnoses range from simple, one system conditions such as wound or deep vein thrombosis, to complex, multisystem diagnoses such as myocardial infarction together with aspiration pneumonia; and a combination of chronic kidney disease, ischaemic heart disease, type 2 diabetes mellitus and atrial fibrillation.

3.2 | Medications prescribed by NPs

Prescribing medications was reported in a total of 69% ($N = 561$) of the patient encounters. Medications were prescribed as: Preventative (105, 19%), Maintenance (117, 21%), Treatment (443, 79%) and Other (13, 2%).

There were over 24 subgroups of medication classes prescribed by the NP participants. The classes of medications prescribed and the frequency of each are provided in Figure 4.

Several NPs ($N = 122$ [15%]) reported ceasing or altering medications. Justification provided for cessation of medications included an observation of medication side effects, drug interactions, treatment completions, titration of doses for treatment effect and non-compliance with therapeutic regimens.

3.3 | Diagnostic tests ordered by NPs

Diagnostic imaging was reported during patient encounters (64.8%). Ultrasound (US) in 60 encounters, with four being performed personally by the NP. These were undertaken to determine urine volume in most cases ($N = 3$) with one occasion of service to determine a rotator cuff injury.

Computed tomography (CT) scans were ordered for 57 (7%) of patient encounters and magnetic resonance imaging (MRI) for 12

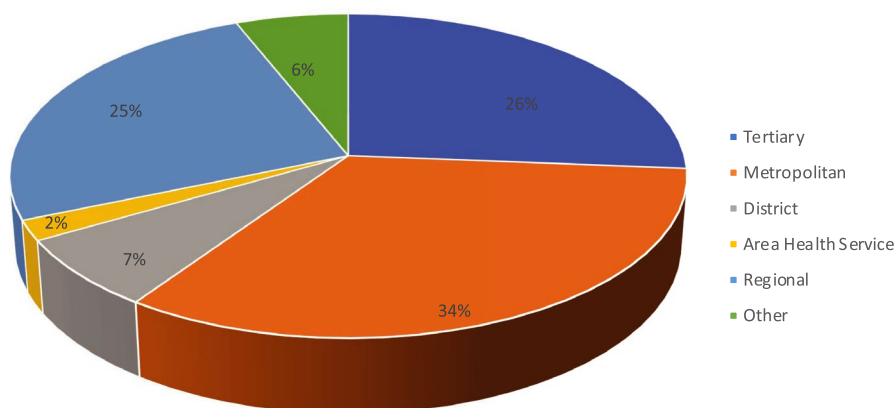
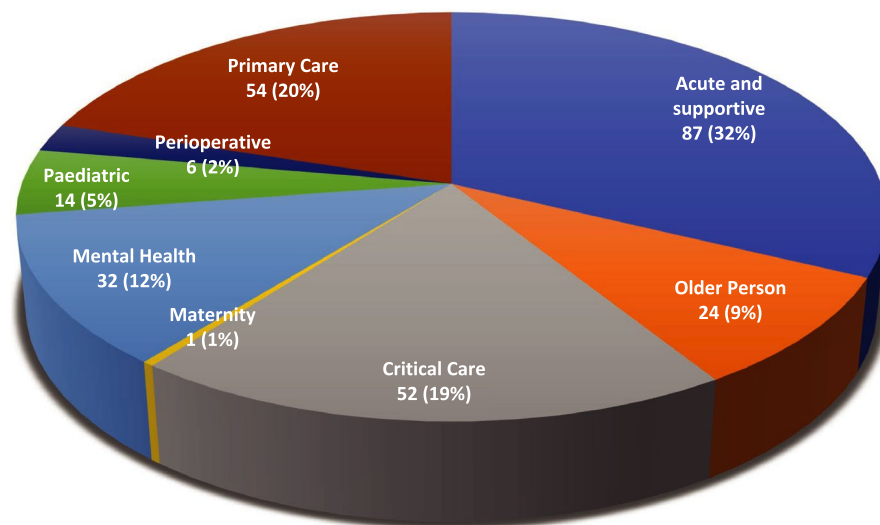


FIGURE 1 Geographic location of study NPs

FIGURE 2 Category of NP practice**FIGURE 3** Thematic representation of patient presenting problems/diagnoses

Neurology	- delirium - post ictal
Pain	- neuropathic pain - traumatic neck pain
Circulatory	- epistaxis - limb ischaemia
Diabetes	- diabetic ketoacidosis - T2DM with poor glycaemic control
Foreign body	- eye FB - oesophageal FB
Respiratory	- chronic obstructive pulmonary disease - pulmonary oedema
Renal	- end stage kidney disease - renal disease with fluid overload
Cancer	- acute pain related to mucositis - breast cancer - recurrent, refractory vomiting and nausea
Cardiac	- ST segment myocardial infarction (STEMI) - heart failure
Mental health	- Schizophrenia - Depression
Infection/inflammation	- pneumonia - cellulitis
Burns / Wounds	- electrical / chemical and scald burns - deep and superficial lacerations to a variety of body surfaces

patient encounters. Two PET scans, one Pap smear and three bone scans were ordered by NPs with another 22 diagnostic tests classified as "other." On further analysis, "other" included items such as electrocardiograms, echocardiograms and hearing tests. The type of test and anatomical areas investigated are represented in Table 1.

Half ($N = 411$, 50%) of participants ordered pathology tests. Biochemistry was most frequently requested ($N = 300$, 37%) followed by haematology ($N = 282$, 34%) and microbiology ($N = 124$, 15%). Requests for serology ($N = 38$, 5%), cytology ($N = 16$, 2%) and histology ($N = 8$, 1%) were also reported.

Common biochemistry included urea and electrolytes (279, 93.0%), followed by liver function tests (192, 64.0%). An internal

provider was used in 201 cases, (67.9%), an external provider in 97 cases (32.8%) and "other" provider in five cases (1.7%).

Common haematology tests included full blood examination (271, 96.1%) and a white cell count (WCC) in 96 cases (34.0%). In a small number of encounters ($N = 16$), >3 tests were ordered. Type of provider included internal (189, 67.0%); external (95, 33.7%); and "other" (2, 0.7%).

Cytology tests were not commonly ordered by NPs. When requested, the tests included urine in 6 [37.5%] cases, sputum and cervical cytology each in one case (6.3%). The "other" category was reported in eight cases (50.0%). An internal provider was recorded in nine cases (56.3%) and external provider in 7 cases (43.8%),

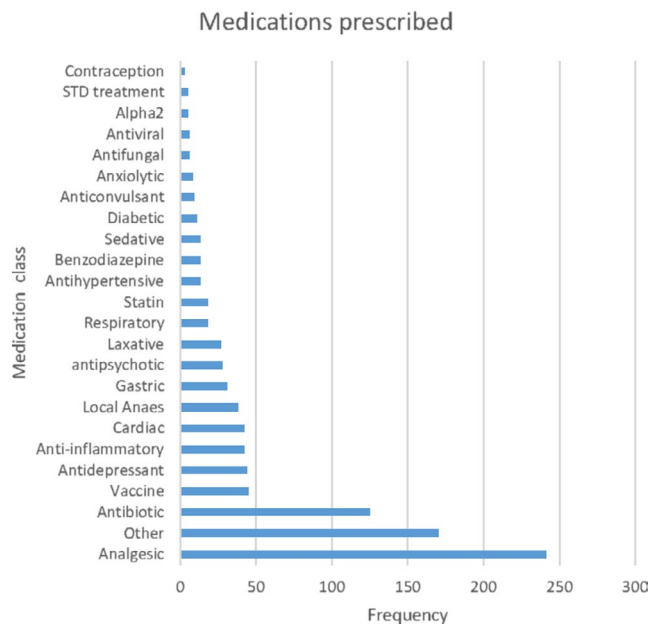


FIGURE 4 Frequency of medication prescribing by class of drug

TABLE 1 Frequency of radiology by anatomical site (N)

	XR	U/S	CT	MRI	PET scan	Bone scan
Upper limb	73	15	29	10	2	2
Lower limb	40	14	27	1	2	3
Chest	38	12	21		2	2
Spine	5	11	18	1	2	2
Abdomen	5	6	3	1	2	2
Head/neck	2	3	2		1	2
Pelvis	2		1		1	2

A total of 38 serological tests were ordered: hepatitis B (27, 71.1%); hepatitis C (21, 55.3%); cytomegalovirus (CMV) (2, 5.3%); coeliac (1, 2.6%); and "other" in 24 cases (63.2%). Most used an internal provider (22, 57.9%) and the remainder by an external provider (16, 42.1%).

Microbiology tests included urine (76, 61.3%), wound (27, 21.8%), human immunodeficiency virus (HIV) (8, 6.5%), faeces (3, 2.4%), Herpes Zoster in 1 case and "other" (29, 23.4%). Service provider included internal (79, 63.7%), external (44, 35.5%) and "other" (1, 0.8%).

Histology was least commonly ordered ($N = 8$) and classified into alimentary (1) blood (1), skin (3) and "other" (3). An internal provider was used in six cases and four by an external provider.

3.4 | Therapeutic interventions

A total 583 therapeutic interventions were provided. The most common intervention was Education and Information ($N = 369$) followed by Procedural ($N = 196$) and Counselling ($N = 189$). See Table 2.

In reporting the specifics of "Education," participants indicated a variety of responses, and some of these were general comments about "advice," "education" and "health promotion." Some participants indicated that "education" also included education of staff.

Procedures included application of plaster/backslab/bandage/sling, provision of wound care including use of nerve blocks and sedation for suturing. One NP inserted intrauterine devices (IUDs).

Social assistance included assistance with housing, government entitlements, linking with other services, providing letters and assisting people with planning services and appointments. The "Other" category included preparing court reports and organizing emergency transfers, together with co-ordination of care.

The most common referral types were medical specialist (192, 43.4%) and general practitioner (GP) (137, 31.0%). NPs reported receiving referrals directly from specialist agencies in 45.8% (375) cases. The referrer included GPs (101, 27%) and medical specialists (98, 26%), with NPs also referring to other NPs in a small number of cases (3, 0.8%) (Figure 5).

4 | DISCUSSION

This is the first large-scale study undertaken to explore NP roles and practice patterns in the state of Victoria, boasting the fastest growing numbers of the NP workforce in Australia (NMBA, 2020). The study represents an effective cross section of NPs, from the perspectives of clinical specialty and geographic location.

The participant demographics are reflective of a very experienced cohort of nurses. Similar to previously reported demographic detail of NP samples, the average number of years working as a RN was almost 23.8 years in the current study. This was similar to the figure reported by Clifford et al. (2019) with work experience of 22.6 years and an average number of years in an NP role reported as 4.6 years. Most participants in this study were female (75%), with the remainder reported as male (25%). This finding suggests a different demographic distribution pattern for gender than for the general nursing population, a workforce which is normally reported at 90% female and 10% male (ANMF, 2019; Gardner et al., 2017; Woo et al., 2019) and varies from that reported by Chattopadhyay

TABLE 2 Therapeutic intervention patterns

Therapeutic intervention type	Frequency N (%)
Education	369 (45%)
Procedure	196 (24%)
Counselling	189 (23%)
Monitoring	175 (21%)
Admission	71 (9%)
Other	37 (5%)
Social assist	28 (3%)
Provision/assist with aids	11 (1%)

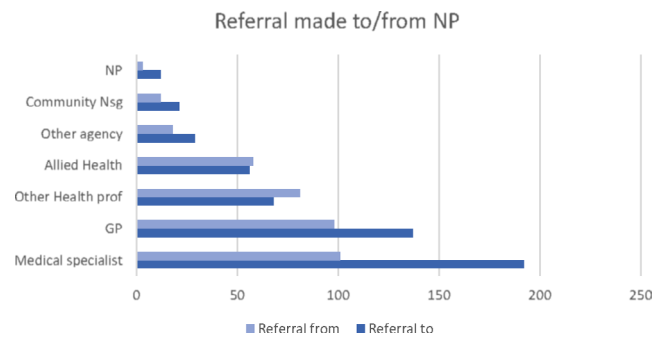


FIGURE 5 Referral patterns

et al. (2015) and Poghosyan and Liu (2016)—at 93% and 97% female population, respectively.

Several key findings from this study highlight the areas of practice where NPs report working, the models of practice as described by the NPs and the variety of patient diagnoses managed by NPs. Other predominant findings were the utility of a diverse and varied suite of diagnostic and prescribing practices NPs used to assist in providing health care, like NP practice reported by Chattopadhyay et al. (2015). The referral patterns of the NPs suggest functioning multidisciplinary relationships and finally, that NPs are active in a variety of interventions during their patient encounters.

This study found that the distribution of NPs across areas of specialty practice supports a shift from that seen in previous works where the largest single clinical group of NPs was in the emergency department specialty (Clifford et al., 2019; Lowe, 2010). Most NPs in the current study reported working in acute and supportive care, followed by those who reported working in primary care. There are NPs working in very specific fields of practice, such as *Paediatric Allergy*, to those more general practice contexts such as *Primary care*.

The findings of this study indicate a greater number of NPs working in primary care, outpatient settings and community care settings. The increase in numbers of NPs reporting their workplace as primary care has increased compared with previous reports (Parker et al., 2013). The Australian Government Department of Health (DoH) future planning for health care identifies an increase in the number of NPs working in primary care as a key strategy to improve service delivery, which is a finding consistent with international health planning (Kooienga & Carryer, 2015).

Those NPs working in primary care reported working with vulnerable populations such as Refugee Health, Prison Care and mobile clinics, providing evidence of the potential for NPs to practise and improve delivery of care to vulnerable populations. These findings are consistent with previous literature reporting the value of NPs in providing care to vulnerable populations (Buerhaus et al., 2015; Lowe, et al., 2013; Xue & Intrator, 2016), providing us with further evidence of the potential of the NP to meet the gaps in service reported across many vulnerable populations (DHHS, 2017; Kelly et al., 2017).

It is acknowledged that service gaps may require what has been referred to as “complementary” or “alternative” services (Martin-Misener et al., 2015) and it is clear NPs can provide the services

required to meet many healthcare needs. There are several NPs providing patient services in metropolitan, rural, regional and remote areas. As well as diverse geographic settings, the clinical services provided are also varied. The findings add further evidence of successful NP roles in areas where, unlike other healthcare professionals, the ratio of nurses to population across various geographic locations remains fairly stable and is between 3.2 times (city)–6.2 times (very remote) the number of medical practitioner numbers (Lowe & Plummer, 2019). Rural and remote area health needs have previously been identified as key priorities for governments, with the burden of chronic diseases in particular more prominent. The current findings support the need for more sound government policies to support the further development of NP roles across the rural, regional and remote areas of Australia to improve the health outcomes of these specific populations.

Models of practice reported by NPs in this cohort extend from those which are disease or systems related, to those described in more general terms of the patient cohort. The findings indicate the broad range of possibilities for NPs to function across patient categories and deal with simple issues such as minor injury/illness, chronic diseases such as renal and heart failure, supportive roles such as those in palliative care as well as life-threatening conditions requiring stabilization ± transfer to larger tertiary centres for more definitive management. The diversity of NP models of practice is consistent with other reports (Torrens et al., 2020) and validates the flexible and dynamic nature of NPs to respond to healthcare needs and should prompt further expansion and implementation of models where service gaps continue to widen. The critical role of the NP to meet future health needs in Australia is also reported internationally (Chattopadhyay et al., 2015).

Of note, a key outcome of this study confirms a growing trend of research around the NP being an educator and provider of advice to patients and other staff (Lowe et al., 2018; Lutze et al., 2018; Winter et al., 2020). The participants report providing education about medications, follow-up care and wound care advice, together with providing education for other staff. Education is a vital component of the NP role which will result in improved patient outcomes.

Another key finding relates to the prescription of medicines as a tool in patient encounters. Prescribing medicines was included in the practice of most NPs (approximately two-thirds of the cohort) across a variety of settings. The most commonly prescribed medications were reported as analgesics and antibiotics. This is like previous research reporting on prescribing practices (Buckley et al., 2013; Lowe et al., 2018). The findings of this study however highlight that in one-third of patient encounters ($N = 270$), NPs report not prescribing any medications during the episode of care, a finding similar to that of Buckley et al. (2013) who reported that approximately 20% of NPs did not prescribe. This study did not specifically ask whether non-prescribing was linked to policy barriers; however, the authors believe that in this setting, it is more likely that some NP practice does not require medication prescription as part of usual patient encounters. A key finding of particular interest is that participants in this study report “ceasing” medications in approximately 15% of patient encounters. This finding is

consistent with that found by Lowe et al. (2018) but differs from Buckley et al. (2013) who suggested that NPs were not confident in ceasing prescribed medications. It may be that NPs are becoming more confident in their decision-making around medications, or it may be due to a wider formulary, as evidenced by the number of NPs in this study having more than one notation, a requirement in Victoria linked to drug formularies.

This study provides evidence of the scope of diagnostic tests used by NPs to assist in formulating a definitive diagnosis and management plan during the patient encounters. Almost two-thirds of participants reported ordering diagnostic pathology tests, with approximately one half of participants reporting the use of diagnostic imaging tests to assist their critical thinking during patient encounters. The array of tests is evident—from simple XR, NP performed U/S to MRI and PET scans, as well as evidence that all body parts are investigated by NPs, highlighting the potential value of NPs in delivering health care to a growing need for services.

The significance of NPs using an external provider to undertake the necessary tests is that this process would likely have resulted in an “out of pocket” expense for the patient. Access to the Medicare Benefits Schedule for NPs has been previously reported in association with sustainability of NP roles and equity issues for patient groups (Considine & Fielding, 2010; Lowe et al., 2018; Middleton et al., 2011) and linked to other reports of NP activities not fitting well into a fee for services model (Winter et al., 2020).

A further finding of this study relates to the interdisciplinary referral patterns existing between NPs and GPs, NPs and specialist medical practitioners, and NPs and other healthcare providers, which is evidenced in the reporting of referrals made to and by the NP participants. The information reported in this study represents a bi-directional referral pattern across the range of health professionals and may be suggestive of closer collaboration amongst these groups with regard to patient requirements and outcomes.

4.1 | Limitations

Whilst the sample provided a good representation of NPs across clinical specialties and geographic locations, we acknowledge that it was undertaken in one Australian state. Whilst the participation rate of NPs (40%) in the patient encounter section of the study is credible, it is also acknowledged as a limitation. Another limitation was that the patient encounters were not random, but selected for self-reported entry by each NP prospectively which may have resulted in selection bias. However, the study aim was not to examine the outcome of patient encounters but rather to investigate and describe NP patterns of practice.

5 | CONCLUSION

The results of this study emphasize the variety of NP roles able to be emulated—both by clinical specialty and by geographic location.

The results provide evidence to assist government policy in relation to policy changes required to assist the growth of the NP workforce to better meet patient needs and therefore influence an increase in patient outcomes. Further, the findings reinforce the need for legislative changes required to support the transition to true integration of NPs to a more truly patient centred delivery of care. To overcome some of the barriers to true integration of NP roles, newly developed and evidence-based government policies are necessary to support and drive change.

Given the outcomes of this study, further evidence of NP roles successfully managing patients in multiple settings and that the necessary clinical skills to assess, diagnose and manage broad patient profiles are clear. Evidence suggests that the healthcare needs of all health consumers, in regional, rural, remote and metropolitan areas, can be improved with greater access to care.

Recommendations for change arising from this research are as follows:

- NPs are provided with the necessary legislative changes required to fulfil their professional obligations to patients within their full scope of practice.
- Recognition of potential patient outcomes is linked to NPs working to full scope of practice.
- Development of a sustainable workforce nationally and internationally is linked to recognition of NP integration into the health workforce.

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CONFLICT OF INTEREST

There are no conflicts of interest to declare.

ETHICAL APPROVAL

Ethics approval was granted by the Austin Health Human Research Ethics Committee (HREC) (Project No. LNR 17/375). Completion of the survey implied consent to participate in the study. Patient consent was not required for this study.

DATA AVAILABILITY STATEMENT

Due to the nature of this research, participants of this study did not agree for their data to be shared publicly, so supporting data are not available.

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