

# BMJ Open Workshops on diagnosis and management of dementia for general practitioners: a pre-post intervention study of dementia knowledge

Laura Tierney,<sup>1</sup> Ron Mason,<sup>1</sup> Kathleen Doherty,<sup>1</sup> Margaret Winbolt,<sup>2</sup> Marita Long,<sup>1</sup> Andrew Robinson<sup>1</sup>

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<sup>1</sup>Wicking Dementia Research and Education Centre, University of Tasmania, Hobart, Tasmania, Australia

<sup>2</sup>Australian Centre for Evidence Based Aged Care, La Trobe University, Melbourne, Victoria, Australia

## Correspondence to

Professor Andrew Robinson;  
[Andrew.Robinson@utas.edu.au](mailto:Andrew.Robinson@utas.edu.au)

## ABSTRACT

**Objectives** To assess improvements in dementia knowledge among general practitioner (GP) registrars and supervisors following their participation in dementia workshops.

**Design** Pre-post intervention study.

**Setting** General practice education in Australia.

**Participants** 296 GP registrars and 91 GP supervisors.

**Interventions** Registrars participated in a 3-hour face-to-face workshop on diagnosing and managing dementia. Supervisors participated in a 2-hour modified version of the workshop designed to support them in teaching registrars.

**Main outcome measures** The Dementia Knowledge Assessment Scale (DKAS) was used to assess overall dementia knowledge as well as knowledge on four subscales (causes and characteristics; communication and behaviour; care considerations; risks and health promotion). Changes in mean scores and the proportion of participants obtaining a threshold score (90th percentile score preworkshop) were used as measures of improvement.

**Results** Few registrars and supervisors identified previous experience of formal dementia education. At baseline, mean dementia knowledge scores were 36 for registrars and 37 for supervisors of a total score of 50. Both groups had significantly improved overall dementia knowledge following the workshop with a mean score of 43. Improvements in knowledge were observed for all four DKAS subscales. Between preworkshop and postworkshop periods, there was an increase in the proportion of registrars and supervisors obtaining the threshold score for total DKAS as well as the four subscales. A significantly higher proportion of registrars compared with supervisors obtained the threshold score postworkshop in the areas of causes and characteristics and risks and health promotion.

**Conclusions** Prior to the workshop, no differences in overall dementia knowledge were observed between registrars and supervisors. While knowledge improved in all areas for both groups postworkshop, findings from this study suggest the need to include foundational content such as the causes and characteristics of dementia in educational workshops for both trainee and experienced GPs.

## Strengths and limitations of this study

- The sample of general practitioner (GP) registrars and supervisors participating in this study are representative of the broader Australian GP registrar and GP populations.
- GP registrar workshops were a compulsory component of the broader education programme which reduced the risk of self-selection bias although there was likely some self-selection bias of GP supervisors attending the supervisor workshop.
- Dementia knowledge was assessed using the Dementia Knowledge Assessment Scale, a validated measure.
- As dementia knowledge was measured immediately postworkshop, the impact of improved dementia knowledge on the diagnosis and management of dementia in general practice was not addressed in this study.

## INTRODUCTION

The central role of general practitioners (GPs) in the diagnosis and ongoing management of dementia has been widely acknowledged.<sup>1-5</sup> GPs see many of their patients regularly and develop long-term relationships with them,<sup>6</sup> meaning they are well placed to notice emergent pathologies indicative of dementia. At present, a diagnosis of dementia relies on comprehensive cognitive and medical evaluations<sup>7,8</sup> often initiated by a GP. Not surprisingly, an Australian study of carers and family members of people with dementia revealed that in 84% of cases, the first health professional consulted about dementia symptoms was a GP.<sup>9</sup> Further, GPs are also likely to be responsible for the overall management of the patient following diagnosis.<sup>2,10</sup>

A timely dementia diagnosis can potentially improve the quality of life of patients with dementia and their family caregivers. Such a diagnosis can give doctors the opportunity to prescribe treatments that may slow

dementia progression and give patients and their families the opportunity to access appropriate support services and participate in discussions and decision making about future care.<sup>3 11–13</sup> Optimal support and management of dementia may prevent psychological distress for patients with dementia and their family members and delay the need for higher levels of care such as admission to residential aged care.<sup>13</sup> There are a range of challenges to GPs making timely dementia diagnoses and providing comprehensive ongoing management. These include patient and caregiver knowledge and attitudes, health system structure and resources and GP knowledge, confidence and attitudes.<sup>11 14–16</sup>

Despite the breadth of responsibility, several studies have identified GPs' current dementia training as inadequate in preparing them for the timely diagnosis and ongoing management of dementia.<sup>5 11 17–19</sup> While GP registrars are exposed to a wide range of patients in their training,<sup>20</sup> they have limited exposure to those over 65 years of age and those they do see tend to have less complex medical conditions than those seen by more experienced GPs.<sup>21 22</sup> Importantly, poor knowledge of dementia among GPs has been identified as one factor contributing to low rates of dementia diagnosis, delayed diagnoses and poor management outcomes.<sup>11</sup> Up to 90% of patients with few or early symptoms of dementia have not been given a diagnosis of dementia<sup>11</sup> with their symptoms often misdiagnosed as depression, memory loss and vitamin deficiency.<sup>3</sup> This reflects the complexity of diagnosing dementia, with its insidious onset and varied symptoms.<sup>13</sup> Most diagnoses are not timely, occurring in the moderate to advanced stages of dementia,<sup>18</sup> yet up to 40% of these patients might not receive a diagnosis.<sup>11</sup> Interestingly, Hansen *et al*<sup>14</sup> report that GPs may be reluctant to diagnose dementia due to uncertainty about whether the neurological changes related to dementia are a disease process or a normal part of ageing. While a comprehensive knowledge of dementia can positively impact ongoing management,<sup>23</sup> knowledge gaps, such as not recognising the terminal nature of dementia, can result in unnecessary and burdensome interventions.<sup>24–27</sup> Gaps in dementia knowledge can exacerbate other challenges and barriers to timely dementia diagnosis and comprehensive ongoing management by GPs.<sup>11</sup>

Presently, the research literature on dementia knowledge and the evaluation of dementia education for GP registrars is limited and there is no literature specifically addressing these for GPs who provide supervision and mentoring for GP registrars. A better understanding of dementia knowledge among GP registrars and supervisors is vital as knowledge can be seen as a foundation for confidence and to underpin practice.<sup>28</sup> Therefore, this study seeks to evaluate the dementia knowledge of GP registrars and supervisors and determine the impact of participating in a dementia diagnosis and management workshop on improving dementia knowledge.

## METHODS

### Study aims and design

A face-to-face workshop for GP registrars, titled Recognising, Diagnosing and Managing Dementia in General Practice, was developed by the Wicking Dementia Research and Education Centre in response to GPs' reported need for improved dementia education and an identified absence of appropriate dementia-related teaching in registrar training programmes. A modified version of the workshop was developed for GP supervisors who support registrars during their training. This study employed a pre–post study design to assess the baseline dementia knowledge of registrars and supervisors and to determine the impact of participation in the respective workshops on their dementia knowledge.

### Participants

Participants in the study were GP registrars and supervisors who attended the face-to-face workshops entitled Recognising, Diagnosing and Managing Dementia in General Practice. GP registrars are defined as medical graduates who are enrolled in a vocational training programme to specialise in general practice.<sup>20 29</sup> Supervisors are experienced GPs who have completed their GP training, have undergone accredited supervisor training and have ongoing contact with registrars within the practice setting providing support, feedback and facilitating learning.<sup>29 30</sup>

### Development and content of the workshops for GP registrars and GP supervisors

Separate workshops for registrars and supervisors were delivered face-to-face by a teaching team of GP medical educators from the Wicking Centre (including ML). The duration of the registrar workshop was 3 hours while the supervisor workshop was 2 hours. Both workshops included a presentation component with consideration of cases, role plays, group discussion and opportunities for participant questions integrated throughout the workshops. The key topics covered in each workshop are outlined in [table 1](#). The registrar workshops were delivered by Wicking Centre GP medical educators through regional GP training organisations<sup>20</sup> as a compulsory component of their broader registrar education programme. The supervisor workshops were also delivered by Wicking Centre GP medical educators but were offered as an optional workshop during regional training days. The supervisor workshop was based on the registrar workshop but designed to support supervisors to teach their registrars the diagnosis and management content provided in the registrar programme. The emphasis of the supervisor workshop was on illustrating the importance of early identification of dementia, structuring the process of dementia diagnosis, communicating the diagnosis and developing a patient-centric dementia management plan. The supervisor workshop did not address more foundational topics such as types of dementia, risk factors and dementia prevention. The complex topic of

**Table 1** Content of registrar and supervisor workshops

Workshop content	Registrar workshop	Supervisor workshop	Related DKAS subscale
Defining dementia	✓	✓ (brief)	Causes and characteristics
Types of dementia	✓	✗	Causes and characteristics
Early warning signs	✓	✓	Risks and health promotion
Consequences of not diagnosing dementia	✓	✓	Causes and characteristics; risks and health promotion
Criteria for diagnosis of Alzheimer's and vascular dementia	✓	✓	Not addressed
History taking for dementia	✓	✗	Not addressed
Examining for dementia	✓	✓ (brief)	Not addressed
Tests to do prior to diagnosis	✓	✓	Not addressed
Stages of dementia	✓	✓	Communication and behaviour; care considerations
Giving the diagnosis	✓	✓ (detailed)	Not addressed
Domains affected by dementia	✓	✓ (brief)	Communication and behaviour; care considerations
Dementia prevention and risk factors	✓	✗	Risks and health promotion
Management of dementia	✓	✓ (brief)	Communication and behaviour; care considerations; risks and health promotion
Medications for dementia	✓	✓	Communication and behaviour
Driving with dementia	✓	✗	Care considerations

driving with dementia was not included in the content of the supervisor workshop. Fitness to drive regulations vary across states in Australia and GP supervisors were considered likely to have the knowledge and skills to navigate the regulations in their state as they apply to many different circumstances such as patients with diabetes, epilepsy, stroke and post heart attack as well as dementia.

### Processes and measures

All workshop attendees were invited to complete the Dementia Knowledge Assessment Scale (DKAS)<sup>28 31 32</sup> immediately prior to and immediately following the workshop. The DKAS was developed independently of the workshops. The content and thematic areas to be included in the DKAS were identified and agreed on by a group of international dementia experts using a Delphi approach.<sup>32</sup> During the Delphi study, the experts considered key information about dementia that is relevant for the general community as well as healthcare professionals for the provision of care for people with dementia. Therefore, the DKAS focuses on knowledge relevant for the practical care of people with dementia rather than a high level of scientific or clinical knowledge related to dementia. Despite not measuring some aspects of dementia knowledge that are relevant for GPs, the DKAS has been shown as a reliable and valid measure of dementia knowledge across a range of participant groups.<sup>28 31 33</sup> The DKAS comprises 25 items about the characteristics and trajectory of dementia, risk factors and

aspects of care. Response options are true, possibly true, false, possibly false and don't know, which are rescored to fully correct (2), partly correct (1) or incorrect (0) and added to calculate a total score out of a maximum of 50.<sup>28</sup> Scores can also be calculated on four subscales: Causes and Characteristics (seven items relating to the pathology and terminal nature of dementia); Communication and Behaviour (six items relating to how a person with dementia engages with their environment and other people); Care Considerations (six items relating to symptoms of dementia relevant to care provision); and Risks and Health Promotions (six items relating to risk factors for dementia and conditions that may be associated with or mistaken for dementia).<sup>28</sup> Table 1 indicates how each of these DKAS subscales relate to the workshop content. Demographic information about participants was also collected and included questions about their experience and previous education relating to dementia.

### Analysis

The data were analysed using SPSS V.22.<sup>34</sup> The demographic characteristics, previous dementia experience and education were analysed using descriptive statistics. Means and SD were calculated for the DKAS total score and subscale scores for registrar and supervisor groups. Differences in mean scores were identified using the paired samples t-test for intragroup differences and the independent samples t-test for intergroup differences.

In the absence of a gold standard of GP dementia knowledge, an arbitrary threshold score was set at the 90th percentile of preworkshop scores, that is, the preworkshop score for which 90% of scores were below and 10% of scores were above. This indicates that approximately 10% of participants achieved the threshold score prior to the workshop and this was considered to be a score reflecting comprehensive knowledge. For simplicity of reporting results, the preworkshop 90th percentile score will be called the threshold score. The proportion of participants who obtained at least the threshold score postworkshop was calculated as a measure of improvement across the sample. This was calculated for the total DKAS scores as well as the four subscales. McNemar's test was used to test differences in the proportion of participants obtaining the threshold score preworkshop and postworkshop within each participant group. The differences between participant groups were tested using the Pearson's  $\chi^2$  test.

### Public and patient involvement

The development of the workshops was informed by earlier studies which demonstrated gaps in the way GPs understood and managed dementia.<sup>14</sup> This previous work involved extensive engagement with GPs, seeking their input and feedback through qualitative interviews. GP members of the team were codevelopers of the programme and have played, and currently play key roles in the coproduction process. Recruitment involved GP members of the team contacting GP training providers to include the workshop in their training programme. This began in Tasmania and then expanded following our attendance at the Australian Medical Educator Network meeting where we presented on the programme and recruited GP medical educators to support its progressive rollout among training providers. GP members of the team were integral to this process and all recruitment activities. The focus on GP registrars and supervisors participating in planned training sessions with GP training organisations with whom they are affiliated was a deliberate strategy to address burden of intervention concerns. While GP medical educators from the Wicking Centre continued to deliver the workshops, this approach situated the workshops in the context of the normal learning activities. The GP members of the team were key players in developing this strategic response to issues of getting access to GPs. The DKAS, the outcome measure reported in this paper, was developed with substantial involvement of key stakeholders including dementia advocates, academics, clinicians, residential aged care facility (RACF) care and nursing staff and members of the public who participated in an online dementia course.<sup>31 32</sup>

### Ethics approval

Ethical approval for this project was granted. Before the workshop commenced, the study was described to participants and all participants were given an information

**Table 2** Participant demographic characteristics

Sample characteristics		GP registrars (n=296)	GP supervisors (n=91)
Age	Mean (SD)	35 (6)	52 (9)
	Median (range)	34 (27–57)	51 (32–75)
Gender*†	Female	177 (60.6%)	42 (46.7%)
	Male	115 (39.4%)	48 (53.3%)
Country of birth	Australia	130 (43.9%)	38 (41.8%)
	Other	166 (56.1%)	53 (58.2%)
English as a first language*‡	Yes	210 (71.7%)	75 (83.3%)
	No	83 (28.3%)	15 (16.7%)
Previous experience of formal dementia education*§	Yes	17 (5.8%)	19 (21.3%)
	No	275 (94.2%)	70 (78.7%)
Family member diagnosed with dementia*§	Yes	108 (37.0%)	32 (36.0%)
	No	184 (63.0%)	57 (64.0%)
Occupational dementia healthcare experience*§	Yes	257 (88.0%)	89 (100.0%)
	No	35 (12.0%)	0 (0.0%)

\*Some participants did not respond to these questions.

†GP registrars (n=292), GP supervisors (n=90).

‡GP registrars (n=293), GP supervisors (n=90).

§GP registrars (n=292), GP supervisors (n=89).

GP, general practitioner.

sheet. Return of the completed surveys at the end of the workshop implied their consent for use of the data.

## RESULTS

### Participants

Between 2014 and 2017, 17 workshops were held in Queensland, New South Wales, Australian Capital Territory, South Australia and Tasmania with a total of 459 attendees. Three hundred and eighty-seven participants completed both the preworkshop and postworkshop DKAS survey, resulting in an 84% completion rate. Characteristics of the 72 workshop attendees who did not complete the preworkshop and postworkshop DKAS survey are unknown. The demographic characteristics of the 387 participants are shown in table 2. On average, registrars were 17 years younger than supervisors. Compared with supervisors, a higher proportion of registrars were women and born in Australia and a lower proportion spoke English as their first language.

Workshop participants had various types of dementia exposure and experience (table 2). Formal dementia education was not common in either participant group and fewer registrars than supervisors reported previously completing formal dementia education. Just over one-third of registrars and supervisors reported having a

**Table 3** Mean DKAS preworkshop and postworkshop scores

	GP registrars (n=296)		GP supervisors (n=91)	
	Mean (SD) range		Mean (SD) range	
	Preworkshop	Postworkshop	Preworkshop	Postworkshop
Total (/50)	36.10 (7.22) 13–50	42.71* (6.08) 7–50	37.13 (6.13) 18–50	42.55* (4.37) 33–50
Causes and Characteristics Subscale (/14)	10.63 (2.51) 0–14	12.82*† (1.78) 1–14	10.40 (2.59) 3–14	12.05* (1.95) 8–14
Communication and Behaviour Subscale (/12)	7.58 (2.53) 0–12	8.32* (2.56) 0–12	8.33† (2.32) 1–12	8.82* (2.46) 3–12
Care Considerations Subscale (/12)	8.95 (2.72) 0–12	11.11* (1.85) 0–12	9.14 (2.25) 4–12	11.47*† (0.96) 8–12
Risks and Health Promotion Subscale (/12)	8.95 (2.17) 0–12	10.45* (1.93) 0–12	9.26 (2.00) 4–12	10.20* (1.80) 4–12

\*Improvement was statistically significant between preworkshop and postworkshop.

†Indicates the participant group with the higher mean score where the difference between groups was statistically significant.  
DKAS, Dementia Knowledge Assessment Scale; GP, general practitioner.

family member (eg, parent, grandparent, sibling, spouse) diagnosed with dementia. Occupational experience caring for people with dementia was common in this sample with this being reported by all supervisors.

#### Baseline dementia knowledge

No difference was observed for the mean total DKAS scores of registrars and supervisors prior to the workshop (table 3). There was a wide range of scores in both participant groups with registrars scoring between 13 and 50 and supervisors scoring between 18 and 50. The only significant difference observed between registrars and supervisors was for the Communication and Behaviour subscale ( $t(385)=-2.52$ ,  $p=0.012$ ), with supervisors scoring higher than registrars.

#### Impact of the workshop on dementia knowledge

Significant improvements in DKAS total score from preworkshop to postworkshop were seen for registrars ( $t(295)=-19.69$ ,  $p<0.001$ ) and supervisors ( $t(90)=-9.81$ ,  $p<0.001$ ) (table 3). No difference was observed in mean total DKAS scores between participant groups postworkshop.

Subscale mean scores improved significantly between preworkshop and postworkshop periods. For registrars, improvements were observed for Causes and Characteristics ( $t(295)=-16.32$ ,  $p<0.001$ ), Communication and Behaviour ( $t(295)=-5.41$ ,  $p<0.001$ ), Care Considerations ( $t(295)=-13.90$ ,  $p<0.001$ ) and Risks and Health Promotions ( $t(295)=-12.09$ ,  $p<0.001$ ). For supervisors, improvements were also observed for Causes and Characteristics ( $t(90)=-6.75$ ,  $p<0.001$ ), Communication and Behaviour ( $t(90)=-2.19$ ,  $p=0.031$ ), Care Considerations ( $t(90)=-10.46$ ,  $p<0.001$ ) and Risks and Health Promotion ( $t(90)=-4.21$ ,  $p<0.001$ ). Post workshop, there were significant differences between registrar and supervisor mean scores for Causes and Characteristics ( $t(139.344)=3.33$ ,  $p=0.001$ ) and Care Considerations ( $t(295.894)=-2.43$ ,  $p=0.016$ ).

The threshold score and the proportion of participants who obtained that score are displayed in table 4. For the

total score as well as the subscale scores, more than 10% of registrars and supervisors achieved the threshold score or higher as a result of a number of participants obtaining the exact threshold score. The threshold score for both registrars and supervisors was 45 out of 50. There were significant increases in the proportion of registrars ( $p<0.001$ ) and supervisors ( $p<0.001$ ) obtaining the threshold score for the total DKAS score between preworkshop and postworkshop periods and a higher proportion of registrars (45.6%) than supervisors (34.1%) achieved the threshold total DKAS score postworkshop ( $\chi^2(1)=3.79$ ,  $p=0.054$ , Probability=0.015).

The proportion of participants obtaining the threshold score also increased for the DKAS subscales. Improvements were found among the registrars for the subscales Causes and Characteristics ( $p<0.001$ ), Communication and Behaviour ( $p=0.020$ ), Care Considerations ( $p<0.001$ ) and Risks and Health Promotion ( $p<0.001$ ). The increase in proportion of supervisors obtaining the threshold score was significant for the subscales Cause and Characteristics ( $p=0.002$ ), Care Considerations ( $p<0.001$ ) and Risks and Health Promotion ( $p=0.017$ ). There were significant differences between registrars and supervisors postworkshop for Causes and Characteristics ( $\chi^2(1)=9.93$ ,  $p=0.002$ , Probability=0.01) and Risks and Health Promotion ( $\chi^2(1)=5.13$ ,  $p=0.029$ , Probability=0.007) with a higher proportion of registrars obtaining the threshold score compared with supervisors.

#### DISCUSSION

The aim of this study was to assess the baseline dementia knowledge of registrars and supervisors and evaluate the effectiveness of face-to-face workshops for improving their dementia knowledge. Interestingly, few registrars or supervisors had previously participated in formal dementia education. The findings indicate that dementia knowledge

**Table 4** Proportion of participants obtaining the threshold DKAS scores

	GP registrars (n=296)			GP supervisors (n=91)		
	Preworkshop		Postworkshop	Preworkshop		Post-workshop
	Threshold score	Proportion≥threshold score	Proportion≥threshold score	Threshold score	Proportion≥threshold score	Proportion≥threshold score
Total (/50)	45	13.5	45.6*	45	12.1	34.1*
Causes and Characteristics Subscale (/14)	14	13.9	54.1*†	14	17.6	35.2*
Communication and Behaviour Subscale (/12)	11	13.5	19.3*	11	14.3	24.2
Care Considerations Subscale (/12)	12	22.6	66.2*	12	22.0	70.3*
Risks and Health Promotion Subscale (/12)	12	13.9	45.3*†	12	18.7	31.9*

\*Improvement was statistically significant between preworkshop and postworkshop.

†Indicates the participant group with the higher proportion of participants obtaining the threshold score postworkshop where the difference between groups was statistically significant.

DKAS, Dementia Knowledge Assessment Scale; GP, general practitioner.

was similar between registrars and supervisors and significantly improved as a result of their participation in their respective workshop. Prior to the workshop, supervisors had better knowledge of communication and behaviour related to dementia than registrars. After the workshop, a higher proportion of registrars obtained the threshold scores for causes and characteristics of dementia as well as risks and health promotion, compared with supervisors.

The age and gender characteristics of participants in this study were similar to those of 203 Australian GP registrars participating in the Registrar Clinical Encounters in Training (ReCenT) study<sup>35</sup> and over 10 000 Australian GPs participating in the Bettering the Evaluation and Care of Health (BEACH) study.<sup>36</sup> In this study, 61% of registrars were female and the mean age was 35 years old while in the ReCenT study 63% of participants were women and the mean age was 33 years old. Among the GP supervisors participating in this study, 47% were women and the mean age was 52 years while 43% of GPs in the BEACH study were women and 46% were aged over 55 years. Both the ReCenT and BEACH studies used random samples, suggesting that our sample is representative of the broader Australian GP registrar and GP populations.

The level of dementia knowledge of both groups of GPs participating in this study was higher than that of the general population, professional and family carers of people with dementia and comparable to the pre-education dementia knowledge measured by the DKAS found in a small sample of GPs participating in an online dementia course.<sup>28</sup> There are several other studies with mixed findings about dementia knowledge among GPs. In the UK, GPs are reported to have good knowledge of dementia diagnosis and management while there are gaps in their knowledge of its epidemiology.<sup>13</sup> Italian GPs have

limited overall knowledge of dementia.<sup>4 5</sup> These studies did not use the DKAS to measure dementia knowledge and so cannot be directly compared with the dementia knowledge of GP registrars and supervisors in this study. Importantly, to the best of our knowledge, this is the first study comparing dementia knowledge of GP registrars and GP supervisors.

Significant improvements in dementia knowledge were seen postworkshop in all areas for both registrars and supervisors. This indicates that a 2-hour to 3-hour workshop on dementia is an effective way to impact dementia knowledge in these groups. Other formats of dementia education including online modules, lectures, discussions in quality circles and combinations of these formats have also been shown to improve dementia knowledge of GPs.<sup>37</sup> A study evaluating a dementia education programme for family medicine residents in Canada (equivalent to GP registrars in Australia) also found statistically significant improvements in dementia knowledge.<sup>17</sup> However, the Canadian programme was substantially longer than the workshop evaluated here, consisting of a half-day lecture, a half-day interactive workshop and a 1-day clinical practice session at a memory clinic supervised by primary care physicians. The finding that a 3-hour workshop can significantly improve the dementia knowledge of GP registrars is important especially given the wide range of clinical conditions and presentations that need to be covered in their training and curricula.<sup>20</sup> In contrast, a recent study evaluating a primary care dementia education intervention in the UK found that the intervention did not result in improved GP dementia knowledge.<sup>38</sup> The intervention consisted of a 1-hour interactive meeting and was designed to be appropriate for all members of the primary care team including GPs, practice nurses and administration

staff. Participants reported that supplementary training was required for the GPs and the authors of the study concluded that GPs need tailored training to significantly improve their dementia knowledge.

Notably, our study demonstrates that at baseline, registrars and their supervisors had the same overall dementia knowledge. The wide range of baseline scores among both groups indicates that, in some instances, registrars in fact have a better knowledge of dementia than their supervisors. However, the role of supervisors is broader than sharing their clinical knowledge.<sup>22</sup> Supervisors also facilitate registrar learning through encouraging reflective learning and practice, guiding access to resources, providing advice on applying knowledge to specific patient cases and role modelling interactions with patients.<sup>22</sup> Nevertheless, the care of older patients has been identified as a specific content area that needs to be included in educational continuing professional development programmes for GP supervisors.<sup>39 38</sup>

Gaps in baseline dementia knowledge among registrars and supervisors may be partly explained by the limited number who had prior dementia education. This finding suggests significant opportunity for current medical curricula both at undergraduate and postgraduate levels to address dementia specifically, a finding supported by studies where GPs themselves identify a need for more dementia education in undergraduate, registrar and ongoing training.<sup>5 11 17 18</sup> The range in dementia knowledge scores among registrars also suggests that supervisors need a mechanism to assess registrars' knowledge of dementia to tailor teaching to their specific needs. This is particularly important given the breadth of clinical conditions that need to be covered in GP registrar training and curricula.<sup>20</sup> Deficits in dementia knowledge have also been identified in other dementia healthcare providers such as nurses and aged care staff.<sup>40</sup> To provide best multidisciplinary care, this must be ameliorated.

The study findings suggest that registrars and supervisors would benefit from the same depth of education to improve their dementia knowledge. The content of the registrar and supervisor workshops differed, particularly in the areas of causes and characteristics of dementia and risks and health promotion with these areas not addressed in the supervisor workshop. Although it might be assumed that supervisors already have an adequate knowledge of dementia in these areas, the impact of the different workshop content is evident in the finding of significantly more registrars than supervisors obtaining the threshold score for the Causes and Characteristics as well as the Risks and Health Promotion subscales. Therefore, future workshops should cover these more foundational topics, even for experienced GPs. Nevertheless, the findings from this study indicate that participation in the respective dementia workshops provide an effective way to improve dementia knowledge.

While this study has provided valuable insight into the dementia knowledge of GP registrars and supervisors and evaluated the impact of participation in a

workshop on dementia knowledge, there were some limitations. First, there was likely some self-selection bias of supervisors attending the supervisor workshop as it was provided as an optional workshop run concurrently with workshops and lectures on other topics related to GP supervision. However, the registrar workshops were a compulsory component of the broader education programme provided by the regional training organisations reducing the risk of self-selection bias in this participant group. Second, the use of the DKAS to assess dementia knowledge did not allow for the assessment of knowledge in some content areas covered in the workshops (related to diagnosing dementia and communicating the diagnosis). However, the DKAS was chosen for use in this study because it is a valid and reliable measure that can provide an overall score of dementia knowledge as well as measuring knowledge in four key areas.

There are several directions for future research. First, there are a range of other factors that may be associated with dementia diagnosis and management in general practice. We are currently exploring the confidence and attitudes towards dementia of study participants. Other factors that may contribute to dementia diagnosis rates and management including health system resource constraints and patient and caregiver attitudes and awareness<sup>11 41</sup> were outside the scope of this study. Second, educational interventions can be assessed at multiple levels, including participation rates and satisfaction levels, followed by knowledge improvement, changes to behaviour and practice and improved healthcare outcomes.<sup>42</sup> The current study was limited to examining dementia knowledge immediately post workshop and did not address the impact of improved dementia knowledge on the diagnosis and management of dementia in general practice. Ideally, future research would seek evidence of improved knowledge leading to sustained change in practice. More long-term change could be measured by increased rates of diagnosis and different approaches to management and, ultimately, improvements in care for patients with dementia and their families. This needs to be explored in future research.

## CONCLUSION

This study has important implications for GP dementia education. It has shown that GP registrars and supervisors have a comparable level of dementia knowledge. A face-to-face workshop on recognising, diagnosing and managing dementia has been shown to be an effective way to improve dementia knowledge in registrars and supervisors. Findings have also highlighted the need for including more foundational content when developing future GP dementia education programmes, even for more experienced GPs.

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**Patient consent for publication** Not required.

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**Data sharing statement** The data set is not available as ethics approval does not allow release.

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