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The pattern of anxiolytic and hypnotic management by Australian General Practice trainees

Keywords

Family Practice, Trainee, Anti-Anxiety Agents, Hypnotics and Sedatives, Sleep Initiation and Maintenance Disorders, Overdose Risk.

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Abstract

Introduction and Aims

Guidelines recommend anxiolytics and hypnotics (A/Hs) as second-line, short-term medications. We aimed to establish prevalence and associations of A/H prescribing by Australian general practice (GP) trainees

Design and Methods

A cross-sectional analysis from a cohort study of vocational trainees from four GP Regional Training Providers during 2010-13. General practice trainees act as independent practitioners (including for prescribing purposes) while having recourse to advice from a general practitioner supervisor. Practice and trainee demographic data were collected as well as patient, clinical and educational data from 60 consecutive consultations of each trainee each training term. Analysis was at the level of individual problem managed, with the outcome factor being prescription of any anxiolytic or hypnotic.

Results

Overall, 645 registrars (response rate 94.0%) prescribed 68,582 medications in 69,621 consultations (with 112,890 problems managed). A/Hs were prescribed for 1.3% of problems managed and comprised 2.2% of all prescriptions. They were prescribed particularly for insomnia (28.2%) or anxiety (21.8%), but also for many ‘off-label’ indications. Significant associations of A/H prescriptions were: patient-level (greater age, Aboriginal and Torres Strait Islander status, English-speaking background, being new to the trainee but not to the practice); trainee-level (male); consultation-level (longer duration, pre-existing problem, specialist referral *not* being made). Prescribing was significantly lower in one of the four Regional Training Providers.

Discussion and Conclusions

GP trainees, inconsistent with most guideline recommendations, prescribe A/Hs mainly as maintenance therapy to unfamiliar and older patients. Our results suggest changes in management approaches are needed which may be facilitated by support for psychotherapeutic training.

Introduction

Benzodiazepines were first introduced in 1959 for the ‘control of personal and emotional problems’ as safe substitutes for alcohol or barbiturates (1). Benzodiazepines and the subsequently introduced Z-Drugs (BZDs) are functionally equivalent modulators of the $GABA_A$ receptors (1). They are mainly used for anxiolytic and/or hypnotic (A/H) effects, for alcohol withdrawal, or as anticonvulsants, muscle-relaxants or anaesthesia induction agents (2). Much of the evidence base for their efficacy is several decades old, of variable methodological quality and characterised by short durations of treatment and follow-up (2-5). The relative utility, efficacy, toxicities and misuse potential of BZD’s generate considerable debate (2, 6-9).

Some commentary calls for BZDs to be first line therapy for anxiety and/or insomnia (6, 7). However, most guidelines and international recommendations reserve BZDs for cautious short-term use in severe or disabling cases or as second-line options (2, 10-13). Frequently prescribed long-term (1), by four months an estimated 15% of patients

on benzodiazepines are dependent, a rate increasing to 50% after two years (14). Assessing A/H usage is problematic as conventional diagnostic criteria for dependency are weighted towards illicit substance use. These criteria may apply poorly amongst the elderly using BZDs as prescribed by their doctors and, thus, may lead to significant under-estimation of the prevalence of dependency (15). The Coroners Court of Victoria has observed amongst overdose deaths that the vast majority involve pharmaceuticals (87%) with most involving A/Hs particularly BZDs (16). The Coroner noted several “sub-optimal” clinical themes were commonly associated with such deaths. These included BZDs being prescribed: upon request at first consultation; on an ongoing basis for an extended period; or without any attempt to establish who else was prescribing them or whether there was concurrent opioid analgesic use.

A/Hs are predominantly prescribed by general practitioners (GPs) (17). Thus in order to characterise any “sub-optimal” clinical themes and to improve quality use of A/H medicines, it is important to identify which GPs are prescribing, in what context and to whom (12, 18). This requires detailed and reliable consultation-level data. Australian residents receive subsidies for selected medications through the government-run Pharmaceutical Benefits Scheme which subsidises 71% of the BZDs dispensed with this de-identified data accessible publically (19). This data is incorporated by the Department of Health and Ageing (Drug Utilisation Sub-Committee) with estimates of non-subsidised prescriptions from a survey of 370 community pharmacies (10, 19). This database still may significantly underestimate A/H utilisation and contain incomplete or little data on prescriber or patient age, gender or diagnosis (10, 13, 17, 19). Calls have been made for population-based studies to explore individual level data and identify

poor quality use of medicines particularly in disadvantaged populations such as non-English speaking populations or Aboriginal and Torres Strait Islanders (10, 12). Such studies would inform interventions to develop education for prescribers (12), especially early-career and in-training GPs.

A database suitable for such a study is generated by the Australian General Practice Training Program. The program involves a minimum of 18 months post-hospital vocational training in accredited training general practices with regular educational release workshops. GP trainees have regular teaching or supervision sessions with their accredited GP trainers, whom they may also access for advice and support in an "apprenticeship-like model." However, trainees essentially function as independent practitioners (including for prescribing purposes). Four of Australia's seventeen GP Regional Training Providers spanning four Australian states (New South Wales, Victoria, South Australia and Tasmania) participate in the Registrar Clinical Encounters in Training (ReCEnT) project. ReCEnT is an ongoing multi-site cohort study of GP trainees' (registrars') in-consultation clinical experience. In this study of Australian GP trainees, we aim to establish the prevalence, nature and associations of A/H prescribing by using contemporaneously recorded detailed individual trainee consultation data.

Methods

The ReCEnT methodology has been described in detail elsewhere (20). Briefly, initial data collection involves trainee's demographic, education, work experience and current

practice characteristics. Trainees then record the details of 60 consecutive clinical consultations (using a paper-based encounter form) once during each six-month training term. The encounter form data encompasses four broad areas: patient demographics, diagnoses or problems managed (hereafter referred to as problems), management, and educational training aspects. As data collection is designed to reflect a 'normal' week of general practice, consultations in specialised clinics (e.g. vaccination clinics) are excluded. Only office-based consultations, not home or nursing home visits, are included. The study encompasses general practices across all rural-urban classifications from major city to very remote (21).

Data in the current analysis is from eight rounds of data collection, 2010-13 and was confined to patients 16 years of age or older.

Outcome factors

The primary outcome factor in this study was the prescription of an A/H as defined by International Anatomical Therapeutic Chemical (ATC) codes "N05B" and "N05C" (22). Our data included the specific medication and route of administration, but not the dose. Each prescription of each ATC-coded medication was linked directly to the problem for which it was prescribed.

Independent variables

Independent variables related to trainee, patient, practice and consultation.

Trainee factors were age, gender, training term, country of medical qualification (Australia/international), and the number of half-day sessions worked per week.

Practice factors included practice size (number of full-time equivalent GPs), and if the registrar reported that the practice routinely bulk-billed (that is, there was no financial cost to the patient for the consultation). Postcode was used to define practice rurality/urbanicity using the Australian Standard Geographical Classification-Remoteness Area classification of the practice location (21). Postcode also defined the practice location's Socioeconomic Index for Area (SEIFA) Relative Index of Disadvantage (23). SEIFA describes each geographical area in terms of people's access to material and social resources, and their ability to participate in society. SEIFA scores for our analysis were converted to deciles, with lower decile scores representing relative disadvantage. Patient factors were age, gender, Aboriginal and Torres Strait Islander status, non-English speaking background and if the patient was new to the practice or new to the trainee. Consultation factors were duration (measured contemporaneously by the registrar in minutes), the number of problems managed, the ordering of imaging or pathology, and whether a referral or scheduled follow-up was made. Educational factors included whether the trainee sought assistance, advice or information during the consultation or generated learning goals for subsequent attention.

Prescriptions were each coded as "initial," if provided for the first time for that specific medical problem, or else as "continuing".

Problems were coded according to the International Classification of Primary Care, second edition classification system (ICPC-2 PLUS) (24). Trainees could code each problem as either "new" or "pre-existing." The former included initial episodes, exacerbations of recurrent problems, or any problems (regardless of duration) which

were being managed medically for the first time. Problems categorised as ‘Chronic diseases’ were coded via an existing classification system derived from ICPC-2 PLUS (25).

Statistical Analysis

This was a cross-sectional analysis of patient consultations from the longitudinal ReCEnT study. The unit of analysis was the individual problem rather than the individual consultation.

Percentages of trainees’ problems managed with A/Hs (A/H problems) were calculated, with 95% confidence intervals.

To test associations of an A/H being prescribed, simple and multiple logistic regression were used within a generalised estimating equations (GEE) framework, to account for within person correlation (the clustering of patients within registrars) , with a compound symmetry working correlation matrix to model correlations from repeated measures from a trainee. The GEE approach models the lack of independence in the data due to some trainees being inherently more or less likely to prescribe among the patients they see (clustered observations). Wald statistic based confidence intervals and hypothesis tests were used to assess statistical significance of estimated parameters with Huber-White sandwich standard errors.

All independent variables (above) with a p value less than 0.20 and a relevant effect size in the univariate analysis were included in the multiple regression model. Variables which had a small effect size and were no longer significant in the multivariate model were removed from the final model as long as the variable’s removal did not change the

resultant model. A regression model was built with the dependent variable ‘any A/H prescribed’. Statistical analyses used SAS v9.3. Predictors were considered statistically significant if the p-value was < 0.05

Ethics approval

The ReCEnT project has approval from the University of Newcastle Human Research Ethics Committee, Reference H-2009-0323.

Results

Overall, 645 individual trainees (response rate 94.0%) contributed 1,426 recording cycles (including details of 69,621 individual consultations, 112,890 problems and 68,582 medications prescribed). The demographics of the participating trainees and practices are presented in Table 1. A/Hs were prescribed in 1456 (2.1% of total [95% CI: 2.0-2.2]) patient consultations and for 1,473 (1.3% of total [95% CI: 1.2-1.4]) problems, accounting for 1513 (2.2% [95% CI: 2.1-2.3]) of all prescriptions. The majority of A/Hs prescribed were diazepam (n=609, 40.3%, 95% CI: 37.1-43.6) or temazepam (435, 28.8%, 95% CI: 26.1-31.6) (further details in online supplementary material). One and two A/Hs were provided in 94.7% and 5.3% of problems managed with A/Hs, respectively. A/Hs were initiated in 415 (30.2% [95% CI: 27.8-32.7]) A/H problems and provided for continuing use in 959 (69.8% [95% CI: 67.3-72.2]) A/H problems. A/Hs were prescribed for 150 individual ICPC-2 PLUS conditions, with only 50.0% for hypnosis (n=416, 28.2%, 95% CI: 25.6-31.1) or anxiolysis (n=321, 21.8%, 95% CI: 19.5-

24.3) (further details in online supplementary material). There were 92 A/H problems (6.4%) where an opioid analgesic was co-prescribed. There were 3 urinary drug screens requested with A/H prescribing, and no contacts recorded with either regulators or prescription monitoring programmes.

The univariate associations of A/H problems are presented in Table 2 with the multivariate model presented in Table 3.

In the multivariate model, the Regional Training Provider with the highest adjusted odds of prescribing had an odds of prescribing that was almost 50% higher than the referent group training provider (Regional Training Provider 1) [O.R. 1.46 (C.I.s: 1.16, 1.84)]. Patient factors positively associated with A/Hs were older age, Aboriginal and Torres Strait Islander status, and the patient being new to the registrar (though not to the practice). Patients of non-English speaking background were less likely to be prescribed A/Hs. The only trainee association was male gender. A/Hs were more likely to be prescribed for a pre-existing rather than a new problem, but were less likely to be prescribed for “chronic” problems. Consultations where A/Hs were prescribed were marginally, but statistically significantly, longer than other consultations. A/H prescribing was associated with less ordering of imaging and pathology and with fewer referrals.

Discussion

Trainees prescribed A/Hs predominantly as on-going prescriptions for pre-existing problems at their first consultation with a patient who had attended the practice

previously. Higher prescribing rates correlated with patient age, location and ethnicity which may place particular patient groups at greater risk of A/H-associated morbidity or mortality.

Findings in the context of other literature

One study in Australian general practice found anxiolytics and hypnotics to be prescribed at a frequency of 1.2 and 0.9 respectively per 100 problems. These figures are not directly comparable with our finding of the frequency proportion of A/H problems (1.3%), as their study population also included children under the age of 16 and nursing home patients (26).

We found an almost 50% variation in A/H prescribing between Regional Training Providers. A/Hs are minimally regulated by State authorities and so this disparity, previously described between Australian states (19), is unlikely to reflect regulatory influence. Rather it is more likely to reflect differences in liberality of clinical prescribing cultures (27). Similar regional variations in A/H prescribing were found across the USA, unrelated to regional variations in disease prevalence (18). This study also found higher prescribing rates were associated with poorer health outcomes including overdoses, falls and abuse (18).

In 6.2% of A/H problems an opioid analgesic was concurrently prescribed, while for all problems, the equivalent proportion was 2.4% (28). Given that we only had data on co-prescribing at individual consultations, and not on the entire patient regimen, the 6.2% is likely to be an under-estimation. As the Coroners Court of Victoria noted (16), such co-

prescribing is problematic, in that BZDs have shown to be significant contributors to 31% of US opioid deaths (18) and 55% of Victorian heroin-related deaths (12).

Half of all indications for A/H prescriptions were for insomnia and anxiety (28.2% and 21.8% indications respectively). The most common treatment provided by GPs for insomnia is the provision of an A/H (5, 29, 30) despite their limitations including tolerance and adverse effects such as disturbed sleep architecture and rebound insomnia after discontinuation (5). Cognitive behavioural therapies such as sleep restriction or stimulus control have been found to have similar effect sizes to A/Hs, however with sustained benefits (3, 5). As anxiolytics, BZDs are indicated only for acute symptom relief, whilst awaiting first-line therapy to become effective, or as second line therapies or adjunctive therapy for treatment-refractory illness (7, 11, 12). Use of BZDs in panic disorder may worsen outcomes from psychotherapy (11). The majority of other indications that the trainees recorded for A/H prescribing have been described as unrecommended, unspecified or “off-label” (2, 11).

A/Hs were more likely to be prescribed to older patients despite anxiety disorders occurring most commonly amongst those aged 25–44 years and insomnia amongst those aged 50-59 (27, 31). Guidelines consistently warn about the increasing effects of BZDs with age on neuropsychological performance (4, 8, 11, 32, 33). Clinicians often consider ceasing BZDs in the elderly both difficult and unnecessary (9). In a survey of non-institutionalised older Canadians one quarter reported using BZDs, with the majority of these intending to continue taking them or hoarding them (15).

As found with opioid analgesics (28), Aboriginal and Torres Strait Islanders were more likely to be prescribed A/Hs by trainees. Higher levels of prescribing may predispose to

medication misuse or medication mismanagement in this population (13). A lack of access to culturally appropriate psychosocial services may be a barrier to de-prescribing, (13) as may be high rates of chronic illness including psychiatric disorders. A systematic review has found anxiety disorders range in prevalence amongst Aboriginal and Torres Strait Islanders from 17.2% to 58.6% and reported post-traumatic stress disorder rates vary from 14.2%–55.2% (34).

A/Hs were infrequently prescribed for new problems. This is consistent with prescribing patterns of established GPs who are frequently unaware of where or when the prescribed BZD was commenced (9, 30). While BZDs are said to have a positive risk-to-benefit profile for use up to 2-4 weeks, our study supports commentaries that their provision is uncommonly time-limited (2), reflecting the many barriers to de-prescribing (32). Our cross-sectional data cannot describe individual patient illness and medication trajectories. However the following associations of A/Hs prescription are instructive. We found that A/H prescriptions are associated with ‘pre-existing’ rather than ‘new’ problems; with ‘continuing’ rather than ‘initial’ prescriptions; with patients being new to the trainee but not to the practice; and were not associated with the seeking of collegiate advice. Taken together, an interpretation of these findings is that trainees may be simply repeating the prescription of their practice colleagues. This may reflect an inherent power imbalance as trainees’ colleagues are frequently their supervisors and employers as well. Trainees may have presumed their colleagues had endorsed continued prescribing and thus perpetuated potentially inappropriate prescribing (32). A/H problems were less likely to generate referrals than were other problems. A similar difference has also been described amongst established GPs when managing both

anxiety and insomnia (30, 31). From 2001, Medicare provided funding to GPs to undertake training and deliver psychotherapies, but this scheme was infrequently utilised (31). Since 2006, the training requirements were dropped and referrals to psychologists became subsidised by Medicare after the GP completed of specific documentation (13, 31). This pathway has been utilised beyond budgetary forecasts, despite the potential barrier of the subsidy not covering the psychologist's full fee (13, 31). Potential barriers to the making of psychology referrals to assist in de-prescribing include that they may seem too slow to patients and reportedly seem unimportant to clinicians (9) or trainees. Psychological skills are critical for the initial management of both anxiety and insomnia, for the management of BZD dependence (8) and for de-prescribing (11); the latter ideally addressing withdrawal symptom management as well as the underlying psychopathology (8). Most trainees lack advanced psychotherapeutic skills and, based on the infrequency of referrals, may not consider non-pharmacological options.

Strengths and limitations:

Strengths of our study include a large sample size from four of Australia's eight states and territories across all rural-urban classifications with a response rate singularly high for a study of GPs (35). Publically available datasets substantially under-estimate A/H dispensing (10) but this data captures both subsidised and non- subsidised prescribing. The contemporaneous recording of detailed patient, prescriber, practice and consultation variables and the diagnostic indication (that is, ICPC-2 problem) for prescription, all linked to the individual prescription is a particular strength. This combination of this linkage and a high response rate is unique.

Limitations of this analysis include its cross-sectional ‘consultation snapshot’ nature and lack of data on full medication regimens as well as what was actually dispensed or consumed. We also do not have data on patients’ psychiatric status beyond the diagnosis for which the medication was prescribed, on repeats provided or on dosages. We have not included data from specialised clinics, home visits or nursing home visits and our ‘broad brush’ analysis doesn’t allow assessment of appropriateness or quality of trainees’ individual prescribing decisions. While our large sample size is a strength of the study, it entails the possibility of some statistically significant findings being of questionable clinical significance and the effect size of findings should always be considered. GP registrar data may not be generalizable to the GP population. However, this is the first study to specifically examine early career doctors’ prescribing of A/Hs and the data will inform the development of educational interventions to improve their quality use.

Recommendations for practice, policy and further research

Like most primary care health systems, Australian general practice is time poor and funded by a fee-for-service model (26). Pharmaceuticals are more rapidly and inexpensively provided than psychotherapies which may be reflected in an estimated 13% of Australians taking daily psychotropic medications (1, 10). If psychological approaches are to be recommended as first line therapies as against the initiation or continuation of A/Hs (5), there are implications for education and training and for government. Models of care will have to be funded, constructed, evaluated and implemented to facilitate non-pharmacological strategies. Funding for this may be problematic as the majority of medical education is currently sponsored by

pharmaceutical companies (36) and, otherwise, academic medical education research is characterised by chronic underfunding (37). Ideally education should target care provision for vulnerable groups (our findings suggest that these include older patients and Aboriginal and Torres Strait islander populations) and address communicating about the cognitive and psychomotor benefits of A/H de-prescribing (38), negotiation skills about prescribing guidelines, improved psychotherapy skills (8) and the importance of multidisciplinary care (9).

Long-term A/Hs prescribing in the elderly, “off-label” or in conjunction with opioids suggests an evidence-practice disparity (12, 13). This may risk individual and public health harms and should be discouraged.

The PBS currently subsidises most BZDs. But simply re-scheduling of all BZDs to make them less accessible as recommended by the Coroners Court of Victoria (16) may generate new harms from substitution by off-label use of atypical anti-psychotics or cannabis (5, 19, 39). Given our finding that some trainee A/H prescribing seems to be perpetuation of colleagues’ (including trainers’) prescribing decisions, targeted education should involve trainers as well as trainees.

Implications for further research

Our recommendation for new models of care involving an emphasis on non-pharmacological care of insomnia and anxiety will require rigorous evaluation. The ReCEnT study, with its longitudinal methodology and detailed data collection, may provide an opportune framework for evaluating such educational interventions.

Conclusion

Trainees' A/H prescribing practices frequently resemble those practices highlighted in Coroner's reports. Prescribing decisions may often involve presentations of patients whose long-term problems have been previously pharmacologically managed by their colleagues, discordant with most prescribing guidelines. Trainees may be uncomfortable with psychotherapeutic strategies and this may limit their options for the initiation, continuation and withdrawal of A/Hs. Patients deserve a standard of care where doctors can offer evidence-based alternatives to A/Hs and have sufficient psychological management skills to minimise exposure and harms from long-term usage. Regulators and educators concerned about the over-prescribing of A/Hs need to look at equipping GP trainees and their trainers with the non-pharmacological tools to manage insomnia, anxiety, pain and A/H de-prescribing.

Table 1: Participating registrar (trainee), registrar-term and practice characteristics

Variable	Class	n	%	(95% CIs) or Mean (SD)
Registrar variables (n=645)				
Registrar Gender	Female	425	65.9%	(62.2-69.6)
Pathway registrar enrolled in	General (as against rural)	494	77.0%	(73.7-80.2)
Qualified as a doctor in Australia	Yes	480	75.6%	(72.2-78.9)
Registrar age (years)	Mean (SD)			32.8 (6.6)
Registrar year of graduation	Mean (SD)			2005.1 (5.6)
Registrar-term or practice variables (n=1426)				
Registrar Training Term	Term 1	557	39.1%	(36.5-41.6)
	Term 2	488	34.2%	(31.8-36.7)
	Term 3	306	21.5%	(19.3-23.6)
	Term 4	75	5.3%	(4.1-6.4)
Registrar worked at the practice previously	Yes	413	29.4%	(27.0-31.7)
Registrar works fulltime (> 7 half-day sessions per week)	Yes	1091	78.3%	(76.1-80.5)

Does the practice routinely bulk bill	Yes	234	16.6%	(14.6-18.5)
Number of GPs working at the practice	6 or more	941	67.5%	(65.0-69.9)
Rurality of practice (21)	Major City	827	58.0%	(55.4-60.6)
	Inner Regional	424	29.7%	(27.4-32.1)
	Outer regional, remote or very remote	175	12.3%	(10.6-14.0)
SEIFA* Index (decile) of practice (23)	Mean (SD)			5.4 (2.8)

***** Socioeconomic Index for Area (SEIFA) Relative Index of Disadvantage (lower scores indicate relative disadvantage)

Table 2: Univariate associations of independent variables with A/H prescriptions.

		Prescribed A/H		
Variable	**Class**	**No (n=111417)**	**Yes (n=1473)**	**P**
Age group	16-34	31761 (99%)	277 (0.9%)	<0.0001
	35-64	52492 (98%)	800 (1.5%)	
	65+	25037 (99%)	377 (1.5%)	
Patient gender	Male	38257 (99%)	497 (1.3%)	0.4171
	Female	70114 (99%)	941 (1.3%)	
Aboriginal and Torres Strait Islander	No	104579 (99%)	1365 (1.3%)	<0.0001
	Yes	1159 (97%)	32 (2.7%)	
Non English speaking background	No	99429 (99%)	1356 (1.3%)	0.0001

Variable	Class	Prescribed A/H No (n=111417)	Prescribed A/H Yes (n=1473)	P
	Yes	6966 (99%)	49 (0.7%)	
Registrar gender	Male	36734 (98%)	568 (1.5%)	0.0005
	Female	74683 (99%)	905 (1.2%)	
Registrar work-load	Part Time	24180 (99%)	326 (1.3%)	0.7927
	Full Time	84694 (99%)	1111 (1.3%)	
Training term/post	Term 1	44600 (99%)	616 (1.4%)	0.6814
	Term 2	37163 (99%)	480 (1.3%)	
	Term 3	23950 (99%)	303 (1.2%)	
	Term 4	5704 (99%)	74 (1.3%)	
Worked at the practice previously	No	77507 (99%)	1019 (1.3%)	0.4071
	Yes	32382 (99%)	437 (1.3%)	
Qualified as doctor in Australia	No	26700 (99%)	336 (1.2%)	0.2888
	Yes	82933 (99%)	1117 (1.3%)	
Practice size	Small (1-5 FTE GPs)	36731 (99%)	484 (1.3%)	0.8775
	Large (6+ FTE GPs)	72346 (99%)	960 (1.3%)	
Practice routinely bulk bills	No	91849 (99%)	1231 (1.3%)	0.2725
	Yes	18643 (99%)	228 (1.2%)	
Rurality (21)	Major City	64228 (99%)	845 (1.3%)	0.8599
	Inner Regional	33148 (99%)	425 (1.3%)	
	Outer Regional, Remote, Very remote	14041 (99%)	203 (1.4%)	
Regional Training Provider	1	40851 (99%)	473 (1.1%)	0.0083
	2	13244 (98%)	208 (1.5%)	
	3	11218 (99%)	166 (1.5%)	
	4	46104 (99%)	626 (1.3%)	
Patient/practice status	Returning Patient	50663 (99%)	674 (1.3%)	0.0554
	New to Registrar	50471 (99%)	679 (1.3%)	
	New to Practice	7065 (99%)	71 (1.0%)	

Variable	Class	Prescribed A/H No (n=111417)	Prescribed A/H Yes (n=1473)	P
New problem	No	58162 (98%)	1178 (2.0%)	<0.0001
	Yes	53255 (99%)	295 (0.6%)	
Chronic condition	No	83387 (99%)	1188 (1.4%)	<0.0001
	Yes	27676 (99%)	284 (1.0%)	
Imaging ordered	No	102523 (99%)	1458 (1.4%)	<0.0001
	Yes	8894 (99.8%)	15 (0.2%)	
Follow-up ordered	No	60754 (99%)	822 (1.3%)	0.5023
	Yes	50663 (99%)	651 (1.3%)	
Learning goals	No	95764 (99%)	1287 (1.3%)	0.1788
	Yes	15653 (99%)	186 (1.2%)	
Referral ordered	No	97618 (99%)	1310 (1.3%)	0.1550
	Yes	13799 (99%)	163 (1.2%)	
Sought help from any source	No	94833 (99%)	1270 (1.3%)	0.3568
	Yes	16584 (99%)	203 (1.2%)	
* Registrar age	median (min, max)	31 (22, 61)	31 (23, 61)	0.3407
*SEIFA Index (23) [#]	median (min, max)	5.0 (1.0, 10)	5.0 (1.0, 10)	0.5868
*Consultation Duration	median (min, max))	17 (0.0, 120)	17 (1.0, 96)	0.0666
*Number of problems	median (min, max)	2.0 (1.0, 4.0)	2.0 (1.0, 4.0)	0.9256
*Number of pathology tests	median (min, max)	0.0 (0.0, 12)	0.0 (0.0, 9.0)	<0.0001

Note: numbers may not add up to n due to missing data

* Due to analysis at problem/diagnosis rather than consultation level, frequency tables should be interpreted with caution. Reported frequencies at the problem/diagnosis level may not reflect observed frequencies at the subject level.

[#] Socioeconomic Index for Area (SEIFA) Relative Index of Disadvantage (lower scores indicate relative disadvantage)

FTE full-time equivalent

Table 3: Logistic Regression model of Associations of A/H prescriptions.

		Univariate		Adjusted	
Variable	**Class**	**OR (95% CI)**	**P**	**OR (95% CI)**	**P**
Age group	35-64	1.74 (1.51, 2.00)	<.0001	1.69 (1.45, 1.97)	<.0001
Referent:16-34	65+	1.71 (1.45, 2.01)	<.0001	1.59 (1.34, 1.90)	<.0001
Aboriginal and Torres Strait Islander	Yes	2.07 (1.47, 2.90)	<.0001	2.28 (1.66, 3.12)	<.0001
Non English speaking background	Yes	0.50 (0.35, 0.71)	0.0001	0.48 (0.33, 0.69)	<.0001
Registrar gender	Male	1.28 (1.11, 1.47)	0.0005	1.19 (1.03, 1.38)	0.0205
Regional Training Provider	2	1.39 (1.12, 1.73)	0.0025	1.46 (1.16, 1.84)	0.0012
Referent: 1	3	1.29 (1.04, 1.60)	0.0190	1.32 (1.05, 1.66)	0.0157
	4	1.18 (1.01, 1.38)	0.0376	1.30 (1.10, 1.53)	0.0020
Patient/practice status	New to Practice	0.76 (0.60, 0.97)	0.0257	1.17 (0.90, 1.52)	0.2471
Referent: Returning Patient	New to Registrar	1.01 (0.91, 1.13)	0.8364	1.26 (1.12, 1.42)	0.0001
New problem	Yes	0.27 (0.24, 0.31)	<.0001	0.25 (0.22, 0.29)	<.0001
Chronic condition	Yes	0.72 (0.63, 0.83)	<.0001	0.47 (0.40, 0.56)	<.0001
Imaging ordered	Yes	0.12 (0.07, 0.20)	<.0001	0.15 (0.09, 0.25)	<.0001
Referral ordered	Yes	0.88 (0.75, 1.05)	0.1550	0.80 (0.66, 0.96)	0.0148
Consultation Duration		1.01 (1.00, 1.01)	0.0666	1.02 (1.01, 1.02)	<.0001
Number of pathology tests		0.57 (0.47, 0.69)	<.0001	0.58 (0.47, 0.71)	<.0001

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Declaration of Conflicting Interests

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