

ENHANCING EDUCATION AND PRACTICE

Intern Prescribing Decisions: Few and Far Between

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ABSTRACT Objective: *To examine the scope of intern prescribing practices by determining: the proportion of prescriptions that interns chart compared with other medical staff; the proportion of intern-charted prescriptions for which interns are sole decision-makers; whether or not intern-initiated prescribing varies with respect to the specialty to which they are attached, the shifts they are working and the types of charts they are using; the types of clinical conditions for which interns initiate prescribing decisions; and the drug classes that interns use for their self-initiated prescribing.*

Design: *Prospective study of a random sample of intern-charted prescriptions.*

Setting: *Two teaching hospitals of the Hunter Area Health Service, Newcastle, Australia. The study was conducted from the fifth to the eighth month of the intern training year.*

Main Outcome Measures: *The proportion of prescriptions charted by interns that resulted from their own decision-making, the circumstances relating to this, clinical conditions for which they prescribe and drugs prescribed.*

Results: *A total of 17,895 prescriptions were examined—3437 (19%) were intern-charted. Interns reported they were the sole decision-makers for 19% (95% CI: 14–24%) of prescriptions they had charted. Interns were more likely to initiate decisions in accident and emergency (OR=7.5, 95% CI: 2.2–25.2) and obstetric and gynaecology (OR=2.3, 95% CI: 1.6–3.2) rotations than in medicine and were more likely to initiate decisions on night (OR=7.3, 95% CI: 3.4–15.5) and weekend (OR=1.7, 95% CI: 1.0–3.2) shifts than during the day. They were also more likely to prescribe on the “as required” (OR=36.6, 95% CI: 20.6–65.0), “statim” (OR=26.1, 95% CI: 17.0–40.1) and “intravenous” (OR=7.2, 95% CI: 4.3–12.3) charts compared with “regular” charts. A total of 52% of intern-initiated prescriptions were for symptom relief; pain, insomnia and nausea; and 75% of the drugs for which interns made independent decisions were analgesics, antithrombotic agents, psycholeptics, antispasmodics, laxatives and anti-asthmatic agents.*

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Conclusion: *Interns have a limited role with respect to independent prescribing and take the sole responsibility for only one-fifth of the prescriptions they chart. This limited, albeit safe, approach to prescribing may impact significantly on an intern's opportunity to acquire the skills necessary to become an independent, rational prescriber.*

KEYWORDS *Prescribing, intern, physician practice patterns.*

Introduction

The intern (pre-registration house officer) year is a time when the foundations for future clinical practice are being laid. The year is pivotal in consolidating and further developing knowledge, clinical skills and professional attitudes acquired during medical school education. The primary focus of intern training programmes is to prepare new doctors to be competent independent practitioners through clinical apprenticeship, based on in-service training across a range of supervised posts.

Studies of intern competence indicate that junior doctors are deficient in skills ranging from history-taking to communication (Sloan *et al.*, 1997; Smith *et al.*, 1991, 1995). Further, interns report that they feel deficient in managing specific clinical conditions, conducting practical procedures and communicating with patients (Jolly & McDonald, 1989). While levels of perceived competence increase substantially as training progresses, by the end of the year interns still perform at low levels of competence in areas such as managing common clinical conditions, interpreting investigations, making diagnoses, prescribing and understanding the implications of therapeutic options (Gordon *et al.*, 1992; Wise *et al.*, 1995).

It is likely that prescribing habits are first formed in the intern year and that methods learned may determine a doctor's approach to prescribing in subsequent medical life (Charap *et al.*, 1985). There is, however, little empirical research on the scope of intern responsibilities with respect to prescribing, the way in which interns acquire these skills or the determinants of their practice.

Research on the habits of more experienced prescribers (senior hospital staff and general practitioners) highlight that inappropriate prescribing is a global problem (Hogerzeil, 1995). Given the relative inexperience of interns, their limited confidence in the prescribing arena and the demands placed on them in the hospital system, one could argue that results from studies of more experienced prescribers represent the "best-case scenario" with interns being likely to exhibit less optimal practice. The only published study of intern practices (Pearson *et al.*, 2000) used hypothetical clinical case scenarios to show that a substantial number of interns prescribed "inappropriately" for common clinical conditions, even at the end of their training. Whilst there is difficulty in extrapolating from data based on hypothetical case scenarios to real practice, the study raises many questions about a much neglected area of research.

The focus of this study was to establish the scope of intern prescribing responsibilities in their actual practice. We aimed to describe the extent of interns' prescribing practices by determining:

1. the proportion of prescriptions that interns chart compared with other medical staff staff;
2. the proportion of intern-charted prescriptions for which interns are sole decision-makers;
3. whether or not intern-initiated prescribing varies with respect to the specialty to which they are attached, the shifts they are working and the types of charts they are using;
4. the types of clinical conditions for which interns initiate prescribing decisions; and
5. the repertoire of drugs that interns use for their self-initiated prescribing.

Methods

Subjects and Setting

The study was conducted at the two urban teaching hospitals of the Hunter Area Health Service, Newcastle, Australia: the John Hunter Hospital (approximately 500 beds) and the Mater Misericordiae Hospital (approximately 200 beds).

The study was conducted for 99 consecutive days, months five through eight of the training year. Fifty interns were attached to the two hospitals over the study period.

Procedures

An extensive pilot testing phase was carried out to establish data collection procedures that were effective, unobtrusive and impacted minimally on an intern's daily routine. The final data collection procedure (carried out by SP) involved surveying all of the 33 wards serviced by interns at the two hospitals. These comprised 15 medical, seven surgical, five obstetric and gynaecological and four geriatric wards plus two accident and emergency departments. Four randomly selected wards were surveyed each day with each ward being surveyed 12 times during the survey period.

At each ward, the number of available patient medication charts was noted and regular medication, intravenous, "statim" (for single administration) and PRN (for "as required" medications) charts were examined. The number of prescriptions charted by medical staff on the survey day and the previous day were tallied and the number of intern-charted prescriptions (identified by the signature) recorded. For each intern-charted prescription, the intern's name,

date of prescription, patient details (name, ward and bed number) and drug details (drug name, dose, dose frequency and route of administration) were noted. The clinical rotations and shifts of interns were determined from rosters provided by the two hospitals.

Interns who had charted prescriptions were subsequently contacted by telephone (by SP) within 48 hours and asked to participate in a brief interview. For each prescription, interns were prompted using the patient details and asked who initiated the prescribing decision (self, registrar, consultant or nurse), whether the prescription was written after chart review (“rechart”) or was a continuation of a patient’s out-of-hospital medication. If interns had initiated the prescribing decision, they were asked the clinical condition for which the decision had been made.

Statistical Analysis

Unless stated otherwise, data were analysed using the *Statistical package for social sciences* (SPSS), Version 6.1 for Windows (SPSSx, 1990).

Intern-charted Prescribing. The proportion of prescriptions charted by interns compared with all other medical staff was calculated.

Intern-initiated Prescribing. The primary outcome measure was the proportion of prescriptions charted by interns that resulted from their own decision-making. The 95% confidence interval around the proportion was calculated using the intra-cluster correlation and average cluster size (number of prescriptions per intern).

Intern-initiated Prescribing According to Rotation, Shift and Chart. This and subsequent analyses used only intern-initiated prescriptions.

Three separate logistic regression analyses were used to examine the relationship between intern-initiated prescribing (outcome) and rotation, shift and chart type. Standard logistic regression assumes independence of self-initiated prescribing behaviour within an intern. To adjust for within cluster correlation, the generalised estimating equation (GEE) method was used to fit these regression models. GEEs were performed with PROC GENMOD in the SAS Version 6.12 for Windows (SAS Institute, 1998). Compound symmetry was assumed (i.e. the same correlation between all observations for any individual intern). Robust estimates of the variance of the estimated regression coefficients are reported.

Clinical Conditions. The responses of interns regarding the conditions for which they initiated prescribing decisions were written verbatim. Subsequently, members of the research team (SP and IR) reviewed each response and through an iterative process categorised responses according to whether management was for symptom relief or for a specific clinical condition.

Within each of the major categories, responses were further classified. The proportion of prescriptions charted according to these categories was estimated.

Drug Classes. The drugs charted by interns were classified according to the ATC codes (Commonwealth Department of Health and Family Services, 1998). The code is a structured seven-digit alphanumeric code with five levels. Drugs are divided into different groups according to their site of action and therapeutic and chemical properties. The proportion of prescriptions initiated by interns in drug classes defined by these codes was estimated.

Ethics

The University of Newcastle and the Hunter Area Health Service Research Ethics Committees approved the study protocol.

Results

Response Rate

Of the 50 eligible interns, 49 (98%) gave written consent to participate in the study.

Intern-charted Prescribing

During the study period, 7524 beds were surveyed, 1252 were excluded, as beds were not occupied. Of the remaining 6272 eligible beds, 660 charts were absent from the ward or were not accessible as patients were being examined at the time of the ward survey. Thus, 5612 bedside charts were available for review (89% of eligible charts). A total of 17,895 prescriptions were examined during the study—3437 (19%) were intern-charted prescriptions.

Intern-initiated Prescribing

Interns could not be contacted to discuss 365 (11%) of the prescriptions that they had charted. The following figures relate to the remaining 3072 (89%).

Interns were the sole decision-makers for 19% [95% Confidence Interval (CI):14–24% (adjusted for clustering)] of the prescriptions that they charted. Most of the remaining prescriptions written were for the purpose of recharting already prescribed hospital medications (67%). The remaining prescriptions were charted to continue patients' out-of-hospital medication (6%) or were charted under the instruction of consultants (3%), registrars (3%) and nurses (2%) (Figure 1).

Intern-initiated Prescribing According to Rotation, Shift and Chart

Interns have greater odds of initiating prescribing decisions in accident and emergency (7.5 times), obstetrics and gynaecology (2.3 times), and surgery (1.3

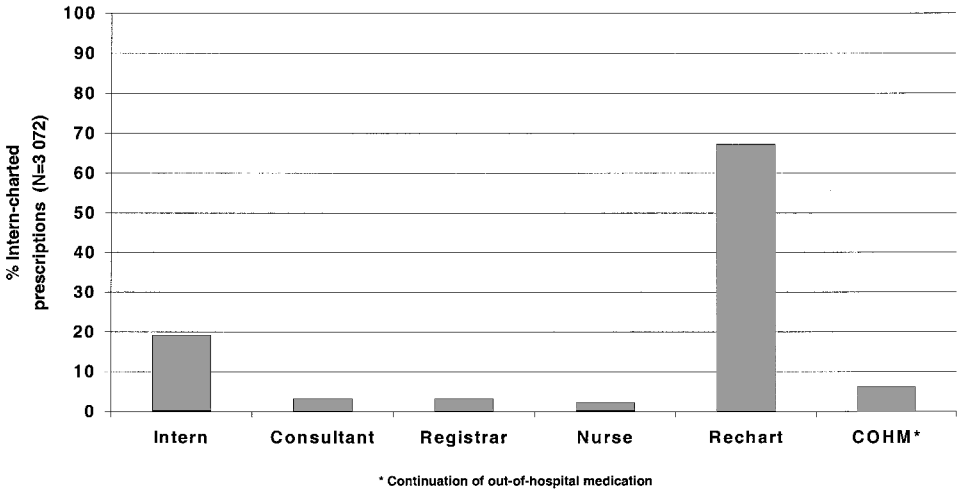


Figure 1. Proportion of intern-charted prescriptions according to prescription type.

times) than in medicine. However, they have lower odds of making self-initiated prescribing decisions in geriatrics (0.2 times) than in medical rotations. Interns also have greater odds of initiating prescribing decisions during night (7.3 times) and weekend (2.2 times) shifts compared with day shifts. Further, they have greater odds of initiating prescribing decisions on the “as required” (36.6 times), statim (26.1 times) and intravenous (7.2 times) charts compared with the regular charts (Table 1).

Clinical Conditions

Approximately half (52%) of intern-initiated prescribing decisions were for symptom relief; pain, insomnia and nausea being prescribed for most often. Forty-one percent of intern-initiated decisions were for managing specific clinical conditions such as thrombosis, infection and chronic airways limitation/asthma (Table 2).

Drug Classes

Analgesics comprised nearly one-quarter of drugs for which interns made self-initiated prescribing decisions. A further 50% of intern-initiated decisions came from five drug classes: antithrombotic agents, psycholeptics, antispasmodics, laxatives and anti-asthmatics (Table 3).

Discussion

There are a number of issues to be addressed before interpreting the results of our study. They relate to the survey methods, response rates and the validity of our outcome measure.

Table 1. Proportion of intern-initiated prescribing according to rotation, shift and chart

	<i>n</i>	<i>N</i>	%*	Generalised estimating equation				
				OR	95% CI*	χ^2	df	<i>p</i>
<i>Rotation</i>								
Medicine	341	1508	23	1.0		107.5	5	<0.001
Geriatrics	44	920	5	0.2	0.1–0.3			
Surgery	94	384	24	1.3	1.6–3.2			
Relief	38	160	24	1.2	0.6–2.3			
Obstetrics & gynaecology	38	67	57	2.3	1.6–3.2			
Casualty	23	33	70	7.5	2.2–25.2			
<i>Shift</i>								
Day	329	2363	14	1.0		156.5	3	<0.001
Weekend	93	336	28	2.2	1.4–3.5			
Evening	51	195	26	1.7	1.0–3.2			
Night	105	178	59	7.3	3.4–15.5			
<i>Chart</i>								
Regular	149	2423	6	1.0		274.5	3	<0.001
Statim	242	337	72	26.1	17.0–40.1			
As required	125	161	78	36.6	20.6–65.0			
Intravenous	62	151	41	7.2	4.3–12.3			

*95% confidence intervals that include 1 indicated that the OR is not different from the reference category.

We chose to study prescribing in the intern's natural environment, a difficult undertaking given the often unpredictable hospital setting, the time constraints and high intern workload. However, we managed to develop relatively unobtrusive techniques to study actual practice patterns. Despite the inherent difficulties, there was an excellent participation rate (98% of eligible interns), a high representation of bedside charts (89% of those eligible), and a high response rate for the follow-up telephone interviews (around 90% of all intern-charted prescriptions).

Our study is limited in that we chose to use the charted prescription as our sole indicator of prescribing, the end result of a proactive prescribing decision. We did not, however, examine the circumstances where prescribing decisions are made for which there is no written evidence; e.g. the choice not to prescribe. Further, we did not examine the process by which these prescribing decisions were made or the appropriateness of decisions.

We relied on the self-reported perceptions of interns to elicit information regarding the clinical condition for which prescribing decisions were made. Such responses are subject to recall bias and social desirability (Patton, 1990). Alternative data sources are patient notes. However, the difficulty in obtaining individual patient consent and the often incomplete documentation about prescribing decisions (Del Degan *et al.*, 1996) made this non-viable.

Table 2. Intern-initiated prescribing according to “condition” (from $n=578$ intern-initiated prescriptions)

	<i>n</i>	%
<i>Clinical condition</i>		
Thrombosis/embolus		
Vein	72	12.6
Heart	16	2.8
Lung	6	1.0
Infection	33	5.8
Chronic airways limitation and/or asthma	28	4.9
Heart failure	24	4.3
Alcohol and drug withdrawal	22	3.9
Peptic ulcer	7	1.2
Hypertension	6	1.0
Anaemia	5	0.9
Atrial fibrillation	4	0.7
Diabetes	3	0.5
Other	8	1.4
<i>Symptom relief</i>		
Pain	122	21.2
Insomnia	53	9.3
Nausea	47	8.1
Constipation	39	6.8
Agitation	18	3.1
Symptoms of vitamin/mineral deficiency	13	2.2
Other	13	2.2
<i>Premedications</i>	30	5.2
<i>Do not know</i>	5	0.9
Total	578	100.0

Despite the constraints of this study, useful conclusions can be drawn about the scope of intern’s hospital prescribing practices.

Our study has shown that around 80% of intern prescribing practices involve charting previously prescribed medications or charting under the instruction of colleagues. These tasks could be viewed as potential opportunities to observe and/or evaluate the decisions of other medical staff and to make active and independent decisions. However, without a good understanding of the reasoning behind individual therapeutic decisions or broad-based knowledge of drugs, interns are unlikely to alter already prescribed medication regimens. Further, in the busy and hierarchical hospital environment, interns are unlikely to have the time or the confidence to question every decision their colleagues make.

Table 3. Intern-initiated prescribing according to drug class (from $n=578$ intern-initiated prescriptions)

Drug class	Most commonly prescribed drug*	<i>n</i>	%
Analgesics	paracetamol; codeine phosphate	134	23.2
Antithrombotic agents	Heparin	84	14.5
Psycholeptics	Temazepam	82	14.3
Antispasmodic, anticholinergic and propulsive† agents	metoclopramide hydrochloride	45	7.8
Laxatives	docusate sodium; senna	44	7.6
Anti-asthmatics	salbutamol sulphate	28	4.8
Antibacterials	gentamicin sulphate	28	4.8
Diuretics	Frusemide	23	4.0
Cardiac therapy	glyceryl trinitrate	13	2.2
Mineral supplements	potassium chloride	11	1.9

*Drugs referred to by generic name. †In all cases metoclopramide was treated as an antiemetic.

Results show that interns took sole responsibility for only a small proportion (around one-fifth) of the prescriptions that they chart and initiated fewer prescribing decisions in geriatric and more in surgery, accident and emergency and obstetric and gynaecology settings. This is an interesting finding and one that may be explained by understanding the unique features of the different settings and how they may impact on practice. In aged care settings interns deal with patients who are often on multiple drugs for several medical problems. It is not surprising that inexperienced prescribers are unlikely to initiate management or alter existing regimens for fear of adverse effects of drug treatment or contributing to polypharmacy. In surgical rotations direct supervision is minimal as senior colleagues are often in theatre. As a result, interns may be required to manage patients more independently. In the accident and emergency setting, interns are often the first contacts with patients and as such are likely to be required to make an initial assessment of the patient and initiate short-term management before senior colleagues review the patient. In obstetrics and gynaecology, many patients are young, generally well and on few medications, thus making a prescribing decision a “low risk” option.

Not unexpectedly, interns initiated relatively more prescribing decisions when working alone on night duty, a time when they have little support or supervision. Whilst night duty could provide interns with the opportunity to become more independent in their prescribing practice, it is often when they are very busy with a number of sick patients that they have never seen before. As a result, interns are likely to practice short-term management, using the “statim” and “as required” medications charts and may only initiate medications that will tide the patients over until the definitive team make an assessment the following day.

Interns had a role in patient management at the simplest level. Nearly half of the prescriptions that they charted were to manage pain, insomnia, nausea and constipation. When interns reported that they had initiated therapy for a specific clinical condition, it was found that protocols or guidelines existed on the wards that are likely to have provided guidance. Not surprisingly, interns were also shown to have a very limited drug repertoire with more than three-quarters of the medications coming from only five drug classes. Further, simple medications that are purchased over the counter in Australia were used to manage many of the symptoms for which they were initiating therapy.

These data suggest that the scope of interns' prescribing practice is limited. One may argue that a cautious approach to prescribing is appropriate and necessary for inexperienced doctors. However, it is also arguable that interns should be showing a greater level of independence nearly two-thirds of the way through their training year and that this limited, albeit safe, approach may impact on their ability to acquire the skills necessary to become an independent, rational prescriber.

Every prescription charted has the potential for intern learning and the present study has shown that there are many opportunities of this kind. The challenge for educators, intern supervisors and interns themselves is to work within the existing environment to create opportunities to extend learning in a safe and non-threatening way.

Although our intern sample was restricted to one Australian urban health care network, arguably these data have wider application, especially given the evidence indicating that interns in many hospital settings face similar pressures and experience similar uncertainties about their competence even at the end of their training year (Gordon *et al.*, 1992; Jolly & McDonald, 1989; Wise *et al.*, 1995). Future studies would be beneficial in this poorly researched area and could extend our work by further examining the quality of intern prescribing or gaining an understanding of the forces that act on interns during prescribing skills acquisition and decision-making.

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Dedication

This paper is dedicated Dr Andrew Lojszczyk (18 December 1972–7 June 1998), who made an important contribution to this work as an adviser and study participant.

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