This inaugural issue is dedicated to

**Tessa Nicholl,**

mentor, advisor and continuing source of support.

We would like to offer our thanks and appreciation for all the work you have done and continue to do on our behalf.

*UBC PSSJ 2012-2013*
**Introducing UBC PSSJ**

Mary H.H. Ensom, PharmD, FASHP, FCCP, FCSHP, FCAHS\(^1\,^2\)

\(^1\) Faculty of Pharmaceutical Sciences, University of British Columbia, Vancouver, BC, Canada

\(^2\) Children’s and Women’s Health Centre of British Columbia, Vancouver, BC, Canada

The UBC PSSJ is the culmination of a remarkable effort by a group of highly-motivated and innovative pharmacy students to go where no others have gone before… namely, an undergraduate student-run peer-reviewed open-access pharmacy journal. The risks and challenges are immense. Even as an experienced journal editor, it would be unimaginable for me to see my editorial team members graduating every year or two and having to garner new editors to continue the legacy. That said, no worthwhile endeavour is ever achieved without the undertaking of substantial risks. Not only is there a large pharmacy student community in Canada, but by spreading the word to other pharmacy student organizations in the U.S. (Rho Chi, for example) and beyond, the UBC PSSJ will be able to ensure the success of this enterprise.

The theme of this inaugural issue is quite appropriately focused on the innovative pharmacy practices local and abroad. Readers will find practical gems such as: interpreting cardiovascular risks and the nocebo effect, and tips on using information technology to support their practice; insights into international and inter-provincial practices to help identify trends and opportunities; and answers to important questions about the transition from student to practitioner addressed through assessment of grading schema and programs to introduce students to practice settings and practice-based research.

I hope that readers will be stimulated and encouraged to read, recommend, and submit articles to the UBC PSSJ as well as join me in applauding this tremendous initiative. Best wishes for the UBC PSSJ's long and successful journey!
Bringing Research Back and the Culture of Student Scholarship

Kelvin Lou, B.Sc.(Pharm.)¹
Sandy Mok, B.Sc.(Pharm.)²
¹Pharmacy Practice Residency Program, Lower Mainland Pharmacy Services, Vancouver, BC, Canada

The idea of UBC PSSJ is deceptively simple: to provide a venue where students can publish their work. However, the execution of this idea is complex and requires some exposition. As a profession that prides itself as an accessible resource of reliable medical information, critical inquiry and scholarship forms the fabric of our practice. Whether answering drug information questions or contributing directly to the medical literature, many pharmacists are engaged in the scholarly process. In other words, research and scholarship is what we do, and this is who we are as a profession. Publishing our scholarly work is also one of the powerful ways to communicate and collaborate with each other and with other healthcare professionals. With so much at stake, it is critical that students are engaged in the scholarly process early on in their careers.

During our time as students, we found surprisingly little discussion about publishing our scholarly work at the undergraduate level, as well as a lack of awareness about the process involved in doing so. An odd situation given the substantial role future pharmacists can play in identifying and solving healthcare-related issues. This belief eventually became the impetus for creating UBC PSSJ. Our goal is to raise awareness on the importance of communicating and collaborating through publishing, empowering students with resources and skills to publish their work, and to bring people together to put it all into practice. These ideas are the essence of our slogan “Bringing research back”, which represents changing the student culture into one that not only celebrates publishing for its own sake, but also to help take scholarship to the final step of putting theory into practice. UBC PSSJ is a call back to basics and a celebration of the things that make scholarship personally rewarding and impactful in the professional community.

All of this can only be achieved if we work as a community. Therefore instead of limiting the scope of the Journal to one area of focus, we strive to initiate a dynamic dialogue between all areas of pharmacy scholarship, including medicinal chemistry, hospital and community practice issues, and pedagogical research. Another unique aspect of the Journal is that although we are proudly a student journal, we also seek to publish work of practitioners and academics. The result is a combination of showcasing student work while bringing students, researchers and practitioners together to learn from the present and future leaders of our profession. It is our aspiration that UBC PSSJ will serve as a means for collaboration among the different specialities within pharmacy, as well as among students and our more experienced colleagues.

To our fellow students, our hope is that we have created something that you feel is yours. Something from which you can learn and to which you can contribute. At times, the problems and issues we face in our profession may seem unreachable so early in our careers. The only advice we can offer is that wherever the solution may lie, the first step is to engage those around you in order to tap into the crackling and pent up energy of your fellow students. Our faculty contains many amazing individuals and it is these individuals whom you can help and in turn receive help. Start there and good things are bound to happen. If UBC PSSJ is any example, by joining together with our peers despite seemingly immense challenges, we believe the Journal is a step in the right direction towards empowering students to engage in the scholarly dialogue.

As we look forward to the road ahead, we would also like to reflect on the journey thus far, and thank the mentors, faculty members and friends of the Journal who have helped transform the dreams of a few naïve students into a full-fledged Journal. We offer our humble thanks on behalf of the entire UBC PSSJ Team. In return, we have precious little to offer except to pledge our dedication to do our part in taking responsibility for our own learning and to give back what we have received by approaching our work with passion and enthusiasm in the way you all have shown us.
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<td>Dr. Kishor Wasan</td>
<td>Associate Dean, Research and Graduate Studies, UBC Faculty of Pharmaceutical Sciences</td>
</tr>
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<tr>
<th>Ms. Tessa Nicholl</th>
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Acknowledgements

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Contact

Website: www.ubcpssj.org
Email: inquiries@supportubcpssj.org
Facebook: www.facebook.com/ubcrxpssj

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Why Heart Health is not Just a Numbers Game

James P. McCormack, B.Sc., B.Sc.(Pharm.), ACPR, PharmD
Faculty of Pharmaceutical Sciences, University of British Columbia, Vancouver, BC, Canada

This is an adaptation from an article written by James P. McCormack, available from EvidenceNetwork.ca.

Introduction

Have you been told by your health care professional that you have high blood pressure, high cholesterol, or type 2 diabetes, and you need to do something to improve your “numbers”? If so, it is likely that their recommendations were based on national clinical practice guidelines written by experts in cardiovascular health.

On the face of it, following guidelines seems a very reasonable approach. What could be the problem?

A recent evaluation of cardiovascular patient guidelines reveals that only 12% of the recommendations are based on randomized controlled trials (the highest level of evidence). In contrast, 54% of the recommendations are based purely on opinion and consensus (1).

Here is what we know well: Evidence from the last 30 years has provided pretty solid support that lowering what would be considered higher levels of blood pressure (above 160 to 170 mmHg systolic), especially in type 2 diabetics, reduces cardiovascular events (heart attacks and strokes) to what many, if not most, would consider a clinically important degree.

The effects of statins and the reduction of very high glucose levels reduce the chance of cardiovascular events.

But the evidence for reducing the risk of cardiovascular disease is not nearly as impressive or definitive when it comes to getting numbers aggressively below the commonly recommended lower number thresholds for blood pressure (<140/90 mmHg), diabetes (hemoglobin A1c <7%), and cholesterol (low-density lipoprotein <2.0 mmol/L). This is important because reducing the chance of cardiovascular events is the only reason why we aim to change numbers in the first place.

Given this, it is unfortunate how many patients and their families worry and become obsessed with these relatively arbitrary breakpoints. A recent British Medical Journal analysis goes so far to say that our idolizing obsession with changing patient numbers is “damaging patient care” (2).

Beware the spin

One of the more tricky aspects surrounding cardiovascular disease numbers is how the magnitude of the cardiovascular benefits is typically presented.

A news report may, for example, state that a five-year study of a drug has shown that it reduces cardiovascular disease by 25%. Sounds convincing, right?

While this number may technically be correct, it is actually misleading.

This is because a typical study result may find that those patients who go without medication over five years have an 8% chance of a cardiovascular event, whereas patients who take the medication in question have their chances decreased to 6%.

Mathematically, it is true that six is 25% lower than eight (a “relative” difference). But the number that matters — the “absolute” number — is actually 2% (eight minus six). In other words, 2% of people obtained a benefit, but 98% of people on the medication received no cardiovascular benefit. The benefit is hopefully greater over a longer period of time, but studies rarely extend beyond five years.

In the case of statins, a class of drugs routinely prescribed to lower cholesterol, evidence shows that the absolute difference in cardiovascular events achieved over a five-year period is roughly 1% to 1.5% in patients who have never had a heart attack or a stroke. Other popular drugs such as ezetimibe (Ezetrol®), niacin (Niaspan®), or fibrates that lower cholesterol numbers have not been shown to reduce the chance of cardiovascular events consistently.

When most blood pressure drugs are used in patients with systolic blood pressures around 160 to 170 mmHg, excluding atenolol (Tenormin®) or doxazosin (Cardura®), the drugs lead to a difference in cardiovascular events of around 2% to 5% (3), and there is a 5% to 8% reduction when a drug called metformin (Glucophage®) is used in newly diagnosed diabetics (4).

Interestingly, other drugs used to lower blood glucose in diabetes have either been shown to have less of a benefit, have no benefit at all, or have not...
been studied to see if they reduce the chance of cardiovascular disease. And we cannot forget the possible side effects and the costs for medications, which patients must consider. Since the majority of patients will not get a cardiovascular benefit from these medications, any side effects really become unacceptable.

**Informed decision making**

Medical guidelines are oddly silent on patient preferences. A recent look at five main Canadian cardiovascular guidelines reveals that only 99 of the 90,000 words in the documents address patients’ values and preferences (5).

So, given all of this, what is a patient to do?

Let us forget the numbers for a moment and focus on what patients can and should do for themselves. The best available data show that stopping smoking, eating in moderation (the Mediterranean diet has the best evidence), and being active are the three most important things a person can do to reduce cardiovascular risk (even if these things do not change your numbers).

If a medication is recommended, patients should ask their doctors whether that specific drug has been shown in well-designed clinical trials to reduce cardiovascular disease, and if so, by how much (in absolute numbers). Patient and doctor should also always have a discussion about the possible side effects and costs of any medication.

The bottom line: The goal is reducing the chance of cardiovascular disease, not just lowering numbers.

In the end, a health care provider should support the patient decision regardless of the path the patient chooses, and not make them feel guilty if they do not blindly follow the latest guideline recommendations.

**References**


Review of Treatments in Hepatitis C Virus Genotype 1 Individuals

Khushminder Rai, B.Sc.(Pharm.)

1Community Pharmacy Residency Program, Faculty of Pharmaceutical Sciences, University of British Columbia, Vancouver, BC, Canada

Hepatitis C is a treatable liver disease. Although the prevalence of hepatitis C virus (HCV) in Canada is low, approximately a quarter of those infected are unaware of their status. This makes diagnosis and treatment difficult. Of the 6 genotypes of hepatitis C, genotype 1 is the hardest to treat and requires the longest duration of therapy as well. Since 2002, a combination of once weekly injection of pegylated interferon and twice daily oral ribavirin has been the standard of therapy in Canada. In 2012, two new protease inhibitors boceprevir and telaprevir were approved for use in combination with standard therapy and have been shown to improve cure rates as compared to standard therapy alone. Similar protease inhibitors as well as polymerase inhibitors are currently in the pipeline to help improve cure rates specifically for HCV genotype 1 patients.

Introduction

Approximately 1% of Canadian population has chronic hepatitis C and of those, 60% are injection drug users (1). Hepatitis C virus (HCV) genotypes 1-3 are more prevalent in Canada (1). Standard therapy has a good response rate in HCV genotypes 2 & 3 (70-80%) with genotype 1 being the least responsive (<50%) (1,2,3). Other genotypes are more prevalent outside Canada (4). Treatment with pegylated interferon (PegIFN) and ribavirin (RBV) has been standard of care therapy since 2002 in Canada and 1998 in US. This therapy includes a weekly subcutaneous injection of PegIFN and twice daily oral tablets of RBV and is associated with some significant side effects such as anemia which may require erythropoietin or transfusion treatments in some patients (1). Therefore, new oral only treatments are being tested which will allow shorter duration of therapy, improved sustained virologic response (SVR) rates, improved adherence and a lower pill burden. SVR is defined as undetectable HCV RNA levels at least 24 weeks after the end of treatment (1). Response to therapy, as measured by SVR, depends on factors such as HCV genotype, viral load, ethnicity, age, gender, and co-morbidities (HIV, depression, etc.) (5). Complications of untreated infection include decompensated liver disease, hepatocellular carcinoma and liver transplantation (1). Newer therapies are being developed to hopefully provide a lower pill burden and improved SVR. This review will discuss therapies for treating HCV genotype 1 infection.

Methods and results

Medline was searched using keywords “hepatitis C”, “protease inhibitors”, “randomized controlled trials” giving 78 results; keywords “hepatitis C”, “polymerase inhibitors”, and “randomized controlled trials” gave 19 results; and all of the above keywords along with “future therapies” gave 4 results. Embase was searched for the keywords “Hepatitis C”, “protease inhibitors”, “polymerase inhibitors”, and 93 results were obtained while keywords “hepatitis C” and “future therapy” obtained in 30 results. No date or language restrictions were applied to any of the searches. Of all these results, 23 relevant randomized controlled trials (RCTs) that were pivotal trials and reviews that discussed these pivotal trials were selected for this review.

Discussion

I. Standard Therapy

Interferons (IFNs) are glycoproteins produced by immune system in response to bacterial or viral antigens (2). IFN-α has two recombinants: rIFN-α2a and rIFN-α2b (2). They bind to cell receptors to induce the production of proteins and increase the host's immune system activity against the virus (6). These effector proteins inhibit different stages of the viral replication cycle, specifically the translation of viral mRNA into viral proteins (2). HCV has acquired resistance by inhibiting the protein kinases in the host required for IFN activity (6). Therefore, monotherapy with IFN has low SVR (10-15%) and patients can rebound after cessation of therapy (7). Overall, SVR increases to 30-40% when given with RBV for 6-12 months but response varies by genotype (7). Genotype 1 patients require longer treatment of 12 months while those with genotypes 2 and 3 only require a 6-month course (7). RBV is a nucleoside analogue that has multiple modes of
action in HCV treatment (8). It can directly inhibit RNA polymerase or get incorporated and lead to mutagenesis of the HCV genome (8). It can also have indirect effects by modifying the immune response of host towards the virus by decreasing the number of activated T cells that express γ-interferon (a cytokine), inhibiting the host cell enzyme inosine monophosphate dehydrogenase (IMPDH) and increasing the production of interleukin (IL)-18 (a proinflammatory cytokine) (8).

Pegylating the IFN increases SVR. Of the two types of pegylated IFNs, PegIFN α2a (Pegasys®; 180 mcg once/week subcutaneously) was shown to attain slightly higher SVR when compared to PegIFN α2b (Unitron PEG®; 1.5 μg/kg once/week subcutaneously) in some studies; however, both have been used in standard therapy along with weight based RBV (1000 or 1200 mg/day) (6,9,10). Treatment with PegIFN-α2a (180 μg/wk) and standard RBV (weight based, 1000 or 1200 mg/day) for 48 weeks has been shown to produce an overall SVR rate of 63% in patients with HCV genotype 1 as compared to only a 24 week therapy with odds ratio of 2.19 [CI, 1.52 to 3.16; P < 0.001] (11). Therefore, a combination therapy of PegIFN and RBV for 48 weeks has been the standard of care for HCV genotype 1 for over a decade. On the other hand genotypes 2, 3 and 4 patients did not have any statistically significant differences in SVR rates when treated for 24 vs 48 weeks or with a low dose vs weight based RBV regimen (11). The side effects associated with IFN therapy include flu-like symptoms, anorexia, nausea, depression, suicidal ideation, retinopathy, renal failure, fatal hepatotoxicity, etc (12). The side effects associated with RBV therapy include anemia, neutropenia, fatigue, headache, insomnia, myalgia, fever, etc (8,13). Use of PegIFN is not indicated in patients with comorbidities such as major uncontrolled depression, decompensated cirrhosis, etc (5). Patients with co-existing mild to moderate depression require psychiatric evaluation, antidepressant treatment and monitoring before and during PegIFN therapy. Reassessment should be done for patients who develop severe depression and require hospitalization (14). Therefore, newer therapies were required to address some of these shortcomings of the standard therapy.

II. Current Therapies

HCV has a single stranded RNA genome which encodes for a polyprotein that is cleaved into four functional proteins essential for viral replication (5). HCV NS3/4A serine protease inhibitors stop replication of viral RNA by inhibiting the cleavage of this polyprotein and have shown improved outcomes and SVR in both treatment-naïve and previously treated patients (5). Two recently approved triple therapies in Canada include boceprevir (Victrelis®) or telaprevir (Incivek®) in combination with standard therapy to improve SVR in patients with HCV genotype 1. They are novel peptidomimetic NS3 protease inhibitors that bind to and form reversible covalent complexes with the RNA NS3/4A protease (15,16).

SPRINT 1 showed that in treatment-naïve patients, after a four week lead-in therapy with PegINF α2b and RBV, addition of boceprevir (800 mg three times a day) starting at week 5 for 24 weeks resulted in almost double SVR rates as compared to standard therapy alone (17). SPRINT 2 also enrolled treatment-naïve patients and tested 48 week standard therapy (along with placebo) vs response guided therapy (which is based on whether HCV RNA levels are undetectable from weeks 8 through 24) vs patients that received boceprevir along with standard therapy for 44 weeks after the 4 week lead-in period (18). If HCV RNA levels were undetectable, therapy was stopped at 24 weeks but if they were detectable at any time during weeks 8-24, patients received standard therapy along with placebo until week 48 (18). They concluded that SVR rates were similar in both short (24 weeks) and long (44 weeks) duration of boceprevir therapy (18). RESPOND 2 assessed the efficacy of the combination of boceprevir with standard therapy for retreatment of difficult to treat patients with chronic HCV genotype 1 infection including those with advanced liver disease (3). Triple therapy with boceprevir 800 mg three times a day attained higher SVR rates (3).

The three PROVE studies showed that in patients with genotype 1 infection, the addition of telaprevir (750 mg every 8 hours) to standard therapy for as short as 12 weeks produces viral suppression and increases the SVR rates even in patients that have failed previous therapies (19). They also showed that the addition of RBV was necessary to decrease the rates of resistance and viral breakthrough (19). The ADVANCE and ILLUMINATE trials are randomized, double-blinded studies that enrolled treatment-naïve patients who received PegINF α2a and RBV, combined with 8-12 week therapy of telaprevir (750 mg every 8 hours with a high calorie meal) (20,21). They found that the combination therapy provided significant improvement in SVR rates and decreased in HCV RNA levels (20,21). The REALIZE trial assessed the safety and efficacy of telaprevir combination therapy in patients that previously failed on standard therapy or those with a high viral load, severe liver fibrosis, and cirrhosis (22). They found an improvement in SVR rates regardless of a lead-in phase with standard therapy (22). Side effects of protease inhibitors include rash, anemia, fatigue, nausea, pruritis, gastrointestinal and flu-like symptoms. (3,17,20,21,22). Comparison of triple therapies with boceprevir or telaprevir is shown in Table 1.
<table>
<thead>
<tr>
<th>Parameters</th>
<th>Boceprevir</th>
<th>Telaprevir</th>
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<tbody>
<tr>
<td>Regimen</td>
<td>4 week lead-in with peginterferon alfa-2b (1.5 μg/kg) plus ribavirin (800–1400 mg daily)</td>
<td>No lead-in required</td>
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<tr>
<td>Combination with</td>
<td>peginterferon alfa-2b (1.5 μg/kg) plus ribavirin (800–1400 mg daily)</td>
<td>peginterferon alfa-2b (180 μg/week) plus ribavirin (1000 mg/day for patients weighing &lt; 75 kg or 1200 mg/day for patients weighing &gt; 75 kg)</td>
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<tr>
<td>Duration of drug</td>
<td>24 weeks of boceprevir</td>
<td>12 weeks of telaprevir</td>
</tr>
<tr>
<td>Duration of therapy</td>
<td>24 weeks if HCV RNA levels undetectable from week 8 through 24.</td>
<td>24 weeks if HCV RNA levels undetectable from week 4 through 12.</td>
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<tr>
<td></td>
<td>If HCV detectable anytime during weeks 8 through 24, continue PegINF/RBV therapy only until week 48</td>
<td>If HCV detectable anytime during weeks 4 through 12, continue PegINF/RBV therapy only until week 48</td>
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<tr>
<td>Dose</td>
<td>4 tablets of 200 mg three times a day</td>
<td>2 tablets of 375 mg every 8 hours</td>
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<tr>
<td>Side effects</td>
<td>Anemia, headache, fatigue, nausea, flu-like symptoms, dysgeusia, rash, itchy and dry skin</td>
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<td>Effect of food</td>
<td>Food enhances absorption by 60% and the type (low/high fat) or timing of the meal (before/during/after) does not matter</td>
<td>Serum concentration decreases by 39% when given with a low-fat meal (249 kcal, 3.6 g fat), but increases by 20% with a high-fat meal (928 kcal, 56 g fat)</td>
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<tr>
<td>Plasma binding</td>
<td>75%</td>
<td>59-76%</td>
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<td>Metabolism</td>
<td>Aldo-ketoreductase (AKR)-mediated pathway into inactive metabolites</td>
<td>P-gp substrate; undergoes extensive metabolism in the liver (hydrolysis, oxidation, and reduction) via CYP3A4</td>
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<tr>
<td>Elimination half-life</td>
<td>Mean elimination half life is 3 hours only</td>
<td>After a single dose = 4.0 to 4.7 hours; steady state = 9 to 11 hours</td>
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<td>Excretion</td>
<td>79% excreted through feces and 9% through urine</td>
<td>Major route of elimination is feces (90%) and minor routes are exhaled air (9%) and urine (1%)</td>
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<td>Dose adjustment</td>
<td>Not required for renal or hepatic impairment</td>
<td>Not required in renal or mild hepatic impairment; use not recommended in moderate to severe hepatic impairment</td>
</tr>
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</table>

Table 1. Comparison chart of triple therapies with boceprevir and telaprevir.

### III. Future therapies

Similar to the recently approved boceprevir and telaprevir, other oral protease inhibitors (danoprevir, vaniprevir, BMS-650032) are currently in the development phase and are also given in combination with standard therapy (5). INFROM-1 investigated the use of danoprevir in combination with mericitabine, a nucleoside polymerase inhibitor, with and without intereferon and RBV (5). They showed a favourable result in the IFN and RBV free cohort but the sample size was very small (5). Triple therapy with other promising nucleoside polymerase inhibitors is also under investigation (5). Host cell factors such as cyclophilin A (cypA), micro(mi)RNA-122, and phosphatidylinositol 4-kinase...
Hepatitis C treatment has come a long way and although, the current triple therapy for HCV genotype 1 provides higher SVR rates and shorter duration of therapy, future therapies offer oral only combinations with a smaller pill burden. This can have a huge impact on compliance and cure rates specifically in genotype 1 patients. However, the applicability of these data to other genotypes remains to be seen as most of the newer studies recruit participants that are HCV genotype 1 in a higher proportion. Therefore, more studies in genotypes 2–6 are required to see the potential benefits of newer therapies in these patients.

Acknowledgments

I wish to acknowledge James Pauly (RPh), CoolAid Dispensary, for providing feedback on this review.

References


Narrative Comparison of Hospital Pharmacy Practice Between Three Canadian Provinces

Charles Au, B.Sc.(Pharm.), ACPR
Cindy San, B.Sc.Pharm., ACPR
Sara Ingram, BA, M.Sc., B.Sc.(Pharm.), ACPR
1Lower Mainland Pharmacy Services, Vancouver, BC, Canada
2University Health Network, Toronto, ON, Canada
3Leslie Dan Faculty of Pharmacy, University of Toronto, Toronto, ON, Canada

In Canada, pharmacists share similar entry-to-practice requirements and professional obligations. However, since the administration of health care services is a provincial responsibility, pharmacy practice in the hospital setting may vary between provinces. This manuscript seeks to provide a broad overview of existing similarities and differences in hospital pharmacy practice amongst three Canadian provinces, by highlighting examples from the authors’ collective work experience and training in Alberta, British Columbia, and Ontario. This is done through a discussion of the impact of differences in regionalization, pharmacy legislation and regulations, technology, drug reimbursement, and education on hospital pharmacy practice. Pharmacists and student pharmacists are encouraged to appreciate the influence of systemic factors upon their practice, and to collaborate on an interprovincial level to advance Canadian pharmacy practice.

Introduction

Canada is home to a diverse population of pharmacists, of which an estimated 17–18% work in a hospital setting (1). Since the administration of health care services in Canada is decentralized, hospital pharmacists practice in fourteen distinct health care systems, which account for the thirteen provinces and the collective territories, and the federal government itself.

Several articles and documents, such as the Hospital Pharmacy in Canada survey, provide a broad overview of Canadian pharmacy practice without commenting on the impact of systemic differences between individual provinces (2). One literature review identified articles comparing the status of specific issues, such as pharmacist scope of practice, between provinces (3,4). Other authors have highlighted differences in pharmacy practice between Canada and other countries, drawn from the experiences of Canadian pharmacists working or volunteering abroad and those of international pharmacy graduates (IPGs) that have moved to Canada (5–8). However, to our knowledge, while the differences between Canadian provinces in pharmacy practice have been documented, their impact has not been assessed or described.

The authors of this article are all hospital-trained pharmacists. Two of the authors (CA and SI) have worked in both British Columbia and Ontario, and a third author (CS) completed her undergraduate training in Alberta before moving to work in British Columbia. The goal of this article was to address potential similarities and differences in pharmacy practice between provinces by reflecting upon the authors’ collective experience; thus, discussion was focused primarily on hospital pharmacy practice in these provinces. In this article, the impact of systemic differences in regionalization, pharmacy legislation and regulations, technology differences, drug reimbursement, and education on pharmacy practice is described.

Differences in Pharmacy Practice

I. Regionalization

Regionalization has been defined as the “creation of an intermediary administrative and governance structure that assumes responsibility for organizing and delivering health care services to a defined population” (9). This concept is intended to address the growing concern that a population’s health care needs are not effectively met by disjointed services that are funded and managed in individual “silos” (9,10). By integrating available resources in a given region, regionalization may improve cost-effectiveness, administrative accountability, responsiveness to population needs, and public participation in health care decision-making (9,11).

Most provinces in Canada have transitioned to a regional structure for health care delivery. In
Alberta, health care delivery is administered by a single provincial health authority, Alberta Health Services (AHS). In 2009, AHS was subdivided into five geographical “zones.” This move created more regional accountability for some services to reflect differences in demographics and patient care needs across the province, while maintaining centralization of other services such as payroll and health records (12). British Columbia contains six regional health authorities. Of these, Vancouver Coastal Health, Fraser Health, and the Provincial Health Services Authority have consolidated the management of several support services, including pharmacy, to capitalize on their geographic proximity and improve efficiency (13–15). In contrast, Ontario does not have regional health authorities and utilizes another model altogether. Ontario is divided into fourteen Local Health Integration Networks (LHINs), which help to plan and integrate health care resources in their communities. Unlike regional health authorities, LHINs do not have unilateral administrative authority, as individual institutions within each LHIN continue to be governed by their own boards (16).

How does regionalization impact pharmacists? A tangible example is the drug formulary, which includes drugs determined to be safe, effective, and cost-effective for patients and residents. In Ontario, each hospital or hospital network maintains its own formulary (17). However, with regionalization, hospitals must align with a regional formulary. This ensures that patients in the same health region receive consistent and equitable access to drug therapy, regardless of which hospital delivers their care. Other examples include aligning pharmacy systems and technology, drug information resources, institutional guidelines, and clinical pharmacist performance expectations as well as centralizing drug procurement and selected drug distribution services. Despite its potential benefits, regionalization can bring about unexpected challenges, such as encountering incompatible technology platforms, characterizing relative needs and developing a fair and robust formula to determine regional allocation of funding, and limiting the ability of individual institutions to make changes independently (10).

II. Pharmacy Legislation and Regulations

In Canada, pharmacy practice is governed by provincial regulatory authorities and the legislation and regulations that they enact in their provinces. Hospital pharmacy departments must also comply with their provincial equivalent of the “Hospital Act”, which (in general) establishes requirements for hospital operation and oversight. Due to the scope of pharmacy-related legislation, we will limit the number of differences highlighted in this article. Of interest, many provinces have recently implemented legislative and regulatory changes to enable an expanded scope of pharmacy practice (3,18). The different paths taken by each province toward enabling, regulating, and funding these pharmacy services have created a complex and potentially confusing landscape for pharmacists, other health care providers, and patients across Canada.

Alberta was the first province to enable pharmacist administration of selected injections and pharmacist prescribing, which includes emergency prescribing, adapting an existing prescription, and “initiating/managing drug therapy” (3, 19, 20). Pharmacists performing the third type of prescribing can assess patients, implement drug therapy, and order lab tests, and must demonstrate their competency by attaining “additional prescribing authorization” (19). In British Columbia, regulations were passed in 2009 permitting pharmacists to administer selected injections and to renew and adapt prescriptions (21). In October 2012, the Ontario government approved similar regulations allowing pharmacists to renew and adapt prescriptions (excluding therapeutic substitution), demonstrate the use of lancets and inhaled or injectable drugs for educational purposes, administer influenza vaccine, and prescribe selected drugs for smoking cessation (22). Of note, there are important differences in the definitions, limitations, obligations, and included drugs associated with these expanded-scope activities for pharmacists in different provinces.

The majority of these recent changes are focused on community pharmacists, given their potential to broadly enhance patient access to health care services. It is unclear whether legislation permitting pharmacist expanded-scope activities will have a significant impact on hospital pharmacy practice, since many hospital pharmacists already adjust drug therapy, order lab tests, and perform other “expanded-scope services” through medical directives and policies at their specific institution. The advantage of legislative changes is that pharmacists could theoretically provide these services in a greater variety of clinical scenarios, at any institution in the province, and under their own authority. Unfortunately, uptake of expanded scope has been slow among pharmacists (for example, only 155 out of 4,277 practicing registrants in Alberta had additional prescribing authorization by February 29, 2012) and any practice changes to reflect pharmacists’ expanded scope in the hospital setting would likely be overseen by institutional policies (2,23).

In addition to expanding pharmacists’ scope of practice, the evolving movement to regulate pharmacy technicians (currently active in Alberta, British Columbia, and Ontario) may impact hospital pharmacy practice (4). Just as many hospital pharmacists already perform expanded-scope activities, many hospital pharmacy technicians
routinely perform drug distribution duties without direct pharmacist supervision. Therefore, regulation may not significantly impact the role hospital pharmacy technicians play in drug distribution, but it will allow them to be accountable for their work. The more interesting question is whether regulation will increase the extent to which “clinical pharmacy support technicians” collaborate with pharmacists to provide patient care. The literature describes multiple examples of trained pharmacy technicians providing clinical support in a variety of settings (24). At Royal Columbian Hospital, a tertiary care centre in British Columbia, clinical pharmacy support technicians assist pharmacists in the Intensive Care Unit (ICU) with patient triage, data collection, troubleshooting, and other duties, which enables ICU pharmacists to be more efficient and more available to perform cognitive-based activities (25). Other authors describe the commencement of hospital pharmacy technicians taking best possible medication histories (BPMHs), which may enable pharmacists to identify and address drug therapy problems more efficiently (26,27). Ultimately, the impact of pharmacy technician regulation in the hospital setting will likely be determined by how scarce human resources (pharmacists, registered pharmacy technicians, and pharmacy assistants) are deployed at individual institutions to perform distribution and clinical duties.

III. Pharmacy Technology

Recent advances in technology are revolutionizing pharmacy practice in the hospital setting. Depending on their practice area and site, hospital pharmacists may work with automated unit-dose (AUD) and barcoding systems, automated dispensing cabinets (ADCs), computerized physician-order entry (CPOE), electronic medication administration records (MARs), and clinical decision support systems (CDSS). However, the most significant difference between provincial systems in pharmacy technology is in the implementation of electronic health records (EHRs).

The availability of province-wide electronic drug databases substantially affects the practice of hospital pharmacists, especially at interfaces of care, such as hospital admission and discharge. In Alberta, the Netcare system enables pharmacists to access dispensed Schedule I and II medications, lab values, imaging, and hospital discharge summaries across the province. British Columbia has PharmaNet, a similar system for dispensed prescription medications, as well as separate tools for accessing lab values, imaging, and hospital discharge summaries (these tools are not fully connected across the province). Medication profiles downloaded from these provincial databases can be used to ensure appropriate continuation of therapy in hospital and to identify drug-related adverse events and medication errors. However, it is equally important to recognize their limitations, including that non-prescription medications may not be recorded and that patients may be non-adherent or taking medications differently than prescribed. Hence, provincial databases are usually an excellent starting point for medication reconciliation, but attaining a BPMH still requires speaking to patients and/or their caregivers and consulting available health records.

In Ontario, there is no complete medication database that includes all residents. The most comparable tool is the Ontario Drug Benefit Drug Profile Viewer (ODB DPV), which is incomplete as not all residents of Ontario have ODB coverage and the tool only records medications covered by ODB. In addition, the DPV does not record the directions for use; for example, it would not be clear whether a patient was taking four tablets once a day or two tablets twice a day. Due to these limitations, medication reconciliation is more time-consuming and may require several additional steps, such as the pharmacist contacting the patient’s community pharmacy for a medication profile.

IV. Drug Reimbursement

A significant part of a pharmacist’s role is ensuring accessibility to drug therapy, which often includes applying for outpatient drug coverage. In order to limit public drug expenditures, governments have policies that establish the population that is covered, what drugs are covered, and the extent of reimbursement, and may set additional criteria for coverage of high-cost drugs. However, there are substantial differences between provinces, which may affect pharmacists’ drug therapy decisions and how they help patients navigate the health care system.

In general, the first step is to identify if a patient is eligible for drug coverage under a public program. In British Columbia, all eligible residents are automatically covered (upon registration) by Pharmacare, whereas enrolment in the government-sponsored drug plan is optional for residents in Alberta. In Ontario, ODB automatically covers select populations, including individuals above the age of 65 years, social assistance recipients, and residents at long-term care facilities. Patients in Ontario who are taking high-cost medications, but are not otherwise covered by ODB, may apply for catastrophic drug coverage through the Trillium program, where patients pay a quarterly deductible based on their income and receive ODB drug coverage benefits. Furthermore, these provincial plans vary with respect to their financial details, such as deductibles and patient co-payments.

Secondly, pharmacists may need to provide documentation that patients meet criteria for reimbursement for selected drugs. Even within each province, there may be varying procedures for
different drugs – some are automatically covered if prescribed by a particular type of specialist, some have clinical criteria that must be met, and others may require a patient-specific application and review prior to approval. This may result in varying public drug coverage of specialized and high-cost medications. For example, Cancer Care Ontario was recently compelled to change its clinical criteria for coverage of trastuzumab, after a woman with HER-2 positive breast cancer was denied access to the drug because her tumour was below the size threshold set by the agency (28). However, if she had been living in British Columbia, Alberta or Saskatchewan, trastuzumab would have been covered, highlighting the inequality of access to drugs for comparable patients within Canada (29).

Another example is public coverage of antiretrovirals, which are used to treat human immunodeficiency virus (HIV) infection and are prohibitively expensive (about $1,000 a month) for anyone without public or private reimbursement. In Alberta and British Columbia, antiretroviral drugs (with some limitations) are fully covered for all eligible residents (30). However, in Ontario, not all eligible residents have automatic ODB coverage, and thus not all patients have automatic public coverage for antiretrovirals. If patients in Ontario do not have adequate private drug coverage, pharmacists may need to help patients apply to the Trillium program or for social assistance, which confers ODB benefits. As a last resort, pharmacists may request and coordinate compassionate supplies from drug manufacturers as well.

V. Pharmacy Education

In Canada, formal pharmacy education is provided by ten accredited Faculties or Schools of Pharmacy, which span eight provinces. All students graduating from these programs sit the same Canadian licensing exam at the end of their training, prior to entry into practice. However, differences exist between and within curricula, especially with regard to the practical courses and experiential rotations. The provision of pharmacy education has important implications for students, preceptors, and hospital practice sites, since student pharmacists receive experiential training in the hospital setting and because many hospital pharmacists teach as professors, preceptors, and lab or case-based learning facilitators.

Opportunities for undergraduate student training as part of structured, experiential training in the hospital setting vary between pharmacy schools. At the University of British Columbia (UBC), students receive a 4 hour orientation in first year and 4 weeks of training in fourth year in an institutional setting (hospital, ambulatory clinic or long-term care facility), compared to 2 weeks in second year and 6 to 8 weeks in fourth year at the University of Alberta (UofA) and 12 hours in second year and 8 weeks in fourth year at the University of Toronto (UofT). Several faculties, such as that of UofT, also provide students with hospital-focused electives. However, in order to prepare student pharmacists to work within innovative and expanded scopes of practice in the future, many pharmacy schools are currently refocusing their curricula to incorporate more practical training in clinical settings. Therefore, even pharmacists who attended the same school, but during different years, may have had different levels of exposure to hospital practice as undergraduate students.

Many pharmacists pursue formal education and practical training beyond an undergraduate degree. UBC, UofT, and UofA each offer unique Doctor of Pharmacy (PharmD) programs, so the majority of PharmD experiential training in Canada is centred in those provinces. Several faculties also plan to introduce entry-level PharmD programs. In addition, opportunities to attain a hospital pharmacy practice residency vary, as they are coordinated by individual hospitals or hospital networks rather than by pharmacy schools in each province. For example, there are approximately 9 accredited residency positions in Alberta, 25–30 in British Columbia and 32 in Ontario (31). The Hospital Pharmacy in Canada survey (2009/2010) reported that the percentage of hospital pharmacists with a Canadian Society of Hospital Pharmacists (CSHP) accredited residency ranged from 70% in Québec to 8% in Manitoba (2). Furthermore, several provinces, including Ontario and Alberta, require that pharmacy graduates complete an internship prior to registration as a full pharmacist. Thus, hospitals in different provinces may have different distributions of student pharmacists. Preceptors may need to spend more time with undergraduate students to provide an overview of hospital practice, while interns, residents and PharmD students may be more independent learners and better able to contribute to the practice site through clinical, research and teaching activities.

Differences in pharmacy education do not only affect the educational backgrounds of hospital pharmacists. Pharmacists that have attended the same school are likely to share a similar approach to pharmaceutical care and be familiar with the same regional pharmacy leaders and experts. From a broader perspective, pharmacy education also includes informal learning opportunities that allow practicing pharmacists to build regional networks to facilitate the sharing of knowledge and best practices. Since occasions to connect with pharmacists in other provinces may be infrequent, pharmacists are likely to develop a sense of

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1 For the graduating classes of 2012 from UBC, UofA and UofT.
community with others within their local region or province.

Discussion

It is apparent that there are key differences between provincial health systems that affect hospital pharmacy practice. These differences are particularly noticeable for pharmacists that have worked in more than one province. In addition to having to learn the system at their local site, pharmacists that are new to a province will encounter a different structure in the public health system, different technology, and a different community of pharmacists. Their success in transitioning between provinces suggests that pharmacists have a remarkable ability to adapt and apply their knowledge and skills in a variety of settings.

In fact, there is an enormous diversity in how hospital pharmacists practice across Canada. For example, hospital pharmacists may work in teaching hospitals, community hospitals, or outpatient clinics, may have different roles and responsibilities, may work with advanced pharmacy technology, and may be integrated with interdisciplinary health teams to varying extents. While these topics have a significant impact on practice, they are more dependent upon how pharmacy resources are invested and structured between and within individual institutions. In all provinces, hospital pharmacists have similar responsibilities, including coordinating drug distribution and providing pharmaceutical care. Therefore, from a broad perspective, there are few, but still significant, ways in which hospital pharmacy practice differs between provinces.

Given that all pharmacists have a common goal of ensuring optimal drug therapy outcomes for our patients, we would benefit from improving communication and knowledge translation across our provincial borders. There is much we can learn from our neighbours, even by simply appreciating how different pharmacy practice can be. In particular, the sharing of best practices and collaboration in national initiatives has the potential to engage pharmacists across Canada, and improve health care quality without “re-inventing the wheel” (32). For example, pharmacists working on integrating medication reconciliation processes at their individual institutions collaborated through Safer Healthcare Now!, a national program focused on improving patient safety, and communicated using the Communities of Practice, a web-based forum for discussion and document sharing (33). At the national level, the Canadian Society of Hospital Pharmacists (CSHP) is leading efforts to promote excellence in hospital pharmacy practice through CSHP 2015, a quality care initiative to advance the safe, effective and evidence-based use of drug therapy and pharmacists’ contributions to public health initiatives (34). Similarly, the Canadian Pharmacists Association (CPhA) is leading the Blueprint for Pharmacy, a landmark effort to build the future of pharmacy in Canada through engagement of and collaboration between pharmacists and pharmacy organizations (35).

What can be done to foster interprovincial collaboration at the student level? Student pharmacists can actively participate in national pharmacy organizations, such as CPhA, CSHP, and the Canadian Society of Pharmacy Students and Interns (CAPSI), and seek to network with students and pharmacists from other provinces. These opportunities will help develop mutual awareness of pharmacy education and practice elsewhere, provide a forum to share ideas and collaborate on initiatives, and foster a greater sense of unity within the Canadian pharmacy community. Pharmacy student leaders can advocate for faculty and industry funding or lead fundraising events in order to help alleviate financial barriers associated with interprovincial travel. And finally, student pharmacists can proactively express their opinions on pharmacy education and practice issues through unique avenues that are accessible to students and pharmacists elsewhere, such as through a student-run and open-access pharmacy journal.

There are important limitations to this article, namely its scope and focus. The intent was to describe the most important ways in which pharmacy practice might be similar or different between provincial health care systems by highlighting examples from the authors’ collective experiences as hospital pharmacists that have worked in more than one province. However, only three provinces were discussed, and the authors did not contact other pharmacists in order to attain a wider array of perspectives. Therefore, all relevant differences in hospital pharmacy practice between Canadian provinces could not be captured, and this article does not presume to be a comprehensive review of this topic. In addition, differences between provinces that primarily affect pharmacy practice in the community or industry were not considered and, in the future, an appraisal of their impact would be a worthwhile pursuit.

Conclusion

There are important differences between provincial health systems that affect how hospital pharmacists learn, work, and navigate the health care system. However, regardless of location, hospital pharmacists share similar overarching goals, responsibilities, and challenges. Canadian pharmacists and student pharmacists would benefit from increased awareness of practice issues in other provinces and from participating in collaborative initiatives that span multiple provinces.
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Taking Notice of the Nocebo Effect on Drug Therapy

Grace Chan, B.Sc.(Pharm.) Candidate 2014
Anthony Le, B.Sc.(Pharm.) Candidate 2014
Faculty of Pharmaceutical Sciences, University of British Columbia, Vancouver, BC, Canada

While the nocebo effect has been interpreted and classified in a number of different ways by researchers from all over the world, many agree that its existence is real and can significantly influence clinical outcomes. Both the nocebo and placebo effects share similar triggers, but their physiological mechanisms differ significantly. Given the compelling cases that have been published in literature, we believe that the nocebo effect impacts patient care and drug therapies in important ways that should not be ignored. Studies have shown how it can affect common healthcare practices such as generic substitution and ADR (adverse drug reaction) reporting, and can be influenced itself by important aspects of healthcare such as clinician-patient interactions and patient autonomy. Based on this information, we will be extending the concept of the nocebo effect to include a broader range of expectation triggers, and we assert that recognizing the nocebo effect can play a significant role in improving pharmacy practice.

Keywords: nocebo, placebo, side-effect, drug, psychology

Compared to the placebo effect, the nocebo effect is seldom heard in pharmacy practice, generating 183 results on PubMed as opposed to 55,600,000 for the term “placebo”. The nocebo effect is traditionally defined as an unfavourable experience resulting from a therapeutically inert drug or procedure, though a recent article in the New York Times has broadened its definition to include any harm arising from negative patient expectations, regardless of whether the drug is real or placebo (1). Certain studies have used the term “nocebo-related effect” to describe similar expectation-induced exacerbations of symptoms, but which exclude the involvement of any inert drug (2). Some researchers believe that the nocebo effect is merely a negative aspect of the placebo effect and should therefore be classified as the same phenomenon (3). Others consider it distinct from the placebo effect, based on observed differences in neural activation and duration of effect (4, 5). Despite varying opinions on how to best classify and define the nocebo effect, we acknowledge that all theories have their merits and can be integrated to provide a more encompassing view of the phenomenon’s implications on different patients under different circumstances.

In exploring the neural profile of the nocebo effect, many studies have focused on the perception of pain and how it is influenced by verbal suggestions (2). These studies have utilized brain imaging to reveal that anticipated enhancements in pain that trigger nocebo-like effects can activate the anterior 21thernet21d cortex, insula, thalamus, and prefrontal cortex without any pre-conditioning events (2). In contrast, the placebo effect has been linked to dopamine release in the nucleus accumbens, and there is a general consensus that these effects are strengthened through learning (5, 6). Indeed, it has been shown that prior positive experiences with an analgesic can lead to more successful therapeutic outcomes from a placebo analgesic (4). One rationale for the difference in activation pathways between the nocebo and placebo effect is that the areas of the brain known to be involved in the nocebo effect: the thalamus, insula, and anterior cortex, can be considered as more “primal” centres of the human brain (6). They are innately involved in danger perception and fear responses and have evolved to protect mankind from immediate danger (7). Moreover, the nocebo effect has been associated with cholecystokinin release and activation of the HPA axis in fear mediation and pain transmission (2).

While high-quality controlled studies on the nocebo effect are limited due to ethical concerns of deliberately inflicting distress on study participants, many examples of the nocebo effect in healthcare can still be found in literature. One case report illustrating the “classical” definition of the nocebo effect describes a 26-year-old male who experienced severe hypotension after swallowing 29 inert capsules labeled as a new experimental drug to treat his depression (8). The patient, believing that he had fatally overdosed himself on antidepressants, required intravenous fluids to restore his blood pressure. He was immediately revived when one of the physicians involved in the study revealed the true nature of the capsules. This event demonstrates the powerful physical and psychological impact of the nocebo effect, and suggests the possibility that the phenomenon may also influence the reporting of...
adverse drug events. Because health care professionals rely on the testimony and presentation of their patients to discover and report novel or unusual adverse effects of drugs, nocebo-related adverse events can easily be interpreted as novel events and be reported along with adverse events being caused by the drug itself. Furthermore, reports of adverse drug reactions have been known to be influenced by negative expectations of the reporting professional themselves, as shown by a study investigating the reporting trends of AEFI.s (adverse events following immunizations) conducted in France (9). This study found that health care professionals disproportionately reported AEFI.s to non-live vaccines that reflected the symptoms of diseases the vaccines were designed to prevent.

We argue that the nocebo effect can also influence real drug therapy, outside of its traditional definition regarding side effects arising from a placebo treatment. Indeed, it has been shown that verbal suggestions of pain can induce hyperalgesia, an increase in pain sensitivity from an already painful stimulation, as well as allodynia, the induction of pain from a painless stimulation (5). This observation demonstrates physiologically significant nocebo-like effects that can have applications in a patient care setting. As well, hyperalgesia can be seen in this case as an analogy for heightened side effects experienced from a real drug, and allodynia as an analogy for side effects occurring from the use of an inert drug. Further, it is known from studies on analgesics that anxiety about a drug can activate cholecystokinin, which facilitates pain transmission, dampening the drug’s effectiveness (2). This concept may apply to other drugs not used to treat pain, but whose side effects include pain or discomfort that may be intensified with the nocebo effect.

One clinical study investigated the role of the nocebo effect in postoperative patients requiring opioid painkillers. The study found that verbal suggestions by the clinician and the quality of the clinician-patient interaction had a psychological influence on the amount of opioids required by the patient after surgery (10). In a phenomenon termed “anxiebo” by the study’s researchers, patients who did not receive words of encouragement during the procedure required on average more opioids than those who did (10). Though subjective in its classification of what constitutes good clinician-patient interaction, the study described the potential use of guidelines that would help clinicians identify and interact with patients more prone to the anxiebo effect (10). This raises the question of whether or not pharmacists should be intentionally shaping the expectations of patients to optimize the outcomes of their drug therapies. But it also creates the ethical dilemma of uninformed consent if pharmacists choose to downplay the side effect profiles of medications in order to allay patients’ fears of taking them. In a medical culture founded on respect for patient autonomy, where patients normally make decisions based on full disclosure of all risks and side effects associated with a treatment, filtering information that may potentially trigger the nocebo effect can be problematic.

Patient autonomy is critical to most Western medical practices and has been known to influence the success of drug therapies. Meynen and Swaab have investigated the role of the nocebo effect in the treatment of non-compliant psychiatric patients (11). Though they conceded that it is difficult to extrapolate placebo and nocebo effects from study observations to multifaceted clinical settings, it was generally observed that coercive administrations of psychiatric medications resulted in less favourable outcomes than administrations in settings where patients could voluntarily take their medications (11). This suggests that patient autonomy may play a role in minimizing the nocebo effect, since it allows patients the chance to identify the benefits of a particular treatment before receiving it. If universal, this finding can be applied to community pharmacy settings where patients may benefit from a more supportive and encouraging environment that optimizes success of their drug therapy. Particularly in chronic illnesses such as cancer and hypertension, where maladaptive thinking can affect the rate of disease progression in certain patient demographics (12), it is important to empower patients with not only the knowledge of how their medications work, but also the choice of whether or not to take them after assessing the evidence against their own values.

Regardless of how we choose to classify the nocebo effect, there are examples of therapeutic outcomes that can sometimes be affected by fatalistic thinking, a mentality shaped not only by the patient’s personal beliefs and experiences, but also the manner in which information is presented by a pharmacist. Particularly in psychiatric disorders and other conditions where an optimistic mindset can play a great role in recovery, how a pharmacist communicates with the patient may determine whether and to what extent side effects could occur. Furthermore, the nocebo effect may be especially potent during stressful or demanding situations experienced by patients, such as in waiting for surgery or being newly diagnosed with a chronic or critical illness. These patients may be particularly sensitive to the effects of negative connotations conveyed by health care professionals and their caregivers, whether inadvertently or not. Thus, a patient’s first encounter with the pharmacist to learn about their medication(s) for the first time is critical in determining the ultimate success of their treatment.
Researchers have suggested establishing guidelines that would allow clinicians to identify the patients who seem more susceptible to the nocebo effect. While this may not be possible without generating discriminatory stereotypes of patients based on their apparent character or behavioural traits, the potential therapeutic benefits of identifying patients at risk of this phenomenon may allow for many advances in the field of personalized medicine. Furthermore, the likelihood of a nocebo reaction occurring is influenced by a myriad of complex, interrelated factors, such as past experiences, situational factors, cultural values, and personal belief systems. These factors, if to be discerned, require experience and sensitivity on the part of the pharmacist, as well as the understanding of the mind’s involvement in physical health. These considerations all point towards the importance of utilizing a more holistic approach in patient-focused care, one that recognizes individualized factors of both the mind and body.

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Implementation of a Student-Initiated Tri-Mentorship Program: A New Platform for Pharmacy Students to Connect with Hospital Practice, Research and Residency

Jane Lin, B.Sc.(Pharm.)

1Pharmacy Practice Residency Program, Lower Mainland Pharmacy Services, Vancouver, BC, Canada

In June 2011, the Lower Mainland Pharmacy Services (LMPS) Residency Program (British Columbia) partnered with the University of British Columbia branch of Rho Chi, an international academic honor society in pharmacy, in launching the first year of Tri-Mentorship Program: Students Meet eXperts (TMP-SMX). This program was developed and initiated by two third year UBC pharmacy students who sought to enhance and formalize opportunities for exposure to hospital pharmacy practice.

Both students had participated in a variety of volunteer activities relating to ongoing pharmacy research at local hospital sites and various formal and informal shadowing and mentoring. The consensus among all participants was that student involvement was an extremely positive and valuable experience. These volunteer activities were mostly organized by the students themselves. The students felt that a more formalized system that facilitates the participation of greater numbers of students in this type of mutually beneficial arrangement was needed.

A review of the currently available programs in British Columbia revealed a variety of different programs outlined below:

**Canadian Society of Hospital Pharmacists – BC Branch Mentorship Program:** The program pairs undergraduate student CSHP members to hospital pharmacists (1). First year students are paired with dispensary pharmacists for an introductory overview of the medication distribution system. Second year students are paired with clinical pharmacists for pharmacists’ work up of drug therapies. Third year students are paired with residents to expose them to the residency program and evidence-based medicine. Fourth year students are paired with clinical specialists to learn about specialized practice. The program is completed through a half-day to a week of job shadowing.

**University of British Columbia (UBC) Faculty of Pharmaceutical Sciences Directed Studies Courses:** These research-focused elective courses range from supervised clinical research projects, development of patient education materials, to development of clinical technician training program and are directed by hospital clinical pharmacists. The course may be worth three or four credits over a school term. Enrollment in directed studies is limited to four to eight students per term.

**UBC Summer Student Research Program (SSRP):** This program takes place from May – August each year with a 3-month commitment. The nature of summer projects varies from laboratory-based research to interprofessional clinical research led by UBC Pharmaceutical Sciences Professors. The students receive ~$4,000 in financial support. Awards are made available to 10–12 students each summer, dependent on availability of research funding.

**UBC Structured Practice Education Program (SPEP) rotation in hospital:** All pharmacy students at UBC are placed in a four–week hospital rotation during their fourth year. Students participate in case work-ups and direct patient care in a hospital setting. These rotations usually provide limited exposure to clinical research and to advanced training programs such as the pharmacy practice residency.

The TMP-SMX founders sought examples in the literature of similar programs developed in Canada. They learned from the model designed in “Developing, Implementing, and Evaluating a Formal Pharmacist Mentorship Program” (2). The authors of this paper sought to develop a formal mentorship program for staff pharmacists who have not received further formal clinical training, such as hospital residency. Through the program, the authors wished to promote professional growth in clinical competency and therapeutic knowledge, as well as to increase job satisfaction and employee retention rate. The program consists of mentoring training workshops and learning modules, pre- and post-
training self-reflection exercise and a 12–month mentorship. The main role of the mentors is to help support the mentees in identifying learning objectives and action plans. The mentor-mentee pair also complete weekly activity logs. The program had three mentor-mentee pairs with bimonthly formal meetings.

Although the setting and target audience for TMP–SMX differs from that described by Nieuwstraten et al., we were able to adapt the aspects of peer-assisted learning and long-term experience (12 months) into our program (2). Additional goals we had were to provide more pharmacy research opportunities and also a shadowing and mentoring experience that covered a variety of practice settings and specialties. With these goals in mind, the TMP–SMX founders proposed the project to the Rho Chi UBC chapter advisor and the LMPS residency coordinator to outline the implementation of the program.

The TMP–SMX is a program that integrates mentorship, clinical practice, clinical research and residency (2). The term “Tri–Mentorship” refers to the three levels of participants that form the foundation of this program: principal investigators and resident clinical preceptors, resident, and the undergraduate student. Each undergraduate student is paired with one hospital pharmacy practice resident and assists with that resident’s research project. The resident serves as the student’s primary mentor and liaises between the student, the research team, and rotation preceptors. Residents are expected to obtain permission from their preceptors and arrange one shadowing session per rotation for the students if possible. Through this overlapping structure, it is hoped that students gain a broad learning experience while researchers benefit from additional manpower.

TMP–SMX is an optional program for Lower Mainland Pharmacy Services residents. Since the LMPS program begins in June, resident mentors are recruited as soon as the resident research project assignments are confirmed in July. During student recruitment, resident’s research project overview, elective rotations as well as pod assignments (Vancouver, Fraser, BC Cancer Agency, and Pediatric) are made available to the students online. The resident-student matching process mirrors that of hospital residency and takes place in July and August. Beginning in September, students start research training, rotation shadowing and attending presentations. Students are expected to commit six to eight hours weekly to the research project. However, the discussion time between the resident and the student are flexible and self-directed.

Advantages for the principal investigators include additional manpower to collect data and greater chance to detect significant findings through a larger sample size. Hospital clinicians are often limited in their capacity to conduct research due to time and funding constraints. TMP–SMX serves as a channel for researchers to connect with research students to help discover new knowledge that could benefit patient care. A potential downside of having multiple data collectors may be the introduction of confounding factors such as inconsistent data coding and interpretation. Thorough initial training, a clear definition of data collection parameters, contingency plans and readily frequent communication can minimize this risk.

Advantages for the residents include the opportunity to develop mentoring and coaching skills. The Tri–Mentorship program fulfills and compliments multiple LMPS residency objectives such as “demonstrate skill in the modeling form of practice-based teaching”, “demonstrate skill in the coaching form of practice-based teaching” and “completion of UBC Online Clinical Instructor Education Program” (3). Since our profession relies heavily on experiential learning, and preceptors can greatly impact the learning outcomes, it is imperative that residents develop their teaching skills as they mature professionally. Furthermore, residents benefit from reflection and strengthening of their own learning through verbal discussion with the students. This also complements the purpose of an online ePortfolio. Although residents would be required to dedicate time outside of residency to meet and train the mentees as well as arranging shadowing sessions, it is our hope that the resident’s time would be compensated through the research work contributed by the mentee.

The advantages to students are many-fold. Through TMP–SMX at no cost, student mentees are able to obtain a structured and comprehensive overview of various pharmacy specialties through rotation shadowing throughout the year. Students are also encouraged to discuss and learn from the resident’s experience with the Pharmacy Residency Program, in addition to hands-on participation in clinical research. In addition, starting in 2012, students were invited to attend various resident case presentations and didactic teaching sessions throughout the year. Through the development of a committed relationship with the resident, the students would have a supporting channel to connect and explore the world of hospital pharmacy.

TMP–SMX is currently in its second year. The number of Tri–Mentorship pairs has increased from three in 2011 to eleven in 2012. Informal feedback from student mentees from 2011 was positive and all expressed that having gone through TMP–SMX has motivated or confirmed their interest in pursue a career in hospital pharmacy. They were able to outline the daily activities of a clinical pharmacist and a resident and briefly describe the medication distribution system in the hospital. They also
appreciated the challenges of clinical studies, such as small sample size and low response rate. Students were able to identify practice issues to their clinical pharmacist, such as patient load, time, and challenges to residents; this includes steep learning curves, balancing between pre-readings, presentations, and projects.

Currently, undergraduate students have ample exposure to community pharmacy practice through volunteer, work experiences and UBC internship placements in second year and third year. TMP–SMX helps to promote hospital pharmacy and awareness of hospital residency while broadens the students’ exposure to different career pathways of pharmacy. This provides the students with the opportunity to better plan and utilize their undergraduate years, regardless of their career goals.

We believe that this type of student-led Tri-Mentorship model could definitely be implemented elsewhere, especially by students who later become residents themselves. The marriage of a pharmacy school club and a hospital pharmacy practice residency program makes a sustainable platform for shadowing and research assistance. The recent consolidation of the hospital pharmacy practice residencies into one program in British Columbia’s Lower Mainland under a single program coordinator facilitated the implementation of the TMP–SMX program. A large number of residents and sites with central coordination eliminated some of the barriers to implementing such a program. The authors suggest a thorough assessment of the local resources be conducted prior to implementing a program such as this. This will help to avoid duplication of programs. The integration of this program with a school club was also critical in making pharmacy students aware of this opportunity. In addition, having residents involved with advertising to their fellow residents and managing TMP–SMX on the residency end of things allowed for better integration and expansion of the opportunities available to students. Lastly, seeking advice from faculty members and residency program coordinators contributed to the success of the TMP–SMX program.

While not every student will be able to participate in such program, every spot counts.

We would like to thank our Rho Chi Faculty Advisor, Dr. Mary Ensom and the LMPS residency coordinator in 2011, Dr. Peter Loewen, for their support through the development and implementation of TMP–SMX (4).

References


Using Technology to Support Clinical Pharmacy Practice

Dean Elbe, RCSHP, BCPP, PharmD
Child & Adolescent Mental Health, BC Children’s Hospital, Vancouver, BC, Canada

Purpose

I have worked as a clinical pharmacy specialist in the Child and Adolescent Mental Health (CAMH) programs at BC Children’s Hospital (BCCH) for the past five years. In this article, I would like to share some of the ways I have incorporated technology into my practice in order to become more efficient and to better contribute to achieving optimal patient medication outcomes.

Approximately three years ago I was given the opportunity to integrate technology into my practice via the purchase of a notebook computer by our mental health program. I have always considered myself tech-friendly, and for many years had thought about how technology like this could benefit my practice if the opportunity became available. Previously, I had used various handheld devices including a Palm Pilot and even my iPhone for certain applications, but getting the notebook computer was a game changer. Presently, my notebook is a vital tool in my practice day-to-day as a clinical pharmacist and as my colleagues would tell you, I rarely go anywhere in the hospital without it.

I am responsible for managing the drug therapy of approximately 25 inpatients on a weekly basis. Some of our inpatient units have a rapid turnover with a constant influx of new patients via the emergency department. On others units, patients are admitted for several months. I attend inpatient rounds on at least one of our units on a daily basis. On some days, rounds can last over three hours in duration, but I find the patient care rounds to be the most efficient place to discuss medication changes with the psychiatrists and team. After follow-up work and patient or family counseling is completed, this often leaves little time for administrative or research activities, or preparation for the next day’s rounds. I also provide drug information services for all of our inpatient and outpatient mental health programs and am a provincial resource for child and adolescent mental health drug information.

Discussion

In order to maximize what you can accomplish with technology in your practice, cooperation between the pharmacy and the information technology department (IT) at your facility is crucial. However, at some institutions, IT can be a rate-limiting step. The existing information systems and network infrastructure will usually determine the hardware, operating system (OS), and software that you are able to use at the site, and the level of access you are granted to the various applications supported by the hospital network. Ideally, a coordinated and consistent approach by the pharmacy department is best when planning to integrate technology into clinical pharmacy practice. Maintaining confidentiality of patient information is of critical importance, and access to networks and patient data must occur via secure password protected systems. I store patient information only on a secure hospital network drive, and never on the local notebook hard drive itself. If my notebook is ever lost or stolen, the patient information will remain secure with this setup. At BCCH, we are fortunate to have wireless access to the hospital network and internet throughout the mental health building. While less convenient, on days when the wireless access goes down, access is still available via wired cable in almost every meeting room within our building. My notebook runs on Windows XP, an older Windows OS first released in 2001. Use of this OS remains necessary in order to access our Centricity inpatient pharmacy software. Development of a good relationship between the pharmacy department and IT can help facilitate the granting of user administrator rights, which is important in the network environment to be able to install the third-party software and browser extensions discussed below.

Network systems I access on a regular basis include the laboratory system, the admission discharge and transfer (ADT) system, the hospital-wide Cerner clinical information system, the Centricity inpatient pharmacy software, and various drug information resources (for example, UpToDate, Lexi-Comp, Micromedex, DynaMed, and the online electronic Compendium of Pharmaceuticals and
Questions are raised repeatedly over time by different admission. Together with the information from the current admission, previous admissions can be retrieved and stored on an annual basis. Some patients (and have to store) on an annual basis. Some patients reopen, and login to multiple applications and folders before discussion about the next patient begins. Collation of all this information in one rapidly accessible location makes my ability to capture, synthesize, and relay information and recommendations during rounds much more efficient during fast-paced patient care rounds. Storing patient profiles and medication lists electronically significantly reduces the volume of paper I consume (and have to store) on an annual basis. Some patients within our programs have multiple admissions over time, and patient profiles and information from previous admissions can be retrieved and stored together with the information from the current admission.

In my specialty practice area, certain topics and questions are raised repeatedly over time by different staff and psychiatrists (especially with a steady stream of new psychiatry residents turning over every 6 months). When I first started this role, I decided to save a PDF copy (for personal use) of every full text article I retrieved from the literature. I rename and save the PDF file by lead author, abbreviated title, and journal name and year. I then categorize and store the PDFs by disease state or therapeutic category. This allows me to rapidly find primary literature on a topic, and not have to go back to search the PubMed database each time I need to find a favorite article (though it is important to periodically review resources to determine if new literature, trials, or practice guidelines in a topic area have been published). The file names can be searched via Windows search by author, drug, year, or virtually any other keyword. Storage of information in this manner also assists in training students and residents, since I can direct them to a particular folder on my network drive for primary literature on a given drug or disease. One thing I do regret is not using reference and document management software such as Zotero (www.zotero.org) or Mendeley (www.mendeley.com) to organize all this information right from the start. Unfortunately, I now find that there may be just too many articles to enter and categorize into a reference manager, although I would definitely try to incorporate articles into a reference manager if I had to start all over again.

In addition, I provide psychopharmacology seminars and training to students and residents at distant institutional sites from my office computer via use of a high-definition camera and Telehealth software (Cisco TelePresence Movi). The software provides a direct video link between myself and the participants, and I can show a Powerpoint presentation, website, or video while doing voice narration, taking questions, and holding a discussion remotely.

When a drug information question is raised at rounds that I am unable to answer immediately through use of online resources such as my publication archive, Pubmed, and the drug information databases, I am often able to send a response, pertinent articles, forms, or information to the prescriber’s inbox even before they get back to their office following rounds. If an order entry discrepancy is spotted within the inpatient pharmacy system, I can correct the order entry right from rounds and then report the incident via the electronic provincial Patient Safety Learning System (PSLS). When reviewing a patient’s medications, I can identify the medication while on the nursing unit and make the order entry in the inpatient pharmacy system (and can even print new labels to the dispensary if necessary). This saves delays in turnaround time, and reduces the risk of the patient’s medication supply from being lost while it is being accessed.

This wide level of access provides a rich database of patient information, laboratory information, and medication-specific information, which allow me to efficiently monitor for, identify, and quickly resolve drug-related problems. I have a patient medication profile template created using Microsoft Word which I use to store collated patient-specific demographic information, diagnoses, laboratory and medication information, and progress notes. Each patient medication profile is stored on a secure network drive in a folder by patient name, in addition to the month and year of their admission. Other documents that I store in this folder include the patient’s PharmaNet profile (as a PDF) from the time of admission, any admission or consult notes recorded in the clinical information system, along with any completed forms required for continuity of pharmaceutical care. Examples include Pharmacare Special Authority form, Clozapine patient registration, or Health Canada Special Access Program forms, which are all available online as PDF templates and can be rapidly completed electronically. I also store a copy of any full-text PDFs of articles from the medical literature that pertain to a patient’s care in their respective folder. Patient care rounds in mental health can run for a long time, and staff and physicians will generally not wait for the pharmacist to close down, logout, reopen, and login to multiple applications and folders before discussion about the next patient begins. Collation of all this information in one rapidly accessible location makes my ability to capture, synthesize, and relay information and recommendations during rounds much more efficient during fast-paced patient care rounds. Storing patient profiles and medication lists electronically significantly reduces the volume of paper I consume (and have to store) on an annual basis. Some patients within our programs have multiple admissions over time, and patient profiles and information from previous admissions can be retrieved and stored together with the information from the current admission.
transported to the pharmacy or back to the nursing unit. I can leave patient specific notes within the Centricity pharmacy software (i.e. explanations about unusual medication situations) which are automatically displayed to the user each time the medication profile is accessed.

Luckily, Windows OS allows multiple applications to be open at one time. Switching between windows can be done rapidly using keyboard shortcuts (which are usually much more efficient than using an onboard mouse or trackpad). Often, I will have a patient profile, a current list of medications from Centricity, the ADT data and laboratory system, the clinical information system, a PharmaNet profile, Pubmed, and one or more drug information databases open on my notebook computer at one time.

When discussion at rounds veers away from medication-related topics for an extended period of time, I am able to check the hospital Outlook system for my email inbox and schedule information. For short drug information questions or time-sensitive requests received via email, I can often respond, and if necessary send documents or links to pertinent information, right from within rounds. This means that when rounds are complete, I do not return to my office with an inbox jammed full of requests that I only then begin to process. This helps to free up time for afternoon meetings, training sessions, or project time in the remainder of my work day. It also means that I stand a better chance of leaving work on time rather than being bogged down dealing with an inbox stuffed full of emails which have no hope of ever being cleared out.

Even the ability to do a Google or Wikipedia search from within rounds to find information about an obscure diagnosis or clinical situation (e.g. what is a Capgras delusion?) is incredibly valuable. When asked by nursing staff for drug information where a picture is worth a thousand words (e.g. what does a lamotrigine-induced Stevens-Johnson rash typically look like?), a Google image search can be illustrative and shared with the team almost immediately. Similarly, when teaching students and residents, showing carefully pre-chosen YouTube videos can effectively demonstrate medication adverse effects (especially dynamic movement disorders such as tic disorders, and the increasingly rarely encountered adverse effects of akathisia and tardive dyskinesia) better than any description. During patient counselling sessions, I can print any required forms or electronic patient medication teaching sheets for common medications used in child and adolescent mental health from our Kelty Mental Health website (www.keltymentalhealth.ca/treatment/medications) wirelessly to any network printer in the building, for immediate retrieval following the meeting.

Keeping up with current medical and pharmacy literature in my specialty area is imperative. Free medical literature indexing and alerts such as Physician’s First Watch and Journal Watch (www.jwatch.org) from the New England Journal of Medicine (available for general medicine as well as segmented into topics from many different practice areas including pediatrics and mental health) consistently keep me on top of the latest news in my area, often 24 to 48 hours before a story hits the mainstream medical news. These services can be either accessed online, or you can choose to be notified by daily or weekly alerts to your inbox. The full reference citation is always provided with each headline, and with access to PubMed full-text articles via UBC library, I can scan the email subject line for topics that interest me, and then retrieve the full text PDF, usually immediately. One caveat is that the service is US based, so it does refer to drugs that may not yet be available in Canada. Also helpful is the use of a news aggregator service such as Alltop (www.alltop.com). This free service can be customized to your interests or practice area, and will display top news headlines from a wide variety of medical, pharmaceutical, and even general interest subject areas, all on a single web page.

Additional software requirements beyond the standard IT issues concerning Microsoft Office Suite are minimal. I view and edit PDF documents often, and find the highlighting, editing, and annotation features of Adobe Acrobat Professional very useful. I use Adobe Photoshop for editing and customizing images for Powerpoint presentations, but this is not needed for day-to-day clinical practice, and alternate low-cost and open source image editing programs are available.

I collaborate with students and clinicians, both for work at the university and across the continent, on various research projects via use of Dropbox software (www.dropbox.com). This web-based data storage and collaboration service allows sharing of documents and files between almost any device and any user anywhere in the world for a small monthly charge. Free access can be granted to collaborators and this may be limited to specific folders. Access can be granted to anyone via a URL link to files located in a designated ‘public’ folder. Dropbox also makes the movement of documents or even very large files between my various devices at work or at home virtually seamless. Google Docs is another free option for document collaboration, though it does not offer quite as many editing features as found in Microsoft Word.

Though I have not needed or attempted to do so, it is possible to access patient specific information from the institution’s network remotely from anywhere via use of a virtual private network (VPN), which involves additional security authentication.
systems such as the use of a physical VPN key plus a password.

The major project for completion of my Doctorate of Pharmacy degree pertained to video podcasting of health information to both the public and professionals. Since graduation, I have worked to refine this process, and can now create short video podcasts at a very low cost, using nothing more than my home computer with free or low-cost software (e.g. Audacity, Photoshop Elements or various open source equivalents, Apple iPhoto/iMovie) and some royalty-free, low-cost stock photography from companies such as iStockPhoto (www.istockphoto.com). Examples of completed video podcasts are available at www.mymediapharm.com.

iDevices

Devices such as Apple’s iPad, iPhone, and iPod Touch enjoy widespread popularity, and are popping up more commonly in hospitals for use as note taking devices, clinical statistics trackers, and patient counselling aids. iDevices afford access to many medical applications, often available at a minimal cost or for free. However, the inability of the user to directly access the file structure of the iDevices OS (by Apple’s design) limits the usefulness of these devices for comprehensive patient monitoring as described above. For security reasons, most institutional IT departments do not support network connectivity of iDevices. If no integrated technology solution is available from your IT department, an iPad or other tablet may be better than nothing, and may provide basic internet and email access, note-taking ability, and some useful apps (e.g. one student used apps such as Instapaper (www.instapaper.com), Noterize (now PaperPort Notes (www.paperportnotes.com), and Evernote (www.evernote.com) along with Dropbox to effectively to organize and annotate various research articles, class notes, and presentation handouts). Though numerous web-based clinical calculators exist, I frequently turn to my iPhone app for rapid body mass index (BMI) percentile calculation for children and adolescents (by TactioHealth Group www.tactiosoft.com). Many other medical and pharmacy related apps are available from the Health & Fitness section of the Mac App Store. Medical Apps are also available for alternate phone and tablet platforms such as Android and Blackberry, though usage of these devices in our hospital appears to be much less common.

Recent graduates who are more technology-savvy at baseline are more likely to make the most from use of technology to support their clinical pharmacy practice. This may be in contrast to pharmacists whose use of technology has been previously limited.

Conclusion

Technology that can greatly improve the efficiency of the clinical pharmacist is readily available at a relatively low cost and is increasingly being employed by hospital-based clinical pharmacists. The broad application of such technology is dependent on favorable connectivity and setup conditions of the institutional network and health applications, and the comfort and proficiency level of the pharmacist employing the technology.
Medication Management Program: Clinical Pharmacy on the Front-Lines

Andrea Cartwright, B.Sc.(Pharm.), ACPR, PharmD Candidate 2015
Peggy Dang, B.Sc., B.Sc.(Pharm.), ACPR
Priti Flanagan, B.Sc.(Pharm.), ACPR, PharmD

Faculty of Pharmaceutical Sciences, University of British Columbia, Vancouver, BC, Canada
Lower Mainland Pharmacy Services, Surrey, BC, Canada

Introduction

The Medication Management Program (MMP) has been delivering community-based clinical pharmacy services to residents in Fraser Health (FH) since April 2005. There are currently four full time clinical pharmacists funded by the health authority, and who work out of Home Health offices in six areas of FH: Surrey, Burnaby, TriCities, New Westminster, Abbotsford, South Surrey/White Rock. These pharmacists visit patients in their homes to assess their medication-related needs. Eligible patients include those 65 years of age or older who have been recently discharged from hospitals on at least 6 regularly scheduled medications. Additionally, any health care professional, such as physicians, Home Health staff (e.g. nurses, case managers, allied health professionals), and hospital staff (e.g. Home Health liaisons, pharmacists) can refer patients to the MMP.

The basis of the MMP was a randomized controlled trial conducted in White Rock, BC, which demonstrated that visits by pharmacists and nurses to high risk seniors after discharge from hospitals resulted in reduced subsequent hospital days and stays, as well as a net reduction in costs (1). According to an economic evaluation of the first two years of the MMP, patients who received the service had lower subsequent health resource utilization (reduced hospital days and stays with associated significant cost savings) in the year after receiving the service compared to the year prior (2). A survey to evaluate patient satisfaction with the program has been undertaken.

The value of this program reaches far beyond its financial implications, towards the clinical endpoint of ensuring that patients will receive rational, effective, safe, and accessible drug therapy. In this workplace spotlight, we will outline the daily activities of a MMP pharmacist, provide examples of interventions made by these pharmacists, and illustrate the duties, challenges, and opportunities of this unique practice setting.

Discussion

I. “A day in the life of an MMP pharmacist”

It is a Monday morning, and upon arrival at the Home Health office, I gather the charts of the patients I will be visiting today. Before heading out to my appointments, I will “work-up” each patient so that I can anticipate some of the drug related problems (DRPs) I might find during my visit. I gather information by reviewing the patient’s PharmaNet profile to identify both previous and current medication use, hospital consultations, medication profiles, and discharge summaries to determine the patient’s past medical and medication history. I can also access pertinent laboratory data to assess their drug therapy. Then, I formulate questions to ask the patient in order to determine if any DRPs exist, specifically focusing on assessing whether or not their medications are necessary, effective and safe. This work-up takes an average of 30 to 60 minutes depending on the complexity of the patient.

PharmaNet is a province-wide network linking all pharmacies in British Columbia and recording every prescription dispensed in the province.
enough to report them, so compiling the list may occur throughout the visit, and can result in me having to help the patient dig through cupboards and drawers to find old pill bottles! Comparing what the patients report taking to PharmaNet and other health care records creates the opportunity to reconcile the medication list and leads to the clinical part of the visit, which is identifying and resolving DRPs. Each medication is reviewed with the patients to determine how it is being taken (how much, how frequently), for what indication and what, if any, effects have been noticed since starting the medication.

I asked this particular patient if he has ever experienced any symptoms of hypoglycemia (confusion, sweating, tremor, nausea); he denied any such symptoms. Initially, this seemed like a “simple” case where no further pharmacy interventions were necessary given that the patient’s oral medications were blister-packed, and the administration was supervised. However, upon speaking with the patient’s home support worker, I discovered that she had observed two such hypoglycemic episodes since his discharge from the hospital two weeks ago. His diabetic medications included gliclazide (Diamicron®) MR 30mg po qAM and metformin (Glucophage®) 500mg po qAM and 750mg po qPM. His most recent hemoglobin A1C was 8.4% in February 2012, and there had been no recent changes to his diabetes medication regimen. However, his compliance prior to his recent hospital admission was questionable, as he had had no medication home support or blister-packing services previously.

By visiting this patient in his home, I was able to obtain additional information from his home support worker - the patient was leaving much of his groceries untouched and only had help with breakfast twice weekly, leaving him vulnerable to hypoglycemia given that he was taking a sulfonylurea and had limited nutritional intake. Considering the significant risk of harm associated with hypoglycemic episodes, particularly in an elderly, cognitively-impaired patient who lives alone, one drug therapy recommendation that I made in a letter faxed to his physician was to discontinue his sulfonylurea and continue with metformin monotherapy, a drug that has been shown to reduce macrovascular events such as heart attack and even death (3,4). The physician agreed with my recommendation, and I faxed the new prescription to the patient’s community pharmacy. Without a home visit, this patient may have continued to experience hypoglycemia, which could have resulted in significant morbidity (i.e. falls, fracture, hospitalization) and mortality. This visit, which involved documenting the patient’s medication regimen, interviewing the patient, and obtaining the necessary corollary information from another health care worker, took about an hour and a half. It was time well spent on decreasing the risk of a poor patient outcome.

The next patient I visited was a 78 year old female who was hospitalized recently for newly diagnosed atrial fibrillation. I met with the patient, her son and granddaughter in their home. Despite recently having been in the hospital, where they likely received education from physicians, nurses, and pharmacists, the patient and her family had many questions about her new medical condition and new medication, warfarin (Coumadin®). This situation is quite common: patients treated in an acute care setting get overwhelmed by the counseling provided in hospitals and come home feeling confused about their condition and new medications. There is often not enough time or resources in hospitals to give patients enough information to allow them to feel that they are making informed decisions. As a part of the process of identifying and assessing drug-related problems, I explained to the patient and her family what atrial fibrillation is, the benefits of taking warfarin (Coumadin®), and the risks associated with this drug therapy. The family and the patient were reassured that they had made the right decision in starting warfarin (Coumadin®) and no longer questioned whether she should stop taking it. As illustrated by this case, the gap between hospital and community care is potentially a significant barrier to safe and effective medication use. Deploying community-based clinical pharmacists can help close this gap and improve patient outcomes.

II. Drug Related Problems

The two cases I provided above are just two examples of the many interventions MMP pharmacists make on a daily basis. From recommending changes to drug therapy to improve medication appropriateness and patient outcomes, to monitoring for adverse effects, counseling on proper use of medications, and simplifying medication regimens to improve adherence, community-based clinical pharmacy services delivered in a patient’s home can have a significant impact on both a patient’s well-being and the public purse. Some of the more commonly encountered diseases are diabetes, COPD, CHF, hypertension, neuropathic pain, osteoporosis, constipation, confusion, dementia, post-Acute Coronary Syndrome, atrial fibrillation, and frequent falls. The multitude of disease states and medications seen on a daily basis challenges the MMP pharmacist to stay on top of the most current literature in order to be able to identify and resolve DRPs. A review of patient visits and interventions made by MMP pharmacists found that on average, three medication-related issues are identified per patient, with up to 12 DRPs identified in some (5). These issues most commonly involved ASA (Anacin®), furosemide (Lasix®) and ramipril.
<table>
<thead>
<tr>
<th>Drug-Related Problem</th>
<th>Actual examples</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>No valid indication</td>
<td>A patient with no history of cardiovascular disease and a calculated 10-year risk of coronary heart disease of 7% is taking atorvastatin for primary prevention of heart disease, and statins are not indicated in low-risk patients for primary prevention.</td>
<td>Recommendation to discontinue atorvastatin (Lipitor®) is accepted.</td>
</tr>
<tr>
<td>Adverse drug reaction</td>
<td>A patient recently admitted to the hospital for bradycardia complains of decreased energy with a heart rate below 50 bpm is found to have restarted her diltiazem (Cardizem®) upon discharge despite being started on amlodipine (Norvasc®). She wasn’t aware that diltiazem (Cardizem®) had been discontinued.</td>
<td>Counseling provided &amp; diltiazem (Cardizem®) is removed from her home with her consent; doctor informed, patient seeing surgeon the next day and was advised to have physician recheck her heart rate.</td>
</tr>
<tr>
<td>No valid indication</td>
<td>A patient recently started on pamidronate (Aredia®) IV as part of her multiple myeloma treatment but was not instructed to discontinue her alendronate (Fosamax®).</td>
<td>Recommendation to discontinue alendronate (Fosamax®) accepted.</td>
</tr>
<tr>
<td>Not receiving drug</td>
<td>A patient had run out of citalopram (Celexa®) the day before and had not made plans to refill.</td>
<td>She is counseled to obtain an emergency fill to avoid SSRI discontinuation syndrome.</td>
</tr>
<tr>
<td>Not receiving drug</td>
<td>A patient is refusing to fill her warfarin (Coumadin®) for her deep vein thrombosis because she does not want to take rat poison.</td>
<td>Counseling is provided regarding the benefits of drug therapy and patient agrees to fill the prescription.</td>
</tr>
<tr>
<td>Subtherapeutic dose</td>
<td>A patient is using her salbutamol (Ventolin®) inhaler every day for symptomatic COPD but is found to be using her inhaler and spacer device incorrectly.</td>
<td>He is counseled regarding proper technique to improve lung deposition of the medication.</td>
</tr>
<tr>
<td>Improper drug selection</td>
<td>A patient is found to be taking sennosides (Senokot®) as needed for pain (not realizing that sennosides (Senokot®) are actually for constipation) instead of his morphine prn pain tabs</td>
<td>The instructions are clarified to avoid the patient experiencing unnecessary side effects (i.e. diarrhea) and/or unnecessary break-through pain.</td>
</tr>
<tr>
<td>Supratherapeutic dose</td>
<td>A patient is taking vitamin B₁₂ supplements from a bottle in addition to the vitamin B₁₂ supplement in her blister-pack because she did not realize it was included in her blister-pack.</td>
<td>The extra bottle of vitamin B₁₂ is removed with the patient’s consent to avoid therapeutic duplication and unnecessary cost and pill burden.</td>
</tr>
</tbody>
</table>

Table 1. Actual examples of DRPs identified by Medication Management Pharmacists during home visits.

(Altace®) (5). MMP pharmacists perform on average two home visits per day with each visit taking approximately one to two hours, with an additional hour spent on writing and faxing letters to the family physician advising of any suggested changes to the patient’s medication regimen; copies are also provided to other involved members of the healthcare team. When a reply is received from the physician, the information is forwarded to the patient’s community pharmacy and other healthcare providers. MMP pharmacists may also make follow-up phone calls to patients, which take an average of 30 minutes per call. In addition, in the home care setting, unlike in an institutional practice, the patient/caregiver is in charge of the medications. Therefore, the pharmacist must include approaches to maximize compliance when making recommendations for drug therapy (e.g. blister-packing, doses given by family members, visits by community health workers for each dose).

Therefore, interestingly, MMP pharmacists are often the first to uncover “logistical” issues that may prevent patients from accessing necessary
medications. For example, a 72 year old female suffering from disabling neuropathic pain was given a free 4 week sample of duloxetine (Cymbalta®) by her family physician. During the visit, it was clear that she would not be able to pay for this drug herself because it is not a PharmaCare benefit. Therefore, even if it proved effective for her pain, she would not be able to continue the medication. After consulting with the patient and physician, my recommendation of initiating venlafaxine (Effexor®) instead was accepted. Table 1 provides more examples of drug-related problems identified and resolved by MMP pharmacists through home visits.

III. Rewarding Practice Setting

Going into patients’ homes to provide clinical pharmacy services is not only beneficial to our healthcare system but also gives clinical pharmacists the opportunity to practice to the full extent of their training. It provides a practice setting where they are able to expand and further develop the pharmaceutical care skills learned in undergraduate pharmacy programs, hospital and community residency programs, and postgraduate degree programs. Moreover, in this setting, the pharmacists are able to follow-up with their patients and gain first-hand experience regarding the outcome of their recommendations. MMP pharmacists, therefore, have the satisfaction of seeing for themselves the impacts they have made in the lives of their patients.

The MMP pharmacists working in the Home Health setting have the flexibility to structure their day based on when it is convenient to visit patients in their homes. While this independence may be isolating for some, the pharmacists connect frequently with each other via weekly teleconference meetings for clinical sharing, and also have face-to-face meetings several times during the year. The pharmacists also need to familiarize themselves with the home care setting and the procedures they need to follow to ensure their own safety and that of patients. One example of this is a risk assessment that needs to be done prior to visiting new patients at home (e.g. screen for pets, smoking – pets must be locked in a separate room, and no smoking allowed during visits).

Working as a home health clinical pharmacist provides diverse opportunities, including teaching of hospital and community residents and Doctor of Pharmacy students, and being an information resource as part of an interdisciplinary team of nurses, physiotherapists, occupational therapists, case managers and home support workers, who work together to maximize the benefit to patients. For example, the occupational therapist may determine that the patient is unable to open their medications, and this is the reason for their non-compliance. A referral can be made to a home health pharmacist, and we can then streamline the regimen and organize a more accessible system (e.g. blister-pack). It is often these “little” adjustments that can have the greatest impacts on a patient’s compliance, health and quality of life.

Conclusion

The FH Medication Management Program provides a demanding and exciting practice setting where clinical pharmacists can practice to the full extent of their education. MMP pharmacists are residency trained, and a strong clinical pharmacy background is essential to their success. The authors have all completed hospital pharmacy residencies and had practiced clinical pharmacy at various health authority sites before joining the MMP team in Fraser Health as early as 2005. The Medication Management Program has provided us with opportunities to grow and learn as practitioners and to gain hands-on experience in treating and following up with a wide variety of patients to help them safely achieve the desired goals of therapy. Currently, this service is provided in only six communities to a small proportion of seniors. However, given its potential for improving patient outcomes and its proven cost savings, expansion of the program to cover more communities and increase patient access to the care of a clinical pharmacist is a future goal.

References

Looking Beyond the USA—Lessons for the Canadian Healthcare System from Around the World

Sarah Li, B.Sc.(Pharm.)

Introduction

A universal healthcare system is something that Canadians have much to be thankful for and proud of. Our neighbour, the United States, serves as a constant reminder about how fortunate we are. We have a healthcare system where no one has to worry about becoming bankrupt when he or she becomes ill, as opposed to a US citizen who cannot afford to pay for private health insurance or who could be denied coverage by insurance companies due to his or her pre-existing medical conditions. Not only is it fairer, the Canadian system is also less costly—the health spending per capita (as a percentage of GDP) in Canada is only half of that in the US (1).

Due to geographical proximity, the Canadian system is traditionally compared to the US and it becomes easy for us to become complacent. But what if we look beyond the US? How do we compare with the rest of the world, or more specifically, with other OECD countries with similar economic status as us (OECD standing for “Organisation for Economic Co-operation and Development”, a group of developed countries such as France, UK, Japan, Norway, New Zealand)?

Where does Canada place in the world?

The OECD Health Data for 2010 reveals that we may have been comparing ourselves to the least cost-effective country all along: the US health spending per capita soars at the very top, at USD$8,233 (17.6% of GDP); Canada is much less than US, at $4,445 (11.4% of GDP), yet still higher than the OECD average of $3,268 (9.5% of GDP). (2,3) Despite the relatively high health expenditure in Canada, there are fewer physicians per capita (2.4 physicians per 1,000 population) than in most other OECD countries (OECD average is 3.1); and the number of hospital beds for curative care in Canada was 1.7 per 1,000 population, only half of the OECD average of 3.4.

The Euro-Canada Health Consumer Index, which compares Canada with 31 European countries with similar health care systems, ranks Canada at the very bottom in terms of patient rights, waiting times, and availability of pharmaceuticals—in fact, Canada also ranks last place in terms of overall value-for-money, lagging behind countries such as Estonia, Netherlands, Spain, and UK. (4) In other words, there are more than a handful of other countries that provide universal healthcare like us, but deliver better services with less spending, achieving a bigger “bang for the money”.

Canada has come a long way in achieving an equitable universal access to healthcare; however, our system has room for further improvement. It is true that all systems are different given their unique history, evolution, and political and economic backdrop, and while we cannot import a system wholesale from another country, it is still meaningful to broaden our horizon beyond our closest neighbour. We can survey those countries achieving better healthcare results, and learn a few lessons and innovations from them that may be applicable to us. I will highlight a few things I learned from my exchange in Europe and further research I have done after returning to Canada.

How about a private system in Canada, like in Europe?

Some of the major issues that plague the Canadian healthcare system include: doctor shortage, long wait time, and relatively low cost-effectiveness of healthcare delivery. Some have proposed the introduction of private health insurance/provider as a solution, suggesting that it would help lessen the healthcare burden and shorten wait times. (5–7) Some of these proponents have pointed to the success of the public-private pluralistic model in some European countries in achieving cost-effectiveness while still maintaining a level of equality. However, the co-existence of a private system is complex and varies greatly from country to country. If we are to contemplate having a private component in our healthcare system at all, we must not overlook these important distinctions that can impact outcomes in actual implementation.

In Europe, 3 main types of private systems are present (8). The first type is “alternative”, where the private health insurance covers the entire health care needs of the insured. For instance, in Germany,
citizens either choose social health insurance, or opt out completely and choose private insurance that covers the same set of health services. The second type is “supplementary”, where the private insurance covers the portion that is not paid for by public coverage. For instance, French citizens would be reimbursed for a portion of their ambulatory care cost by the government, and 92% of them would have complementary private health insurance to cover the remainder co-pay. The last type is “two-tier” (or parallel), where someone can purchase private insurance in parallel to the public coverage. This is the case in Sweden and UK. There are also mixed situations, such as in Spain, where the private system is both a supplementary and parallel system.

UK and Netherlands as examples

Let us take a closer look at the UK and Dutch healthcare systems, both of which have undergone a period of reform to achieve greater value for money while still adhering to the same equality principles underlying the Canadian system. (9) Both countries have higher value-for-money index than Canada and both have two of the highest public satisfaction scores according to the Commonwealth Fund report (4,10).

There are two distinct features that contribute to the cost-effectiveness of the UK healthcare system—capitation payment and fundholding (9). Capitation refers to the way that the government pays the general practitioners (GPs) according to the number of patients registered on the GP’s roster, regardless of services provided to the patients. This may help alleviate the doctor shortage issue if implemented in Canada, as there would be more incentives for GPs to accept more patients to attain a bigger roster. In return, GPs pay a share of the costs of drugs prescribed and certain hospital and specialist services that their patients receive on referral—this is referred to as fundholding. This way, GPs have stronger incentives to be more cost-conscious in their prescription decisions, and in their referrals to specialists or diagnostic services, thus producing substantial savings.

The Dutch system is a mixed social-private insurance model with multiple payers (9). Each Dutch citizen is free to choose from a variety of insurance plans. Allowing the insurers to negotiate selective contracting with healthcare providers, this model relies on the power of competition among insurers to drive down costs. Regardless of which plan the patient chooses, the government pays a subsidy towards the cost of the plan of his or her choice. Coverage is never denied and the subsidy is risk-adjusted to ensure equality. The Dutch model demonstrates that a universal system with elements of free choice and competition is possible.

Conclusion

Some of the measures discussed above are easier to adopt and others are more radical, and no system is free of disadvantages. The intention here is to present different perspectives and ideas, and to spark further discussions and thoughts on how to improve the Canadian healthcare system. Comparing the Canadian healthcare system to the rest of the world rather than comparing it to just our neighbour can help accomplish this.

References

Thanks for reading!

Stay tuned for our next issue!