HPS Pharmacies

Newsline

AUTUMN EDITION 2012

HPS On-Site at Allamanda Private

HPS Partners with Monash IVF QLD

Nurturing the Development of International Pharmacy Students

leadership we inspire

innovation we create

respect we consider

accountability we perform

excellence we exceed

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Steve Yeo

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Front Image
(Left to right) David Harper, General Manager at Allamanda Private Hospital, with Megan Farnsworth, (Partner/Project Manager) at HPS Pharmacies

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Message from Tony Wyatt CEO

The future is certainly looking exciting for HPS Pharmacies, and technology continues to offer an array of opportunity to support our business in its growth activities and developing unique service delivery models.

Recently, six of our Senior Managers attended the APP National Conference on the Gold Coast, and secured some invaluable insight into the industry in its present state, projections for health into the future, and technological availabilities in the marketplace to assist HPS. The Executive Team are already considering proposals and developing business plans for the procurement and integration of new technologies, aimed at assisting our teams to deliver enhanced leading pharmacy services to our clients.

Following this conference, the Annual Partner Summit was held in late March. This event saw all equity partners coming together with our Executive Team to invest significant energy, time and focus on shaping the HPS Strategic Plan in line with changing client needs, industry movements and market opportunities.

The summit highlighted a wealth of opportunities and strategic initiatives for HPS Pharmacies to pursue, and was an important session to ensure our next phase of growth is considered, measured and delivers the ongoing success HPS Pharmacies and our clients have jointly experienced to date.

This is truly an eventful period for HPS Pharmacies and I look forward to sharing some exciting news throughout the course of this year as our future developments unfold.

Tony Wyatt
Partner / Chief Executive Officer

Message from Steve Yeo COO

As we begin the second quarter of 2012, I am very encouraged by the progress the business has already made this year.

The performance of HPS Pharmacies in recent times has been outstanding. In particular, the business moved last year to pursue its charter for growth with the introduction of a business development division, and in the first half of this financial year, we have secured an increase in new client growth at a staggering rate of 20%. This is a truly wonderful success, demonstrating our commitment to leading the industry with unique and tailored pharmacy services is meeting the market's needs perfectly.

A strong contributor to this performance is our newest pharmacy at Allamanda Private Hospital. The HPS – Allamanda pharmacy site is a fantastic addition to our presence in the Queensland market and further strengthens our Healthscope services nationally. I would like to welcome the new Allamanda team to the HPS family and invite you read more on this exciting new addition to HPS on page 7.

With such amazing client growth comes a commitment to invest in expanding specialist resources. Accordingly, we have invested in significantly growing our corporate teams with the addition of new positions, including; Financial Analysis and Planning Manager, National Revenue Controller, Purchasing Controller, Junior Graphic Designer, Finance Manager, and Management Accountant.

Underpinning this expansion of our corporate human capital resource is the unveiling of our newly built Corporate Office facility in South Australia. The contemporary open plan design aptly supports our strong corporate culture around teamwork and unity. I am quite excited by the potential this new facility will unlock from within our very highly skilled and committed corporate teams.

We look forward to the year ahead within our new office facility and sharing with you further new business as developments occur.

Steve Yeo
Chief Operating Officer

This page (left to right): Wendy Freiberg, Pharmacy Technician at HPS Pharmacies, with Maryann McBean, Director of Nursing, at Allamanda Private Hospital, and Alan Tuxford, Regional Operations Manager, VIC/TAS/QLD at HPS Pharmacies.

Cover page (left to right): David Harper, General Manager at Allamanda Private Hospital, with Megan Farnsworth, (Partner/Project Manager) at HPS Pharmacies.

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HPS On-Site at Healthscope's Allamanda Private Hospital

HPS Pharmacies has enjoyed a long-standing relationship with Australia's largest provider of integrated healthcare, Healthscope, which will be further strengthened with the addition of another Healthscope hospital to HPS' growing list of clients.

HPS Pharmacies' newest on-site pharmacy opened at Healthscope's Allamanda Private Hospital in early April, adopting the site from the previous service providers.

Allamanda Private Hospital's General Manager, David Harper, says "our new partnership with HPS Pharmacies brings together our inpatient and oncology services, providing a seamless and comprehensive service to our patients."

"We expect that we will see an improvement in the service to our patients, improved information, and support to our clinicians. In the long-term we anticipate a strong relationship that enables us to work together to improve outcomes to our patients."

HPS Pharmacies' Project Manager Megan Farnsworth, led a focused project management team to deliver HPS – Allamanda on schedule, ensuring a seamless transition between service providers.

"There is a great opportunity to make both immediate and long-term service improvements at Allamanda Private Hospital, delivering HPS Pharmacies' high quality pharmacy service experienced by our Healthscope clients nationwide," says Megan.

"We are currently implementing a wide range of the clinical and professional pharmacy services offered by HPS Pharmacies and look forward to the hospital reaping the benefits of improved reporting through the introduction of HPS' clinical reporting tool, ClinPod, as well as improved processes and the effective use of committees."

Many of the existing Allamanda pharmacy staff have come onboard with HPS Pharmacies.

Wendy Freiberg, a Pharmacy Technician at HPS – Allamanda, has recently joined the HPS Pharmacies team having worked at the pharmacy for several years, and is excited to embrace the positive changes that HPS will bring.

"I work with an amazing team of staff who care about and support one another. We are all committed to servicing and looking after the needs of the patients at Allamanda and also the doctors and nursing staff."

Allamanda Private Hospital first opened in 1979 and provides a full range of both surgical and medical services to the Gold Coast community, including cardiothoracics, neurosurgery, general surgery, vascular surgery, urology, plastic surgery, and ENT. In addition, the 220-bed facility also provides rehabilitation, emergency care, diagnostic imaging, oncology, renal dialysis, intensive care and coronary care.

Maryann McBean, Allamanda Private Hospital's Director of Nursing says "I am most excited about HPS' ability to deliver regular reports identifying opportunities for improved safety regarding medication management."

Maryann has previously worked alongside HPS Pharmacies whilst she was Acting Director of Nursing at Healthscope's Hobart Private Hospital in 2010 and has seen the positive outcomes that can be achieved overtime, such as the monitoring and reduction of pharmacy costs in collaboration with HPS.

Now working with HPS at Allamanda, Maryann looks forward to HPS delivering an interactive service with the patients, regular reporting for improved safety and clinical outcomes for patients, as well as education support for staff and medical officers.

HPS Pharmacies' Chief Executive Officer, Tony Wyatt, is extremely excited by the opportunities presented with the opening of HPS' pharmacy at Southport and believes it will further strengthen the company's strong relationship with hospital owner Healthscope.

Tony says "securing this contract delivers significant value for HPS Pharmacies as we strengthen our presence in Queensland, and further demonstrates our efforts in contributing to HPS' charter for growth in 2012."

HPS is pleased to provide Gold Coast residents with a proven and trusted pharmacy service model.

"Our new partnership with HPS Pharmacies brings together... a seamless and comprehensive service to our patients."
– David Harper, General Manager

This page (left to right): Alan Tuxford, Regional Operations Manager, VIC/TAS/QLD at HPS Pharmacies, with Christine Fitzpatrick, Clinic Manager – Southport at Monash IVF.

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HPS Partners with Monash IVF QLD

It is with great pleasure and excitement that we announce HPS Pharmacies' partnership with Monash IVF QLD.

Monash IVF is a leader in fertility and IVF, and has been a driving force in the development of assisted reproductive technologies, helping many Australian families in their goal to have a baby.

Adrianne Pope, CEO at Monash IVF QLD, is looking forward to a very fruitful association with HPS, and sees this as a great opportunity to create a mutually beneficial relationship.

"I am excited at having another company with different expertise enhance Monash's availability of care to patients, so we can focus on the job of helping people fall pregnant."

Adrianne says partnering with HPS will ensure consistent quality of care for patients utilising fertility medications at Monash IVF QLD facilities.

"HPS Pharmacies have experience in fertility care and bring knowledge of drug regimes to assist Monash IVF staff in offering a high standard, streamlined system for drug dispensing and inventory management."

HPS Pharmacies will be providing a centralised and responsive pharmacy service model to two of Monash IVF's clinics, including a dispensing service, imprest management, prescription delivery, claims management and administration.

Adrianne says that both clinics will benefit from a service delivery, enhanced from the on-site convenience of co-location with HPS Pharmacy sites, Sunnybank and Allamanda.

"The Monash IVF Gold Coast clinic is located adjacent to Allamanda Private Hospital at Southport, and Monash IVF Brisbane located on the Sunnybank Private Hospital Campus.

"Fortunately for the Monash IVF Gold Coast clinic, the new HPS Pharmacies' contract at Allamanda Private Hospital will ensure the same convenience as the Sunnybank site."

Alan Tuxford, one of Australia's leading IVF pharmacist specialists, is passionate about providing the highest quality pharmacy care in this field, and has been influential in developing a sensitive and comprehensive IVF pharmacy service with HPS Pharmacies.

"... partnering with HPS will ensure consistent quality of care for patients utilising fertility medications..."

– Adrianne Pope, Chief Executive Officer

As Regional Operations Manager, VIC/QLD/TAS, Alan is excited to expand HPS Pharmacies' IVF portfolio into the QLD market, and says the co-location now available to both clinics with the opportune opening of HPS' Allamanda site, has provided additional benefits to Monash IVF.

"Having a pharmacy right next door to each clinic has allowed HPS to separately tailor the pharmacy service to the meet the needs of both Monash IVF clinics and its clinicians," says Alan.

"Monash IVF QLD will benefit from a reliable and timely after-hours service and weekend support, providing 24 hour coverage, to cater for any urgent requirements".

HPS Pharmacies' Chief Operating Officer, Steve Yeo says HPS Pharmacies is deeply committed to providing specialised pharmacy support to fertility clinics across Australia, and are incredibly proud to now be providing the highest quality pharmacy services to Monash IVF QLD.

"We are excited to partner with a health care provider that shares HPS Pharmacies' vision and purpose in the provision of best quality clinical care, coupled with intimate and personalised patient support.

"This partnership provides yet another tailored commercial solution to underpin our client's critical business and clinical needs," says Steve.

"We look forward to leveraging enormous value to the Monash IVF clinical teams, by way of our large network of national pharmacists, our deep inherent knowledge in the area of IVF and fertility pharmacy, and the strength that comes in partnering with a large specialist national pharmacy service provider in HPS Pharmacies."

HPS Nurtures the Development of International Pharmacy Students

HPS Pharmacies is dedicated to nurturing the development of international university students by participating in the National Australian Pharmacy Students Association's (NAPSA) Student Exchange Program. This program is arranged in conjunction with the International Pharmacy Students Federation (IPSF) and provides pharmaceutical students with the opportunity to visit other countries and expand their skills and knowledge in a safe learning environment set in the 'real-world'

The purpose of this structured program is for HPS Pharmacies to expose students to the many aspects of pharmacy practice, including dispensing, patient counselling, clinical pharmacy, drug information, supply and distribution, legislative requirements, risk management, and working with other health professions. Students are also given the opportunity to learn more specialised areas offered by HPS Pharmacies, such as oncology manufacturing, compounding and mediSACHe.

Students embark on a rotation between HPS Pharmacy sites, providing them with the best opportunity to view, experience and learn from our highly skilled and technically varied pharmacy staff, hospital staff and allied health staff. It is important to maximise their exposure to the Australian healthcare system and provide them with a better understanding of pharmacy practices within Australia.

HPS Pharmacies' HR Manager, Tracy Dickens, says "students love the opportunity to test their knowledge and skills in a real setting. It is an exciting time for them as they leave the safe environs of University training and start their journey into their practice settings. HPS Pharmacies is committed to making the experience as satisfying for all students and HPS Employees who are involved in the program".

HPS is proud to help open boundaries between systems and practitioners across the globe and facilitates the learning of several international pharmacy students each year.

Below is a first-hand account of Portuguese student Diana Araújo's experiences of HPS Pharmacies' Student Exchange Program, which she participated in last July and August.

As soon as I heard about the Student Exchange Program (SEP) I knew that I had to embrace this opportunity. It was the right moment to do such a long journey and one of the most important choices of my life.

I chose Australia because I wanted to take advantage of my last long summer holiday. I knew that the country is technologically advanced and has a very good health system. On the other side Australia is a melting pot of cultures and people and that fascinates me.

After a long process of selection, I was admitted in HPS Pharmacies for a period of four weeks. During this period I had the possibility to learn a lot about different subjects like chemotherapy preparation, Fred Dispense and others.

It was also very new for me to deal with the patients and team working with doctors, nurses and pharmacists. I now have a different view of the workflow in a hospital, and a better understanding of the role of each professional in this process. These issues can only be learned in an open environment like the one I had the chance to join at HPS.

Usually, my daily routine consisted of the following tasks:

- I followed my preceptor visiting the wards in order to help patients who were going to be discharged and the ones that were going to rehab.
- The patients were given some explanations and counselling.
- We went back to the pharmacy and start doing the dispensing of all the necessary medications and the corresponding medprofile.
- Sometimes I had the opportunity to help preparing chemotherapy. This task was for me one of the major achievements of my internship. I was very impressed with sterile preparation and the level of accuracy that is needed.

Every Friday I assisted to the tutorial classes together with other intern students. These classes were very important for me.

Thanks to this placement I have evolved as a person as well as a professional. I am more open-minded to other realities and ways of living.

I do recommend to other students the SEP experience, because you can get the best of both worlds: excellent professional experience and living in a foreign country.

Pharmacy Business

Supporting Human Research Ethics at Bellberry

Clinical trials are often conducted with philanthropic volunteers who generally do not receive any personal reward or cure for their disease, but may be exposed to significant risks. The processes of protecting participants have continuously evolved since the *Helsinki Declaration* was promulgated 50 years ago, transforming for Australia into the *National Statement* on *Ethical Conduct in Human Research*.

An ethics committee must review any clinical study in Australia, and must be 'certified' if the study includes therapeutic goods which are not yet approved. The expertise required to satisfy the administrative demands and proper concern for the participants might imply that only the major teaching hospitals are able to provide the rigour required. In fact privately funded clinical research has developed into a $600 million p.a. industry divided 60/40 between public hospitals and the private sector.

Bellberry Ltd is a not-for-profit private organisation providing the specialised skills of a certified ethical review committee to clients. The involvement of Emeritus Professors Lloyd Sansom and Dick Ruffin demonstrate their veracity. They also have Ian Tindall, a highly-regarded clinical pharmacist with HPS, and active committee member since Bellberry's inception, now filling the roles of Chair (acting), Deputy Chair, and Reviewer on three of their four committees. In seven years Bellberry have grown into the largest private organisation of its type outside America, offering a service able to consolidate committee functions for multi-centre trials.

This innovative organisation has achieved an entirely paperless process, using the online *eProtocol* submission system. They also support the industry through feedback and advice to inexperienced researchers such as those unfunded students working towards a PhD. Real support can be seen in the $2.5 million they have donated back into medical research to date, an outstanding achievement.

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Buyer Beware

The protection that Australia's isolation offers is being rapidly broken down by people hunting online for that magical 'panacea' which is all natural, harmless, and costs next to nothing.

The processes of regulation, documentation, and quality assurance in providing evidence based medicine can appear bureaucratic and resistant to change, however it also protects us from the many charlatans who advertise these 'miracle cures'.

In the 15 months to April 2012 the TGA issued nearly as many safety alerts for products purchased over the internet as those relating to approved medicines. Of 24 alerts, one was for a counterfeit chemotherapy drug which did not contain its promised dose, two related to topical 'herbal' products which cause significant chemical burns and scarring, and the remaining products promise to be '100% herbal', but in fact contain variations and derivatives of prescription products for impotence (sildenafil) and weight loss (sibutramine).

The very real danger was demonstrated when patients taking sibutramine-laced slimming tablets were hospitalised with acute drug-induced psychoses. (Just as well that it was deregistered here in 2010.)

The Australian health systems are proven in that we can expect to live at least as long as those in any other developed country and with a similar or lower health services spend. With products now bypassing these systems, or being imported and sold by inadequately skilled practitioners, the responsible consumer must consider the veracity of marketing promotions, and where the conservative advice of a pharmacist may protect them from unwise choices.

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What the Whoop!

Where is the whooping cough (pertussis) epidemic in Australia coming from? With cases skyrocketing to 38,500 in 2011 (Figure 1), Australia appears to be experiencing almost a third of the total reported worldwide incidence.

The increase is not from a reduced uptake of our 60 year vaccination program, as rates overall in Australia have been consistently around 70%, rising to 90% over the last decade. Neither has it been imported, as WHO data shows 83% of countries have more than 80% immunisation coverage, and only 4 countries in the world have less than 50%. The worldwide rates of pertussis are declining in direct proportion to increased immunisation.

To unravel the mystery, the 2011 National Pertussis Workshop examined the variables involved in disease prevention. The patient, the bacterium, the vaccine, and management strategies may all contribute.

It was recognised that the diagnostic criteria from symptoms to laboratory findings vary widely between countries. The development of specific diagnostic tests and introduction of mandatory reporting in Australia has increased the rate of reporting regardless of the frequency of infection, particularly in comparison to countries with older systems.

The very success of the vaccination program may have confounded outcomes, as lack of exposure to the bacterium may have resulted in patients becoming more susceptible to infection. The slow to evolve Bordetella pertussis bacterium may have undergone positive selection and adapted to the presence of the vaccine. The transition from cellular to acellular vaccine may also have reduced the effectiveness and/or duration of protection. Studies are now exploring differences in the genetic capacity of patients to seroconvert following vaccination.

The risk of pertussis to the very young explains the National Immunisation program guidelines to vaccinate at 2, 4 and 6 months of age, with booster doses at 4 years and 15-17 years. Most serious and fatal infections have been transmitted within families to neonates who have not been fully immunised. Improving this early protection has given rise to debate on the safety of vaccinating pregnant women and neonates. The goal of 'cocooning' neonates by immunising those around them has persuaded most state and territory governments in Australia to offer free booster vaccines for new parents, siblings, grandparents and carers of babies under 12 months old.

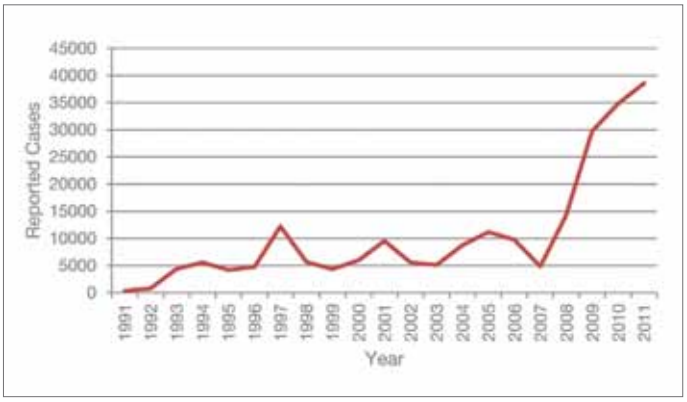

Figure 1. Reported cases of pertussis in Australia.

The solution may lie in new technology, as *Institut Pasteur de Lille* embarks on Phase 1 trials of an intranasal vaccine which may provide protection despite the immaturity of the neonatal immune system.

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From The Team Update

Tim Cookes

Financial Analysis and Planning Manager

Towards the end of last year, HPS Pharmacies introduced new methods to make it easier and more accessible for our patients to pay their pharmacy accounts.

Our patients have always been able to access traditional methods of payment such as visiting their local HPS Pharmacy, mailing a cheque, or calling one of our friendly customer service representatives, however they are now able to pay their pharmacy account online or over the phone, anytime, anywhere.

HPS Pharmacies' secure BPOINT service is accessible to our patients via the HPS website homepage and delivers an online portal hosted by Commonwealth Bank, where payments can be made using Visa, Mastercard or AMEX. This new BPOINT service also extends to the phone, enabling our patients to make a payment by calling HPS on 1300 669 510 and following the prompts.

In addition, HPS Pharmacies can now accept payments via BPAY. This popular method of payment enables patients to make a payment via online or mobile banking direct from their cheque, savings or credit card account (depending on the individual customer's financial institution). To access this payment method, patients login to their financial institution's website or mobile banking application.

Our payment systems are confidential and robust with each transaction being validated using the BPOINT customer reference number to ensure payment of the correct account.

Our new systems are friendly and easy to use, ensuring a seamless patient discharge experience.

Kirsten Boyce

Partner / Director of Strategic Management

Adelaide recently played host to the Annual Partner Summit, where the entire partnership group congregated for an off-site strategy weekend at Mount Lofty House. The Annual Partner Summit is an important two day event, where the partnership group come together to discuss expectations of the management team, and provide a chance to challenge the strategic plan and explore opportunities for internal improvement and business growth. Overall the event is staged to reaffirm a shared vision, unity and purpose amongst the partnership group.

The Annual Partner Summit was attended by all equity partners, in addition to the Executive Team. The Executive Team presented strategic initiatives developed during the previously held Senior Management Summit and Executive Strategy Day, and discussed the key focus for HPS Pharmacies over the next year.

We engaged a number of external consultants to facilitate workshops throughout the two days. Mark Coleman (a consultant and lecturer with the AICD), and Sue Stewart (ninety9consulting) focused on areas of governance and leadership.

The Annual Partner Summit for 2012 was a great success, and achieved a harmonious synergy amongst the partnership group towards a focused strategic direction. The partners walked away from the weekend with a fully informed perspective, positive with the future, and a strong confidence in the Executive Team to drive the strategic plan.

Ly Phan

Pharmacist In-Charge, HPS – Melbourne IVF

HPS Pharmacies began delivering fertility treatment on-site to patients of Melbourne IVF in early January via our brand new tailored pharmacy.

During this time, I have received exceptionally positive feedback from both patients and Melbourne IVF staff regarding our enhanced service.

We have been able to provide each patient with a more personalised, efficient and sensitive service away from the sometimes perceived “prying eyes” many patients may have previously experienced at their local community pharmacy.

Being on-site also enables us to provide patients with a convenient service as it is very common for patients to have a consult at the clinic, need to purchase medication from a pharmacy, and then return to the clinic for administration. We can deliver this all on-site, in one opportune visit for the patient, which we have found to be a fantastic benefit to patients.

Besides the delivery of medication, our staff are able to offer additional services such as counselling to the men and women undergoing fertility treatment. Because we are a specialised pharmacy, we are able to spend more time with each patient and be more attentive to their individual needs.

We are currently investigating ways to further enhance the services we deliver to Melbourne IVF.

Ian Bell

Chief Information Officer

It is my firm belief that it is the staff on the front line of service provision that make or break relations with our customers and clients - and IT can play a large part in this relationship. Through innovative systems, solutions and partnerships, I want to assist our teams to provide unparalleled service to our clients and assist in maximising productivity and job satisfaction.

My vision for the IT team is to provide a proactive, customer and delivery focused service that enhances the substantial breadth and depth of pharmacy skills within HPS. I have already put in place a proactive process whereby we contact each site monthly to ensure that we are providing you with the right IT tools to deliver the best service to our clients, to make sure that every piece of IT equipment is in working order and to understand how we might be better able to support you.

Within the next few weeks we will remove Citrix and replace our old PC’s with new, more powerful PC’s. We have also changed our mobile phone provider.

Very shortly we will be undertaking a full review of our mobile data policy and looking to add more features and a new IT platform to ClinPod, our unique clinical pharmacy system. We will be announcing exciting developments in providing new services to our clients, including sharing data in a manner that increases our level of service and helps our clients drive down costs.

I hope you will all benefit from these changes and that, together, we can ensure that IT partners with you to provide the best service to our clients.

HPS Contributes to Rehabilitation of Cardiac Patients

Heather Galna, Clinical Pharmacist
HPS – Knox, Knox Private Hospital, Victoria

Cardiovascular disease is responsible for 34% of deaths in Australia. It kills equal numbers of men and women and is currently the number one killer of women in Australia.[1]

The **World Health Organisation** and the **National Heart Foundation of Australia** recommend that, 'unless contraindicated, all patients who have had a heart attack, heart surgery, coronary angioplasty or other heart or blood vessel disease are routinely offered…a cardiac rehabilitation and prevention program that is appropriate to individual needs.'[2]

Knox Private Hospital (KPH) runs its program under the guidelines of the **Australian Cardiovascular Health and Rehabilitation Association** (ACRA). Suggested programs consist of three phases; inpatient education, outpatient exercise and education, and lastly a maintenance exercise program. ACRA operates a national database which provides information on cardiac programs offered by various institutions. This allows patients to be referred to one which is both suitable and convenient for them.

Knox Private Hospital offers two cardiac rehabilitation programs to the community. An eight week program for patients with heart failure and a four week program for patients with ischaemic heart disease, post cardiac surgery or other cardiac conditions. Whilst providing education on similar topics to the four week course, the eight week course for heart failure patients has an additional focus on fluid management and long term disease maintenance. The eight week course is also available as an evening program.

Participants of the outpatient program are not necessarily past patients of KPH. Members of the community who have been inpatients in other hospitals, but live locally, can also be referred to the KPH program. They may also be referred by their GP if it is felt participation in an education program would be helpful, or may be there to support a loved one.

As well as daily inpatient education on the wards, HPS Pharmacies have also participated for over ten years in the presentation of the medication education component of the four week cardiac rehabilitation program for patients with ischaemic heart disease. The author has been personally involved in this program for much of this time, both in the preparation of the lecture and its presentation.

During their four week course, clients receive education twice weekly from a multidisciplinary team as described in Figure 1. Monitored exercise is also performed at each session.

Topic	Presenter
Diet, cholesterol and heart disease	Dietician
Stress and the cardiac patient	Cardiac Nurse or Psychologist
Emotional response to heart disease	Psychologist
Diabetes and heart disease	Dietician and/or Diabetic Educator
Risk factor modification and lifestyle change	Cardiac Nurse
Practical dietary management	Cardiac Nurse
Ambulance	MICA Paramedic
Heart disease	Cardiologist
Medications	Pharmacist

Figure 1. Ischaemic Heart Disease Rehabilitation Program.

Our role is to provide a one hour information session on cardiovascular medication. It is not the intention of the lecture to provide a

comprehensive list of all side effects for each cardiac medication. Firstly, this would be irrelevant to patients not on those particular medications and secondly, the retention of such a volume of information would be poor. It must be remembered that some patients are still recovering from a hospital stay and also experiencing decreased alertness due to their new medications.

A variety of topics are covered within this hour, and we try to keep the hour as interactive as possible. Patients are encouraged to ask questions as we speak to them and bring up any concerns they have. Questions that often arise include the use of an alternative or complementary therapy, interactions with other 'non cardiac' medications, and 'how long to continue these medications for'.

The lecture includes the following topics:-

- Broad overview of medications commonly used;
  - Antiplatelet drugs
  - Warfarin
  - Drugs for dyslipidaemia
  - Antihypertensives and medication for heart failure
  - Drugs used for angina
- Use of over-the-counter medications and alternative therapies in cardiac conditions
- Authority prescriptions
- The safety net system
- Devices to aid compliance, e.g. Dosette® boxes, Webster® packs
- Swallowing difficulties, crushing or breaking medications
- Medication and food
- What to do if you miss a dose

Discussing these topics also provides an excellent opportunity for us to educate patients on the contribution their community pharmacist can have to their wellbeing. Participants in the course are encouraged to use the same pharmacy and to utilise the benefits of this relationship. These include:-

- Provision of consumer medication information (CMI) leaflets
- Drug education
- Monitoring of medication use
- Checking for potential interactions, or contraindications, with new medications or over-the-counter requests. (This is particularly important for patients who are seeing more than one specialist for multiple medical conditions.)
- Liaising with their doctor/s about any concerns
- Provision of devices to aid compliance, e.g. Webster® packs, Dosette® boxes

Patients are also encouraged to follow the lifestyle changes recommended to them and are reminded that they do have some control of their disease outcomes and to take maximum advantage of that potential.

The response to the lecture is extremely positive. At the end of each lecture attendees are queuing to ask questions about their medication or express their gratitude for highlighting something of which they had not been aware. The patient's exercise program involves walking up and down a long corridor ending at the pharmacy and the author has often been stopped by past participants to be thanked or asked 'just one more question'. There is no doubt, with this type of feedback, that our contribution is beneficial to their ongoing disease management. The personal reward in receiving that type of response ensures delivering the lecture continues to be a positive experience. The author would encourage any pharmacist who is given the opportunity to be involved in outpatient education, to do so.

Editor's Note: HPS Pharmacies is proud to contribute to the rehabilitation of cardiac outpatient programs in seven of our client hospitals.

References for this article can be found on page 30.

Phosphate Binders in Chronic Kidney Disease

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Chronic kidney disease (CKD) is a rising public health problem in Australia resulting in substantial comorbidities as well as premature mortality. It is a common and serious issue with a greater number of Australian's being treated with either dialysis or renal transplant.

Due to the lack of symptoms in earlier stages of CKD, the true number of CKD sufferers is difficult to estimate. A population survey found that 1 in 7 Australian adults over 25 years of age had some degree of CKD in 1999–2000. In 2007–08, CKD contributed to over 1.2 million hospitalisations, most of which were for regular dialysis. CKD contributed to almost 10% of deaths in 2007. The number of Australians with end stage kidney disease (ESKD) is projected to double in the next decade.

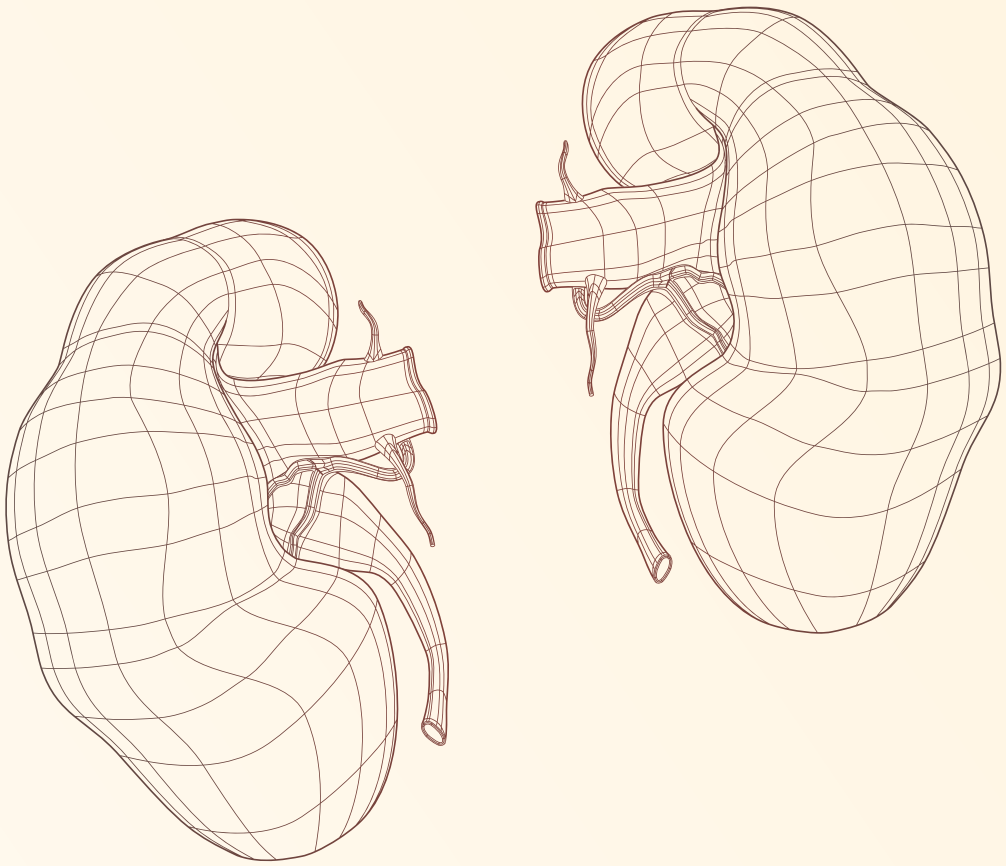
Not only does CKD have an impact on a patient's quality of life, there is also an economic burden caused by ESKD. A report commissioned by Kidney Health Australia to quantify the economic burden of kidney disease in Australia estimated that ESKD will cost the state and federal governments around $12 billion between 2009 and 2020. A report was also commissioned on the cost-effectiveness of early detection and intervention to prevent progression of CKD in Australia. If treated early, the progression to ESKD may be halved and the associated comorbidities may be avoided.

Renal bone disease is a metabolic disorder which occurs in patients with CKD secondary to a disturbance in calcium, phosphorus and vitamin D metabolism. In patients with CKD, the reduction in renal function results in abnormalities associated with the normal homeostatic mechanisms controlling bone biochemistry and hence causes changes to calcium, phosphate, vitamin D and parathyroid hormone levels.

Phosphate is excreted via the kidneys. As renal function declines and reduced excretion results in accumulation; continued ingestion of phosphate as well as the reduced bone uptake of phosphate or increased release of phosphate from high turnover bone results in hyperphosphataemia.

Hyperphosphataemia can lead to the progression of secondary hyperparathyroidism and renal osteodystrophy. The clinical consequences of such conditions result in an increased risk of fractures and microfractures, bone and muscle pain, and even skeletal deformities. Other potential extraskeletal complications include pruritis, red sore eyes, exacerbation of anaemia, soft tissue calcification, peripheral vascular calcification and cardiovascular calcification. The latter is an extremely important issue in patients with CKD as it is well known that a common cause of death in patients with ESKD is of cardiovascular origin.

Control of hyperphosphataemia involves dietary phosphate restriction, dialysis, control of hyperparathyroidism and the use of oral phosphate binders. Phosphate binders have been widely used since the 1970s and act to reduce the absorption of dietary phosphate. Most are di- or trivalent cations that form a complex with phosphate in the gut, reducing its systemic absorption and allowing clearance from the body via the faecal route. It is important that patients understand the timing with which to take their phosphate binders as taking them after or in



between a meal will render them useless. Currently, there are three main types of phosphate binders: aluminium-based, calcium-based and calcium/aluminium free.

Aluminium-based phosphate binders (aluminium hydroxide, Alu-Tab®) are very effective but their application in practice is limited due to the potential toxic effects with long term administration. Long term use of aluminium-based phosphate binders may result in aluminium accumulation which can manifest as encephalopathy, osteomalacia, microcytic anaemia and myopathy. As a result, aluminium is generally only appropriate for short term use.

Calcium salts (calcium carbonate, Cal-sup®, Caltrate®; calcium citrate, Citracal®) have largely replaced the aluminium-based phosphate binders as they are a safe, cost-effective, well tolerated and efficacious alternative. Calcium salts bind with dietary phosphate although less effectively than aluminium. The use of calcium-based phosphate binders is advantageous in hypocalcaemic patients although their use is limited in those with severe hyperparathyroidism. Excessive calcium intake has also been correlated with the development of vascular calcification. Adverse effects with calcium carbonate include nausea and constipation and the large tablets and chalky taste may give rise to non-compliance.

Two newer agents that are alternatives to the aluminium and calcium based phosphate binders are sevelamer hydrochloride (Renagel®) and lanthanum carbonate (Fosrenol®).

Sevelamer is a hydrogel of poly (allylamine hydrochloride) – a large polymer molecule with partially protonated amine groups which bind to intestinal phosphate. It is resistant to digestive degradation and as a result is not absorbed from the GI tract. It is an exchange resin that binds to dietary phosphate and releases chloride. Common adverse effects of sevelamer are generally GI related and include nausea, vomiting, diarrhoea or constipation, and flatulence. In rare instances it can cause intestinal obstruction. Sevelamer also reduces serum low density lipoprotein (LDL) and total cholesterol concentrations which may have benefits in reducing cardiovascular risk factors in CKD patients. Another advantage of sevelamer is that it is an alternative option for patients with hypercalcaemia or those with evidence of calcification. Sevelamer is a costly drug; with a dispensed price of $357.73 to the PBS for 180 tablets compared with $30.46 for 240 Cal-Sup® tablets, and as such is only listed on the PBS for patients whose serum phosphate is not controlled with calcium.

The newest phosphate binder currently available is lanthanum carbonate (Fosrenol®). It is a rare earth element, also binding phosphate in the gut. It is another alternative to the aluminium-based and calcium-based phosphate binders and may be beneficial in those patients with hypercalcaemia. It is also a costly drug (from $523.54 for 180 tablets) and has the same PBS listing as sevelamer.

Treating CKD, a costly condition, through early detection and intervention programs could reduce not only the economic burden on the already stretched health care system, but also the progression to ESKD and its associated comorbidities and premature mortality. Control of serum phosphate in patients with CKD is an important factor in reducing the transition to secondary hyperparathyroidism, renal osteodystrophy, and reducing the risk of cardiovascular mortality.

References for this article can be found on page 30.

Piperacillin + Tazobactam for Pseudomonas – Optimising Your Dose

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Administration instructions for piperacillin/tazobactam 4.5g vials have not been revised since the combination drug was first introduced in 2009. The product information for the originator brand states "TAZOCIN EF may be given by slow intravenous infusion (20 - 30 minutes)"[1], it does not provide any provision for other types of administration methods.

One of the common indications for piperacillin/tazobactam therapy is for pseudomonas infections. *Pseudomonas aeruginosa* is an opportunistic gram-negative aerobic bacterium that is resistant to a large range of antibiotics and may develop additional resistance after unsuccessful treatment. This is why it is important to get the right antibiotic at the right dose at the earliest possible time.

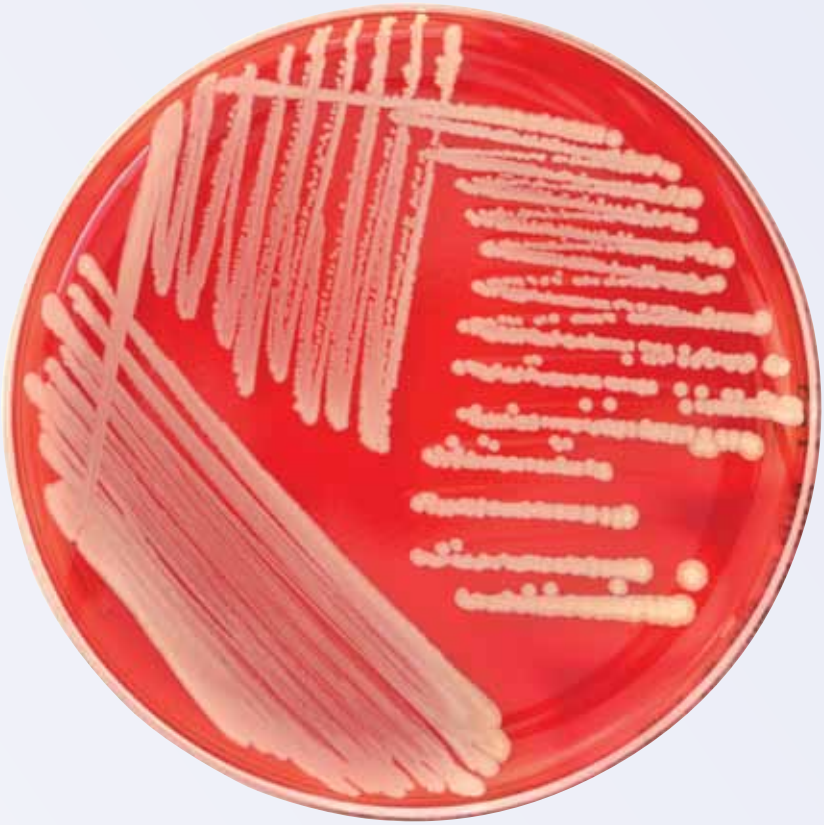
TAZOCIN EF's product information states "the total daily dose depends on the severity and localisation of the infection and can vary from 2g piperacillin/0.25g tazobactam to 4g piperacillin/0.5g tazobactam (TAZOCIN EF) administered every six or eight hours". It also states that the minimum inhibitory concentration required to inhibit the growth of 90% (MIC 90) of *Pseudomonas aeruginosa* is 32mg/L based on isolates collected in Australia. Upon review of the pharmacokinetic data available together with published susceptibility data, it can be seen that a regular six-hourly 30-minute infusion of piperacillin/tazobactam 4.5g may be subtherapeutic if intended to treat pseudomonas. Table 1 summarises the pharmacokinetic data for each ingredient following a single dose (derived from TAZOCIN EF's Product Information).

Plasma Levels (mcg/mL)	At Completion of Infusion					
	0	1	1.5	2	3	4
Piperacillin	298	141	87	47	16	7
Tazobactam	33.8	17.3	11.7	6.8	2.8	1.3

Table 1. Plasma levels after a dose of TAZOCIN EF 4.5g.[1]

In healthy subjects, piperacillin/tazobactam plasma elimination half-lives range from 0.7 to 1.2 hours following single or multiple doses. These half-lives are unaffected by dose or duration of infusion. Piperacillin and tazobactam are 21% and 23% respectively bound to plasma proteins. The protein binding of either piperacillin or tazobactam is unaffected by the presence of either compound. Piperacillin and tazobactam are widely distributed in tissues and body fluids including intestinal mucosa, gall bladder, lung and bile.

Like all beta-lactams, piperacillin/tazobactam demonstrates concentration-independent bacterial killing, with the proportion of the dosing cycle that the unbound drug concentration remains above the MIC being the pharmacodynamic parameter that is best correlated with optimal activity. Piperacillin/tazobactam lacks any persistent effect (post-antibiotic effect) that lasts after antimicrobial exposure to most organisms, such that once the free drug concentrations fall below the MIC, bacterial regrowth is almost instantaneous. The concentration



must remain above the MIC for penicillins for about 30 – 40% of the time for gram-positive and 50 – 60% for gram-negative bacteria.[2]

Based on the data presented in the product information, we can see that the plasma levels of piperacillin are already below the MIC for pseudomonas 3 hours after the infusion. So, for a 4.5g dose given six hourly, there is an interval of about 2 – 3 hours between doses where the plasma levels are subtherapeutic.

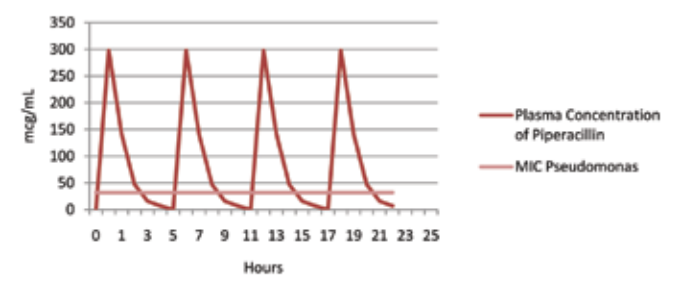


Figure 1. Plasma concentration versus time curve for a 6 hourly 4g dose of piperacillin.

A study by Lodise et al employed pharmacokinetic/pharmacodynamic simulation to compare the standard dose of piperacillin/tazobactam with two alternative doses (4-hour infusions and extended infusions) to delineate their respective *Probability of Target Attainment* (PTA) for *Pseudomonas aeruginosa*.[3] For piperacillin, the necessary percent of time the concentration must remain above the MIC (%fT>MIC) is about 50% – 60% for gram negative pathogens (pseudomonas).

The simulation showed the difference between the probability of achieving bactericidal efficacy, noting for an MIC of 32mcg/mL (pseudomonas) there is a significant difference between the extended infusion regimen compared to the other 30-minute infusions. Based on this data, further simulation was done to alter doses of piperacillin/tazobactam in clinical practice to account for 4.5g doses.[4]

A study by Kim, A et al looked at an optimal dosing regimen of piperacillin/tazobactam, comparing six hourly against eight hourly dosing. The simulation showed the following results:

1. A 30-minute infusion of piperacillin/tazobactam 4.5g six hourly produced a PTA of less than 50%.
2. A 4-hour prolonged infusion of piperacillin/tazobactam 4.5g six hourly produced a PTA of almost 90%.
3. A 4-hour prolonged infusion of piperacillin/tazobactam 4.5g eight hourly produced a PTA of almost 70%.

Based on the simulation outcomes, it is clear that the usual dose of piperacillin/tazobactam 4.5g six hourly given as a 30-minute infusion (total daily dose of 18g) is inferior to an extended 4-hour infusion of piperacillin/tazobactam eight hourly (total daily dose of 13.5g).

The pharmacoeconomic impact of switching to an extended infusion eight hourly regimen could save the hospital around 30% in direct piperacillin/tazobactam costs. Further savings in nursing time spent in the preparation and administration of infusions could also be observed with prolonged or continuous infusions.

In the hospital setting, administration of injectable drugs are generally guided by the product information for the drug, or the Australian Injectable Drug Handbook (AIDH) 5th edition, both of which have no data or recommendations in terms of administering the drug as an extended infusion. The prescriber, however, could and probably should apply clinical knowledge and specify how piperacillin/tazobactam is to be administered based on the indication they are prescribing the drug for to ensure successful treatment of pseudomonas infections.

References for this article can be found on page 30.

Why Worry About Prophylaxis for Venous Thromboembolism?

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In Australia 30,000 people are hospitalised with venous thromboembolism (VTE) each year. This group of patients is made up of approximately:-

- 16,000 with deep vein thrombosis (DVT)
- 14,000 with pulmonary embolism (PE)

Amongst these huge numbers there are at least 2,000 deaths each year. The most unsettling issue is that most of these deaths could have been prevented by giving appropriate prophylaxis against VTE. Pulmonary embolism is the most preventable cause of death in our hospitals.

Patients are most at risk in hospital and shortly after they have returned home. Almost all hospitalised patients do have at least one risk factor, and hospitalised patients are 100 times more likely to have a DVT or PE than the rest of the population. The evidence shows that, without prophylaxis DVT and PE occurs in 20% of medical patients and 2% of surgical patients. The peak in VTE problems is shown at around 2 to 3 weeks. Most of the cases of DVT and PE occur after the patient has left hospital. Readmission may be at another hospital, or under a different medical team within the same hospital following surgery, so it may not be detected as related to the prior admission.

The cost of treating a DVT is considered to be around $109,000 per patient. The problems of VTE are not only the immediate treatment of the painful and possibly life threatening conditions but the risk of lifelong effects on health and disability. Pulmonary embolism can lead to chronic debilitating respiratory disease while the effects of DVT can result in long term ulceration from damage to the circulation and valves of the veins as well as long term disability caused by the ensuing injury. These factors may further increase the cost of treatment of VTE.

An assessment of the VTE risk should be performed for each patient when they are first admitted. Adequate prophylaxis should be prescribed for the patient at this time or even in a preoperative consultation. It is important to note that aspirin is considered to be no more effective than placebo in preventing VTE and is not a suitable form of VTE prophylaxis. Warfarin is also no longer considered to be appropriate prophylaxis and should be replaced by low molecular weight heparin during an admission to hospital.

There are many conditions which are associated with an increased risk of VTE. These are some of them:-

- Advancing age
- Obesity
- Previous DVT
- Active cancer
- Acute medical illness – MI, infection
- Heart failure, respiratory failure
- Nephrotic syndrome
- Surgery
- Trauma
- Prolonged bed rest
- Central venous catheter
- Immobilisation
- Limb paresis
- Oral contraceptives

Prophylaxis can include mechanical and chemical methods both singly or together. Mechanical methods include mobilisation, thromboembolic stockings, venous foot pumps and IVC filters. All of these methods of VTE prophylaxis must be properly fitted otherwise their use may be counterproductive. The use of mechanical prophylaxis requires close observation and monitoring and they are required to be continuously in use for the whole VTE risk period and not taken on and off. Their use may be contraindicated in diabetic neuropathy, peripheral arterial disease, inflammatory conditions of the lower leg, and severe oedema of the leg.

The ideal anti-thrombotic medication would have predictable dose and kinetics, wide therapeutic window for safety, no interactions nor any need for monitoring as well as no dose adjustments, and immediate re-initiation after surgery. Unfortunately this drug does not exist. The medications that we do have include subcutaneous injection of low molecular weight heparins (LMWH) and oral medications such as rivaroxaban, apixaban and dabigatran and the yet to be released idrabiotaparinux.

The prophylactic dose of enoxaparin is now 40mg/day given subcutaneously. A reduction in dose to 20mg daily is only required if the glomerular filtration rate (GFR) is less than 30ml/min. Rivaroxaban is given at a dose of 10mg orally per day. The dose is not adjusted unless renal impairment is severe.

Rivaroxaban should be continued for 14 days after an elective knee replacement and 35 days after an elective hip replacement. Dabigatran dosage is 110mg twice a day for 10 days after knee replacement and 28 to 35 days after hip replacement, but is not recommended if GFR is less than 30ml/min.

Prophylaxis treatment should be continued for longer than was originally suggested. The risk after surgery peaks at 3 to 4 weeks. After cancer surgery, it is considered to be necessary for up to 30 days. In lower leg surgery LMWH should be continued for the entire period of immobilisation. A Cochrane study has shown that there was a 60% reduction in VTE occurrence by continuing prophylaxis for 4 weeks versus 1 week.

Factors which may contraindicate pharmacological prophylaxis:-

- Active bleeding
- Platelet count < 50
- History of gastrointestinal bleed
- History of recent central nervous system bleeding
- Severe hepatic disease (INR >1.3)
- Very high risk of falls
- Adverse reaction to heparin
- Concomitant use of medications that can affect clotting (anticoagulants, antiplatelet drugs, NSAIDs)
- Lumbar puncture
- Palliative/terminal management

All hospitals should actively promote guidelines to encourage the use of VTE prophylaxis for all patients with risk factors. The National Health and Medical Research Council (NHMRC) has launched new guidelines for VTE prophylaxis. There are also the 'Best Practice' guidelines of the Australian and New Zealand working party on the management and prophylaxis of venous thromboembolism. The newest version (soon to be launched) of the *National Medication Chart* will have a preprinted section for VTE prophylaxis to act as a visual reminder to the prescriber.

As well as educating and promoting the use of prophylaxis amongst doctors, nurses, pharmacists and other health professionals, we should educate our patients about the risks and signs of VTE. The airlines have led the way to prevent VTE by promoting exercises and walking during a flight to reduce the risk to their passengers. As the risks are so much higher in hospital, we should also actively encourage the education and awareness by promotion of VTE prophylaxis to all our patients.

References for this article can be found on page 30.

Label Number 5

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5 Ask your doctor or pharmacist before using any other medicine including over-the-counter medicines or health products.

The Pharmacy Board Guidelines offer a rule of thumb for all pharmacists: "Pharmacist must offer counselling to the patient at every opportunity".

Pharmacists can only hope that people take notice of those little stickers on their box of medicine. Before studying pharmacy I had never bothered to look out for these stickers known as '*Cautionary Advisory Labels*', or '*Ancillary Labels*', that are designed to warn against undesirable effects or to optimise efficacy of the use of medication. These labels serve as an additional reminder, or reinforcement of the dispensary label, some of which are mandatory to pharmacy practice. Some of the advice in these labels is already integrated into the dispensing label (the one with the name of the patient, medication, and directions on taking the medication) such as *Label B* – "Take with or soon after food", or *Label C* – "Take at least half an hour before food".

Before the 21st edition of *Australian Pharmaceutical Formulary and Handbook (APF 21),* Label 5 was mainly used to warn patients taking medications with a low therapeutic drug index (e.g. digoxin), having many interactions with other medications (e.g. warfarin), and non-selective monoamine oxidase inhibitors (MAOIs, e.g. tranylcypromine) about the dangers of ingesting certain foods where interaction with these medications will have quite serious reactions.

For example, St John's Wort decreases the efficacy of digoxin, which may be exacerbated with high volumes of electrolyte supplements containing potassium, sodium, or calcium leading to an increased risk of arrhythmias. Such interactions for digoxin have not even included commonly seen medications such as macrolide antibiotics (e.g. erythromycin, roxithromycin), amiodarone, calcium-channel blockers and spironolactone.

While on the other hand, we can't overlook that warfarin seems to interact with almost everything including paracetamol despite a general understanding that they are safe together. This combination can increase a patient's INR levels on higher doses, and even omega-3 fatty acids interact with warfarin, as noted in a recent RGH Pharmacy eBulletin reminding us that people taking more than 7 capsules of fish oil a day will have antithrombotic (blood thinning) effects.

Nowadays with more knowledge of herbal supplements and the new recommendations in *APF 21*, we have seen the list of medicines needing Label 5 grow to include many antidepressants and antipsychotics apart from the usual suspects from anticancer (cyclosporin, lapatinib, sorafenib), certain antibiotics (clarithromycin, metronidazole, rifampicin), antivirals (ritonavir, indinavir), antifungals (fluconazole) and "vitamin-related" (acitretin, calcitriol, cholecalciferol) medications.

So, apart from St John's Wort, what other herbal supplements interact with antidepressants or antipsychotics? Table 1 provides a summary of interactions compiled from *APF 21*, *Blackmores Professional* website, and *Herb & Natural Supplements* to assist us remembering a few.

Herbal Supplements/ Nutrients	General Uses	Interaction	Recommendation/Comments
Evening primrose oil	Schizophrenia, atopic eczema, PMS, ADHD	Increased risk of seizures in patients on phenothiazines.	Recommend caution with natural plant/seed oils for patients on phenothiazines.
Ginkgo	Dementia, tinnitus, macular degeneration prevention, intermittent claudication	Enhanced effects of haloperidol and olanzapine. Decreased absorption of alprazolam.	Ginkgo may lower seizure threshold or the effectiveness of antiepileptics.
Ginseng (Korean or Siberian)	Chronic fatigue syndrome, enhanced psychomotor performance	Increases adverse effects of phenelzine or other MAOIs.	May cause slight drowsiness. 2–3 weeks ginseng-free period is recommended every 30 to 60 days.
Green tea	Prevention of cancer, dental caries, arthritis, asthma, hypercholesterolaemia	Increases CNS-stimulant drug effects, e.g. nicotine, beta-adrenergic agonists. Decreases CNS-depressant drug effects, e.g. benzodiazepines.	Generally will not cause much of a concern, considering the amount of green tea intake for each cup.
Guarana	Psychostimulant, weight loss	CNS stimulant activity, reducing sedative effects.	Found in energy drinks. Additive effect to caffeine including diuresis. Not recommended for patients taking lithium.
Kava kava	Anxiety, insomnia, benzodiazepine withdrawal	Potentiates CNS depression, e.g. benzodiazepine.	High risk of hepatotoxicity. Avoid with anxiolytics, e.g. benzodiazepines. Only use under medical supervision.
Passionflower	Insomnia, benzodiazepine withdrawal	Potentiates CNS depression, e.g. benzodiazepine.	Not to be used with benzodiazepines or other hypnotic agents.
SAMe (s-adenosyl-l-methionine)	Depression, anti-inflammatory	Increased risk of serotonin syndrome.	Avoid medicines acting on serotonin receptors, e.g. SSRIs, SNRIs, TCAs.
St John's Wort	Depression, menopausal mood symptoms	Increased risk of serotonin syndrome. Decreased levels of midazolam, lithium, TCAs and methadone. Increased clearance of benzodiazepines.	Avoid medicines acting on serotonin receptors. Monitor efficacy and symptoms of withdrawal of affected drugs. Long elimination half-life of 26.5 hrs. Discontinue 5–10 days before starting antidepressants.
St Mary's Thistle (milk thistle)	Liver disease – alcohol – and/ or hepatitis B or C induced	Reduced metabolism resulting in increase effects of carbamazepine.	Monitor for adverse effects from cytochrome P450 substrates.
Valerian	Insomnia	Additive sedation to CNS depressants.	Not to be combined with hypnotics or benzodiazepines. Valerian has withdrawal symptoms when taken long term.

Table 1. Interactions between Complementary and Psychiatric Therapies.

Note: Different brands may have different concentration of the active ingredients or extract and thus may cause different effects in some people. It is important to remember that plants from different environments may give out different concentrations of extract, and companies are now researching and standardising their products.

With more knowledge, research and reporting done, we understand that all these little effects add up and we see that herbal supplements are not as safe as we assumed. This puts pharmacists in the front line to monitor for side-effects and again remind people that the pills that they put into their mouth are medications and are considered dangerous if used unwisely or irresponsibly, even if the medications can be easily obtained in supermarkets, health food outlets or are "all-natural". Pharmacists use all the tools that are available to help empower the community with knowledge and promote quality use of medications, even if it is by applying Label 5.

References for this article can be found on page 30.

Syndromes & Symptoms
Migraine

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Migraine is a relatively common condition, affecting approximately 9–10% of Australians.[1] It has been estimated to affect up to 11% of people worldwide.[2] Distribution is skewed towards the female population (17%) as opposed to the male population (6%), which is probably due to hormonal factors.[1] Migraine usually appears in the 20's and 30's and it is relatively uncommon to appear after 40 years of age.[1] It can also occur in children.[1]

Migraine can be divided into two distinct categories. Migraine with aura (classical migraine) is distinguished by the presence of neurological symptoms either before or at the same time as the headache. These may present as visual disturbances, dizziness, tingling in extremities, or speech problems. Changes in mood may also occur. Migraine without aura (common migraine) lacks these neurological symptoms. Both kinds are characterised by recurrent headaches which are often throbbing and only on one side of the head. The pain is often accompanied by nausea, vomiting, photophobia or phonophobia. Migraine headaches last for between 4 and 72 hours, and symptoms usually follow a defined progression for each individual. In addition to suffering the migraine attacks and the resultant loss of productivity, quality of life for sufferers is diminished by constant anxiety over the threat of the next attack.

Migraine was once thought to be the result of vascular changes in the brain, with pain resulting from neurovascular dilation initiated in the ophthalmic division of the trigeminal nerve.[3] According to the vascular theory, the pain produced by this phenomenon was enhanced by peripheral or central sensitisation.[3] It is now known that migraine is more complex, involving neurological dysfunction.

It is currently believed that migraine results from cortical spreading depression (CSD).[3,4] CSD is a wave of tissue depolarisation which moves across the cortex and results in increased extracellular potassium, intracellular calcium and a surge of neurotransmitters.[3] The cortex then experiences an extended period of reduced neural activity.[3,4] During the depolarisation, there is increased cerebral blood flow, which is reduced in the phase of suppressed neural activity.[3] The variation in blood flow activates trigeminal nerves which cause release of neuroinflammatory mediators.[3] Oxygen free radicals, nitric oxide and MMPs (proteases) are increased which further increase and sustain vascular permeability.[3] This results in extravasation of substances which activate nerves around the meningeal blood vessels and cause migraine pain.[4] The exact causes of CSD initiation have not been established. A genetic predisposition to depolarisation has been recently validated by the discovery of several gene mutations contributing to migraine susceptibility.[5]

Triggers are wide ranging and vary between individuals, and may take a combination to produce a migraine.[1] Dietary triggers include caffeine withdrawal, a particular alcohol, inadequate food intake (e.g. missed or late meals), chocolate, MSG, aged cheeses or citrus fruits.[1] Environmental triggers include bright light, travel, strong smells, loud sounds and computer overuse.[1] Hormonal triggers may be related to the first period, menstruation, ovulation, contraceptive pills, pregnancy, HRT or menopause.[1] Migraines may also have physical and emotional triggers such as too much or too little sleep, back and neck pain, illness, exercise, arguments, stress, and relaxation after stress.[1] How these triggers cause CSD is not understood.

Where triggers are identified for an individual, it is best to avoid them, for example being careful not to miss meals, or by avoiding bright light with polarised glasses and hats. If migraines are frequent, sufferers should be encouraged to keep a diary of attacks to identify any patterns or triggers.

Non-pharmacological treatment includes resting in a quiet, dark place. Medication should be taken as early as possible in the aura phase, before the pain starts. If left too long, gastric stasis associated with migraine prevents absorption of medication.

First line analgesic treatment is usually aspirin (600–900mg orally, repeated in 4 hours if required), or paracetamol (1–1.5g orally every four hours, <4g in 24hr).[6] Soluble formulations should be used where possible. Non-steroidal anti-inflammatories that may also be used first line include diclofenac, ibuprofen, naproxen, and also rectal ketoprofen.[6] Large doses may be needed. Codeine should be avoided due to the potential for adverse effects.[6] To treat nausea, metoclopramide (10–20mg), domperidone (10–20mg) or prochlorperazine (5–10mg) may be taken orally.[6]

The 5-HT1 receptor antagonists, or "triptans", are used as second line options. Oral triptans available and their respective recommended doses include naratriptan (2.5–5mg in 24hr), sumatriptan (50–100mg, <300mg in 24hr), or zolmitriptan (2.5–5mg <10mg in 24hr).[6] Newer triptans to the market are rizatriptan

wafers (10mg, <30mg in 24hr) and eletriptan tablets (40–80mg, <160mg in 24hr). Inhaled sumatriptan may be better absorbed than the oral form in some people.[6] Repeated dosing may be needed due to the short half lives of the triptans which can result in headache recurrence.[6] Triptans should be used with caution in combination with lithium, MAOIs, or SSRIs, but appropriate monitoring for serotonin syndrome is necessary.[6] Triptans are not suitable for patients with vascular or coronary artery disease, or uncontrolled hypertension.[6] Up to 25% of patients don't respond to triptans.[6] Successive attacks in patients who have not responded to triptans may necessitate SC or IM dihydroergotamine, or SC sumatriptan.[6]

Drugs used prophylactically for patients who experience more than 3 attacks per month include amitriptyline, pizotifen, propranolol and other ß-blockers, sodium valproate, verapamil or topiramate. Preventive treatment may take weeks to improve headaches, and adherence to these regimens is usually poor.[6]

Recent studies have shown promise for several new treatments. Calcium gene-related peptide (CGRP) has been identified as a target for migraine treatment. CGRP levels are elevated during migraine, and IV administration has precipitated migraine-like headache in susceptible patients.[2] It has been identified as an important neurotransmitter with receptors in both central and peripheral nervous systems.[2] It is also a strong vasodilator, but this effect is not necessary for normal functioning. This means that antagonising its effects will not cause excessive vasoconstriction.[2] A high affinity CGRP receptor antagonist was discovered (olcegepant), and after encouraging trial results, an oral formulation (telcagepant) was developed.

Given the basis of its mechanism of action in the current understanding of migraine pathophysiology, it was expected that telcagepant would be effective. Unfortunately this was not the case, with the pain-free response at 2hr averaging only 26% across 4 randomised controlled trials (RCTs) as compared to 59% in 4 triptan RCTs.[8] No direct comparative placebo-controlled RCTs between telcagepant and the triptans in triptan-naïve patients have been conducted to allow for a clearer understanding of the relative efficacy of telcagepant.

Its tolerability has been excellent, with no more adverse effects than placebo.[8] It may have a place in patients with stable cardiovascular disease for whom the use of vasoconstricting triptans are contraindicated. A number of other new drug treatments and targets are yet to be explored and tested.[9]

Current migraine therapies are limited for sufferers, and often medical treatment is ineffective or insufficient to completely relieve the pain and neurological symptoms. Advances in the understanding of migraine pathophysiology have enabled some progress in the establishment of new unique targets for future directions in its treatments. Hopefully further insights will yield more effective therapies in years to come for this insidious and debilitating condition.

References for this article can be found on page 30.

Hospital Lecture Series
Postoperative Pain Management: Reducing the Evidence – Practice Gap

Paul Spencer, Clinical Pharmacist
HPS – Alexander Avenue, South Australia

'Less than a generation ago the prevalent attitude towards acute pain was widespread acceptance as inevitable, and frequent indifference to its suboptimal management. Now, proper pain management is understood to be a fundamental human right and integral to the ethical, patient-centred and cost-effective practice of modern medicine.' (Cousins & Carr in Acute Pain Management: Scientific Evidence. 3rd ed., 2010 p.iii)

As a natural response to actual or potential injury, pain serves a biological function. It signals injury within the body. Acute pain and injury are inevitably interrelated and activate a complex of neurological, hormonal and immune responses. However, if severe and prolonged, the acute pain response to injury becomes counterproductive. It is known today that untreated acute pain may have damaging immediate and long term consequences.

Postoperative pain is distinguished by its onset following surgery. It is typically characterised by constant aching pain near the surgical site with exacerbation during activities such as coughing, getting out of bed, physiotherapy and dressing changes. Often it is a self limiting condition with a progressive and fairly rapid improvement.

A clear aim of postoperative pain treatment is to keep the patient comfortable and to ease breathing, coughing and movement. This in turn facilitates restoration of physical function. Effective acute pain management is now also known to have substantial benefits well beyond the immediate comfort of the patient. In the acute setting, the risk of medical complications, prospective length of stay and total rehabilitation time may all be markedly reduced.

Effective acute pain control can also have significant physical and psychological health benefits for the patient long after their return to the community. For some patients, debilitating chronic pain can be averted by minimisation of acute pain postoperatively. Effective postoperative pain management, while clearly an ethical priority, is now also being recognised as fundamental in efforts to minimise the total cost of hospital care and rehabilitation.

Acute pain management is a specialist area of clinical practice, backed by substantive scientific evidence. The International Association for the Study of Pain and their journal *Pain* facilitates pain management research, education and practice worldwide. As advanced acute pain management techniques have principally developed within the field of anaesthesia, most professional anaesthesia organisations have policy statements or guidelines on pain management.

Acute Pain Management: Scientific Evidence is published by the Australian and New Zealand College of Anaesthetists (ANZCA) and is recognised as the leading English language acute pain reference. Now in its third edition, it has been endorsed by anaesthetic colleges and pain societies throughout the English speaking world. The editorial working group is an international collaboration that has been chaired successively by Australian leaders in the field. Beyond providing a succinct account of the current scientific evidence, this reference provides a clear framework for managing acute pain and an outcomes-based rationale for doing so. Notwithstanding their detailed attention to the scientific evidence, the authors caution that individualised treatment of patients is needed for the evidence to be applied effectively.

At a local level, many major hospitals have implemented Acute Pain Services to provide

around-the-clock pain care. These institutions provide staff and facilities specifically to optimise perioperative pain management. Clinical activities may be augmented by responsibility for the definition and effective implementation of policies, protocols and guidelines.

In the *Acute Postoperative Pain Management Project (APOP)* conducted by Australia's National Prescribing Service in 2007, it was found that institutional barriers continue to limit the uptake of best practice approaches to postoperative pain management. The project was conducted in Australian public and private hospitals in relation to orthopaedic, abdominal, obstetric and gynaecological surgery. Self described as 'moderately successful', the APOP team promoted specific practice changes to improve pain assessment, analgesic prescribing and communication at the point of discharge.

It may initially appear that notions of 'best practice' provide a rationale for restricting patients' access to the more complex postoperative pain management options. However current scientific evidence clearly portrays individual differences in patient response to particular analgesic techniques and agents. This is a consequence of the complexity in the pain response and genetic differences in metabolism of various analgesic drugs. Perhaps with growing awareness of these issues and the benefits of effective postoperative pain management, the implementation of flexible and patient centred practices will have greater impetus.

The widely referenced *Australian Therapeutic Guidelines* provide an account of the current state of postoperative pain management in Australia. Although not referencing the latest ANZCA scientific evidence, the guidelines do accord with established principles which are evidence based. While consistency might be expected, the guidelines are a purposefully different document, emphasising matters which require consideration when choosing analgesia techniques and agents for a particular patient. The guidelines do not attempt consideration of the differences in pain management requirements following specific surgical interventions.

These guidelines are explored in the 7th HPS Pharmacies in-service education session for 2012, titled *Postoperative Pain Management*. The underlying principles of pre-emptive analgesia; multimodal analgesia; pain assessment using the patient's self-report; regular 'time contingent' dosing; utilisation of local anaesthetics; and continual patient monitoring and assessment will be discussed. An update on the currently available analgesic agents will also be provided with consideration of the effect that patients genetic differences have on drug choice.

Directed at professional nursing staff, the session is also of value to others with an interest in optimising patient care and reducing hospital costs.

References for this article can be found on page 30.

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