HPS Pharmacies

Newsline

WINTER EDITION 2012

HPS and Healthscope Continue Their Legacy

HPS and UniSA Working Together to Develop Our Future Pharmacists

leadership we inspire

innovation we create

respect we consider

accountability we perform

excellence we exceed

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Editor
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Front Image
(Left to right) Alan Foster, Group General Manager Procurement at Healthscope, Steve Yeo, Chief Operating Officer and Tony Wyatt, Partner/Chief Executive Officer at HPS Pharmacies, with Kate Baker, National Pharmacy Manager and Robert Cooke, Managing Director at Healthscope

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Message from Tony Wyatt CEO

As we head towards the final quarter of 2012, I take a moment to reflect on HPS Pharmacies' recent achievements. In the past nine months, our business has experienced exponential growth, delivering significant value for HPS and further cementing our business as the leader in the Australian pharmacy industry.

In July, we secured the future longevity of HPS Pharmacies with the successful re-signing of Australia's largest healthcare provider, Healthscope, for the provision of pharmacy services nationally. I am exceptionally proud to see our contract extended for a further six years, demonstrating Healthscope's confidence in HPS Pharmacies to deliver a high quality pharmacy service to their hospitals. To read more, please turn to pages 6 – 9.

Securing this significant contract further complements the strong work of our recently formed Business Development team, who have successfully secured new business in the areas of public and private hospitals, oncology, corrections, veterinary, and IVF and fertility. Of course this success is also attributed to the ongoing superior work exemplified by our staff body in the delivery of the highest quality pharmacy services to our clients and their patients.

Underpinning HPS Pharmacies' success is our continued dedication to innovation. The Correctional Services Healthcare Summit in August afforded HPS an opportunity to showcase our innovative quality improvement programs and packaging solutions, and provided the ideal platform to launch our new methadone bottle design.

HPS Pharmacies has strong ties with Catholic Healthcare and we were pleased to show our continued support as keynote speaker sponsor at their conference, also held last month. In recognition of HPS' ongoing support, I was fortunate enough to have been invited to join their head table at the Conference Dinner and Awards Evening.

I anticipate the last few months of 2012 will be highly successful as we intensify our charter for growth. We look forward to continuing our journey with you, as our valued clients and associates, during this time and are truly excited about what the future holds for HPS Pharmacies.

Tony Wyatt
Partner / Chief Executive Officer

Message from Steve Yeo COO

As we bid farewell to another winter, I am quite pleased to communicate HPS Pharmacies has moved to further consolidate the strategic direction of the business for the next 12 months.

The last weekend of May saw Melbourne play host to HPS Pharmacies' bi-annual Management Group Conference (MGC), with the event being held for the first time in Victoria. The MGC was again a productive weekend, and served as a great opportunity for effective communication and to launch a number of exciting new business initiatives which I will share with you in due course.

This MGC had a strong focus on purchasing and quality inventory management, with much emphasis on streamlined processes and stock handling principle skills training. These processes have been immediately implemented at each of our sites nationally to ensure greater efficiencies in stock management and improved productivity and effectiveness for HPS staff.

In addition, HPS Pharmacies' second Senior Managers Conference (SMC) for 2012 was held in Melbourne, immediately preceding the MGC. This format enabled the senior group to come together and re-align departmental focus in line with business performance and future planning, whilst also preparing as a senior team for contributing to a successful MGC event.

The MGC and SMC are important events for HPS Pharmacies, as forums for collaboration, learning and uniting the leaders of our business in a renewed focus, purpose and shared vision. I eagerly anticipate the well-planned flow-on effects that will be achieved for our clients through the initiatives presented at these conferences as we strive to continue to provide you with the highest quality of pharmacy service.

Steve Yeo
Chief Operating Officer

This page: Robert Cooke, Managing Director at Healthscope (pictured right) with Tony Wyatt, Partner/Chief Executive Officer at HPS Pharmacies.

Cover page (left to right): Alan Foster, Group General Manager Procurement at Healthscope, Steve Yeo, Chief Operating Officer and Tony Wyatt, Partner/Chief Executive Officer at HPS Pharmacies, with Kate Baker, National Pharmacy Manager and Robert Cooke, Managing Director at Healthscope

HPS and Healthscope Continue Their Legacy

HPS Pharmacies is elated to announce the successful re-signing with Australia's largest provider of integrated healthcare, Healthscope, for the provision of pharmacy services nationally.

Re-signing with HPS Pharmacies demonstrates the confidence that Healthscope has with HPS Pharmacies' existing levels of pharmacy service, and directly supports the business' vision and direction of growth in the future by renewing its strong business partnership for another six years.

It also signifies a broadening of the partnership between HPS Pharmacies and Healthscope with the majority of Healthscope owned hospitals now serviced by HPS.

"We are delighted for the opportunity to add further value to the existing partnership through an extension of our services, and a closer working relationship between our two companies in providing the highest quality of care to hospital patients around Australia," says HPS Pharmacies' CEO, Tony Wyatt.

HPS Pharmacies has been the pharmacy service provider of choice to Healthscope for the last six years, representing a significant proportion of HPS Pharmacies' footprint nationally.

Healthscope's National Pharmacy Manager, Kate Baker, says HPS Pharmacies is a national provider of pharmacy services with a focus on public and private hospitals, whose strength lies within the highly specialised area of medication management.

"Having a strong relationship with HPS Pharmacies has paid dividends in the overall quality of care we deliver," says Kate.

"Our short-term focus will be further leveraging HPS Pharmacies' experience and knowledge of hospital pharmacy accreditation and quality use of medicines to enhance our national program of developing excellence."

Excellence is a guiding principle for HPS Pharmacies in the pursuit of delivering the highest quality pharmacy services, with core values well aligned to that of Healthscope's.

Kate says, she is excited moving forward by the continuity of expertise for best practice and medication management delivered by HPS.

"Their continuity of reporting and processes also ensures the individual needs of our hospital sites are met to a high standard.

"HPS' clinical pharmacists have the expertise to interact with all levels of personnel at our hospitals, from our nursing staff to doctors, and the patients themselves to our Executive Team. This high level of open communication ultimately contributes to the highest quality patient care," she says.

Tony believes securing this contract delivers significant value for HPS Pharmacies as it cements itself as the leader in the Australian pharmacy industry and the pharmacy service provider of choice within the private hospital market segment.

"The contract represents enormous future certainty for HPS, enhancing our longevity, and providing a solid foundation to support the exponential growth secured in the last nine months," he says.

"Healthscope enjoys a close working partnership with HPS Pharmacies to deliver mutually beneficial outcomes for each of our sites...I look forward to our growth together as the pharmacy landscape evolves and changes overtime."

– Kate Baker, National Pharmacy Manager

Healthscope HOSPITALS

Kate Baker, Healthscope

"Healthscope has been in formal partnership with HPS Pharmacies for six years, during which time our businesses have collectively grown from strength to strength. We are excited to extend our mutually beneficial partnership by a further six years with the re-signing of HPS Pharmacies as our national pharmacy service provider, ensuring our relationship continues to grow.

HPS Pharmacies delivers continuity of care for our patients nationally and are one of only very few pharmacy service providers with the experience to manage our specific case mix and accreditation requirements.

The re-signing of this contract signifies a broadening of our partnership and we look forward to our growth together as the pharmacy landscape evolves and changes overtime."

Kate Baker, National Pharmacy Manager, Healthscope

"The size and scope of HPS Pharmacies' business is exceptionally beneficial to Hobart Private Hospital and enhances our ability to perform well. The relationship we have with HPS is well founded and we are very happy with the service they deliver."

John Amery, General Manager, Hobart Private Hospital, Healthscope

"Healthscope and HPS Pharmacies share a collaborative partnership, working together to implement new processes, reports, and information packages, which facilitate improvements in medication management and costs within our hospital. HPS' responsive on-site service enables their staff to deliver timely information and patient education. Their staff are familiar with our hospital and its operations and meet regularly with our Executive Team, which results in hospital wide improvements."

Leanne Umstad, General Manager, Melbourne Private Hospital, Healthscope

"HPS Pharmacies is a national company, whose team of expert pharmacists deliver a quality on-site service at Sunnybank Private Hospital, focusing on patient and staff education. They have delivered cost savings to our hospital and have strengthened their relationship with our specialists. I look forward to further developing and fostering our current partnership with HPS Pharmacies at a site level."

Katrina Ryan, General Manager, Sunnybank Private Hospital, Healthscope

Healthscope HOSPITALS

HPS Pharmacies

"The Healthscope business partnership is of great importance to HPS Pharmacies, and re-signing as their national pharmacy service provider for another extended term is a great testament to the high quality services that the entire HPS Pharmacies team delivers to clients every day.

This partnership is now on a path spanning beyond a decade of united services, and I am excited at the tacit value that our businesses will develop through that time, and to the strong united contribution to the provision of healthcare that businesses of our size and quality can deliver together.

We are excited by Healthscope's future goals, and humbled that Healthscope has chosen HPS Pharmacies as a supporting partner to achieve their future success."

Steve Yeo, Chief Operating Officer, HPS Pharmacies

Steve Yeo, HPS Pharmacies

"The continued relationship with Healthscope is critically important for HPS strategically and on many other different levels. We look forward to growing with Healthscope as they expand their services and operations in the private hospital sector."

Tin Huynh, Partner/General Manager – Hospitals, HPS Pharmacies

"The re-signing of Healthscope's national contract with HPS Pharmacies demonstrates the strength of our collaborative partnership and will ensure continuity of care for both staff and patients moving forward. We are excited to leverage our extensive knowledge of Healthscope's hospital operations in tailoring our services to meet each site's individual and specific needs. Healthscope shares our vision and purpose in the provision of best quality clinical care and we take great pride in continuing our partnership."

Alan Tuxford, Regional Operations Manager VIC/TAS, HPS Pharmacies

"HPS Pharmacies' relationship with Healthscope has grown from strength to strength over the years. Both organisations are well positioned to work in harmonious collaboration and leverage off each other's success. The partnership promotes the achievement of common goals and outcomes in pharmaceutical care and medication management. We are excited at the potential for growth and achievement during this next contract period."

Dominic Coppola, Partner/Regional Operations Manager SA/WA, HPS Pharmacies

HPS Pharmacies

This page: Students at UniSA's City East Campus

HPS and UniSA Working Together to Develop Our Future Pharmacists

HPS Pharmacies has collaborated with UniSA in 2012 to deliver a renewed and highly specialised clinical placement program for fourth year pharmacy students. The program offers students the opportunity to apply their theoretical knowledge and expand their learning ability beyond the lecture theatre, as part of an eight-week clinical placement with HPS Pharmacies.

Paula Kwan, Partner and Pharmacy Manager at St Andrew's Hospital in Adelaide, facilitates the student placements and says the program has enabled HPS to establish a strong relationship with UniSA and allows the business to give-back to the pharmacy industry.

The program also assists in generating awareness of HPS' unique career opportunities for future graduates.

"We expose students to traditional pharmacy within a hospital setting, involving them as much as possible in the day-to-day operations as well as providing exposure to the site's quality improvement projects. Examples of these include antibiotic stewardship and patient surveys. The program also gives students an opportunity to experience compounding, aseptic dispensing, oncology, corrections, and HPS' methadone program," says Paula.

Between April and September this year, HPS hosted three eight-week placements, offering UniSA students the opportunity to experience pharmacy at one of the business' South Australian sites, in addition to a one-week stint at HPS – Alexander Avenue and HPS – Calvary North Adelaide.

Simon Bell, an Associate Professor at UniSA's School of Pharmacy and Medical Sciences says "we're very grateful to HPS for providing such an excellent opportunity for our students to be mentored by experienced pharmacists. I have no doubt that this will provide them with a greater appreciation of the changing roles of pharmacists within the Australian healthcare system.

"By working with HPS, we're able to offer our fourth year students a range of professional practice experiences. This helps to ensure our graduates are well equipped to develop and deliver innovative healthcare services in the future."

Bharathy Naidu, a fourth year pharmacy student at UniSA, has recently completed her professional placement with HPS and says she was given the opportunity to gain a comprehensive understanding of a pharmacist's role including the breadth of services they can provide.

"We highly value our ongoing relationship with HPS...we're very grateful to HPS for providing such an excellent opportunity for our students to be mentored by experienced pharmacists."

– Simon Bell, Associate Professor, UniSA School of Pharmacy and Medical Services

"I learnt there's a lot more to being a pharmacist than just dispensing medication and educating patients. Having the chance to see so many different and unique services that HPS provides has certainly been great for me. Being exposed to the industry during my studies has given me a better idea of what I want to do in the future."

Bharathy's experience with HPS has also assisted her fellow students.

"At the completion of their HPS placement, each student gives a short PowerPoint presentation about their experiences. This allows all fourth year students to learn more about the range of healthcare services provided by HPS," says Simon.

"At the University of South Australia, we strive to provide our students with the skill, knowledge and attributes to deliver innovative healthcare services. For this reason we highly value our relationship with HPS. By participating in a professional placement at HPS, our students gain experience working with a range of health professionals. This contributes to our graduate's readiness to work collaboratively to improve health outcomes," he says.

In addition to HPS' strong relationship with UniSA, Paula says there are a number of additional benefits to the program for the pharmacists and staff involved, including the reward of seeing each student gaining confidence in themselves by the end of their placement.

"I would highly recommend the program to other students because it's a great learning opportunity. I had a great time with HPS and met lots of fantastic people who were all very good teachers," says Bharathy.

Pharmacy Business

Pharmacy Leads the Way

Consumers should, at the very least, expect to be safe when receiving care from health practitioners, let alone achieving the desired improvement in health. Regulation of those who wish to practice in these fields establishes more reliable outcomes for patients through the application of quality standards and codes of practice.

In registering as a health practitioner in Australia we are assessed not only for our academic knowledge, but also for the practical skills learnt during internship programs, for mastery of English, and for the relevance and impact of any criminal convictions. To practice we must carry professional indemnity insurance, undertake continuing professional development, and demonstrate current experience.

Australian Health Practitioner Regulation Agency (AHPRA) now administers the registration of 565,000 individuals from 14 professions, which means that we have one registered health practitioner for every 20 working Australians. In establishing the national accreditation scheme, AHPRA has the challenge of integrating established, well regulated professions with emerging groups who have had fragmented arrangements if they have been regulated at all.

The state based Pharmacy Boards entered the national scheme with established compliance to most of the new requirements, such as the way South Australia has achieved mandatory professional development back in 2004 after years of increasingly active encouragement.

As a result, pharmacy was chosen to pilot the framework for auditing compliance during the first quarter of this year. Pharmacists were randomly selected to participate, and given four weeks to complete a checklist and compile supporting documentation. The findings of the pilot will help identify the best process for auditing all health practitioners going forward, and to determine the type and frequency of audits, and the percentage of practitioners to be surveyed to get a representation of each profession as a whole.

Be prepared, your profession may be next!

The Public Interest in Private Health

While lifestyle is a recognised contributor to health, some of us would be sceptical about the reasoning behind private health fund offers of rebates for fitness, weight management, quit smoking courses, and swimming lessons. In the battle for market share, the funds spend approximately $90 million annually on ancillary services which can include the Alexander Technique, aromatherapy, homeopathy, iridology, massage, naturopathy, and shiatsu.

The government has now committed to ensuring that its investment in private health through tax rebates and incentives provides demonstrable clinical efficacy, cost effectiveness, and safety and quality. The 2012–13 Budget saw the investment of $1 million for the Chief Medical Officer, Prof. Chris Baggoley, to oversee a review of private health insurance rebates for natural therapies.

Starting in July, the review will see consultation with consumers, service providers, professional bodies and private health insurers. From January 2014, the private health funds may only rebate those natural therapy services which are approved. The remaining services must be fully funded by the consumer.

Services provided by practitioners registered with the Australian Health Practitioner Regulation Agency, or funded through Medicare will not be affected, including acupuncture, audiology, Chinese medicine, chiropractic, dental, diabetes education, dietetics, exercise physiology, occupational therapy, osteopathy, physiotherapy, podiatry, psychology services provided by Aboriginal health workers, speech pathology, medical, nursing including mental health and midwifery services, and optical.

HPS Probes Professional Indemnity

HPS have recently expanded its contribution to risk reduction in the pharmacy industry through the appointment of partner, Paula Kwan, to membership of the *South Australian Advisory Committee of Pharmaceutical Defence Limited* (PDL), the premier insurer of pharmacists nationally.

PDL's Marie Ritchie (CEO) and John Guy (Victorian Chair) presented at HPS Pharmacies' Management Group Conference an insight on risk management from the perspective of professional indemnity insurance, which became mandatory for pharmacist registration last year.

By taking out personal rather than employer sponsored professional indemnity insurance, the practitioner ensures that protection is not only current, but transfers to other employment, and extends to include any professional service such as advice given in a social setting, and to activities that may not be supported by the policies and procedures of the employer. It also ensures personal indemnity and legal representation if both the practitioner and employer are involved in a complaint.

PDL's experience with errors caused by confusing and similar drug names saw them consulted by the *Safety and Quality Council* to assist in defining the 341 items on the inaugural TALLman list, which will see prescribing and dispensing software apply selective capitalisation to make differentiation easier.

Some easily confused names and the new TALLman disambiguation are:-

Easily Confused Names		TALLman Disambiguation	
Movalis	Mobilis	moVALis	moBILis
Temodal	Tramadol	tEMOdal*	tRAMadol
Aldomet	Alodorm	alDOMET	alODORM
Sirolimus	Tacrolimus	SIrolimus	TACrolimus

As the only hospital based and dispensary active member of the committee, Paula has already found a role in sharing her experiential knowledge, particularly in providing insight into the different systems and challenges for pharmacists in a hospital setting as compared to community pharmacy.

From the Classics to Quality Care

The fundamental commitment to provide 'regimens for the good of my patients … and never do harm' in the Hippocratic Oath has been redefined in the *National Safety and Quality Health Service* (NSQHS) *Standards* which will become mandatory for the accreditation of hospitals and day procedure services from next January. Fifteen agencies have been approved to offer accreditation to date.

The standards are grouped into 10 categories, ranging from Governance to Prevention of Falls, and are seen as essential to improving patient safety and quality of care. They target areas where evidence shows a real chance of achieving the best possible outcomes for the highest number of patients.

Pharmacy services are integral, both administratively and clinically, in implementing programs for the specified indicators. Strategies are focused on particular medicine groups; namely to improve appropriate antimicrobial use, to prevent venous thromboembolism, and to prevent toxicity from those particular drugs with a high risk from their narrow therapeutic window and/or preventable dosage errors.

Implementation of the standards will also ensure that medication orders are accurately documented and interpreted, from effective transition between community and hospital care, to plain language orders using universal abbreviations, 'TALLman' lettering to help differentiate medication names that are easily confused, and 'Safe Electronic Medication Management'.

From our first accreditation interview in 1980, to our decade of experience with the *National Medication Chart*, and our electronic medication management tool, ClinPod, HPS contributes a long pedigree of continuously improving systems and outcomes. We look forward to this next challenge with some excitement.

Reference:

1. The Australian Commission on Safety and Quality in Health Care (ACSQHC). National Safety and Quality Health Service Standards. Sydney, Australia. Available from www.safetyandquality.gov.au/our-work/accreditation/nsqhss. Accessed 7 June 2012.

From The Team Update

Tracy Dickens

Human Resources Manager

HPS Pharmacies' Executive and Human Resources (HR) teams have been liaising closely with our Pharmacy Managers, Pharmacists In-Charge and Pharmacists over the past few months to negotiate an Enterprise Bargaining Agreement. We have been working alongside employee representatives and the Association of Engineers, Scientists and Managers (APESMA) to ensure a mutually beneficial outcome for HPS and our valued staff, and we are pleased to communicate our negotiations are progressing well.

Separate to these discussions, our HR team recently attended a one-day strategic planning session, where we recognised the past, evaluated current strengths, and sought to develop the roadmap to enhance our contribution to HPS in the future. The outcome was the development of a robust strategic vision and direction, which has infused the team with a sense of purposeful action.

During this session, we also discussed the necessity to provide new HPS employees with a comprehensive induction process, resulting in quicker integration, more rapid delivery of required levels of performance, higher retention rates and the ability to reinforce organisational culture, values and expectations at an early stage. The HR team is currently reviewing our induction processes including direct consultation with new recruits on how to improve the overall induction experience.

Jim Tavasci

Finance Manager

In June and July, we finalised HPS Pharmacies' annual budgeting process for the 2012/2013 financial year. This was a collaborative effort across all levels of management within the business to foster commitment and ownership at each of our sites. During this time, HPS' Financial Analysis and Planning Manager and I flew across the country to meet with our Regional Operations Managers, Pharmacists In-Charge and Site Managers to develop their budgets for the following financial year. These budgets were consolidated, received Board approval, and are now be used to support the business' decision making during the current financial year, as well as to set financial controls and monitor and report on our financial performance.

July was an exceptionally busy period for our Finance team as we wrapped up the end of year accounts. This process extended over several months and is where effective planning is required to ensure a smooth year end close. As Finance Manager, I have overseen this process and worked closely with my team to ensure HPS Pharmacies' financial statements are accurate and reliable and that all our compliance obligations have been met.

Briar Buttfield

Marketing Coordinator

In November 2011, the Marketing team instigated a project to develop a new corporate website that more accurately reflects the HPS Pharmacies' brand and professionalism delivered by the business to our clients nationally.

We are excited to communicate the first phase of development is nearing completion and we anticipate this will be finalised in September, ready to 'go-live' shortly after.

This first phase meets our business' dynamic requirements and includes easy to navigate 'Quick Links', dedicated sections for clients and patients, a link to our patient payment portal, snapshots of HPS' latest news, detailed information about our services, feedback forms, HPS' online publications and brochures, improved search functionality, client testimonials, and relevant industry links, to name but a few.

The development phase will be ongoing, with plans to enhance the provision of tools such as a secure area for information sharing and a client portal to further support our client relationships.

In line with the upcoming launch of our new website, HPS Pharmacies will also unveil additional marketing initiatives, which will be gradually introduced throughout our marketing collateral and site signage.

As Marketing Coordinator, I am excited by the progression of the HPS brand and the added benefits our new website will deliver to HPS Pharmacies and in turn our clients.

Nicki Jackson

Procurement & Contracts Manager

HPS Pharmacies held its two day bi-annual Management Group Conference (MGC) in Melbourne during May. The key theme of the conference was around 'Managing Inventory' and 'Purchasing Principles'.

The conference was a great forum for sharing ideas and learning across our management team, and provided HPS' Procurement team with the opportunity to share vital information, as well as provide hands on training in managing stock and purchasing budgets.

The 3 hour session followed the theme of 'Order, Receipt, Transact and Count'.

Our managers were made aware of the importance in ensuring orders are placed with suppliers in line with purchasing supply agreements and budgets.

They were educated on accurate and timely receipting processes, ensuring all stock is receipted into our inventory systems on arrival to allow immediate dispensing to clients and that all transactions are correctly entered in the system to enable a quality invoicing process.

At month's end, all sites are required to perform a full stocktake to verify that inventory is being well managed and errors are eliminated.

With some hands-on training and performance initiative reveal, our management group left the conference feeling they had new knowledge, tools and strong incentive to implement these quality inventory management processes at their site.

A Bismuth Comeback?

Jonathon Soon, Acting Pharmacist In-Charge
HPS – Knox, Knox Private Hospital, Victoria

Bismuth compounds have been used for centuries in medicine. In gastroenterology these medications have mainly been used for the treatment of peptic ulcer disease, dyspepsia, parasitic infections, microscopic colitis, and infectious diarrhoea. Intake of prolonged doses of bismuth subgallate was first associated with encephalopathy in Australia in 1972, leading to its restriction or removal in most countries. In Australia it is only available through the *Special Access Scheme*. Yet, *'triple therapy,'* one of the oldest effective treatments for clearing Helicobacter pylori (H. pylori) infection, uses bismuth in combination with antibiotics.

Bismuth *'triple therapy'* consists of a bismuth compound (usually colloidal bismuth subcitrate or bismuth subsalicylate) in combination with metronidazole and tetracycline or amoxycillin, and reportedly cures 87.9% of patients within 1 week of treatment and 89.2% of patients within 2 weeks of treatment. H. pylori has not been reported to show resistance to bismuth, which may also reduce the development of resistance to co-administered antibiotics, and may be effective at treating H. pylori strains with established resistance to other antibiotics.

The major modes of action for bismuth are that, firstly, it helps to form an acid and pepsin-resistant protective coating at the ulcer site and, secondly, it may have antibacterial effects on H. pylori. The pharmacology for the first mode of action is explained by bismuth compounds exerting their effects via local action within the lumen of the stomach and duodenum. After ingestion, bismuth compounds are taken up into gastric mucosa as well as binding to protein within the base of ulcers after coming into contact with gastric juice, thus forming a protective layer over the ulcer.

With regard to bismuth's antibacterial activity, though unclear, proposed mechanisms include: inhibition of enzymes produced by H. pylori such as urease, catalase and lipase, thus affecting the local environment of H. pylori; inhibition of H. pylori adherence to surface epithelial cells in the gastrointestinal tract; formation of bismuth complexes with bacterial cell walls and within periplasmic membrane causing eventual disintegration of the bacteria; and finally, inhibition of adenosine triphosphate synthesis in H. pylori.

Bismuth is included in a number of regimens for the eradication of H. pylori, although it is not usually used in first-line treatments. First-line therapy involves a proton pump inhibitor, amoxycillin, and clarithromycin for 1 week. Should there be a penicillin allergy, metronidazole may be used in place of amoxycillin. Bismuth is usually only used with other agents after the failure of first-line treatments. The original *'triple therapy'* used colloidal bismuth subcitrate, tetracycline, and metronidazole for 2 weeks, however due to the dosage (4 times daily), number of tablets involved, duration of therapy (2 weeks), and the adverse effects, it has gradually fallen out of favour, though it still achieves high H. pylori eradication rates. Rising clarithromycin resistance rates ensure that there is still a place for *'triple therapy'* using bismuth.

The dosage regimen of colloidal bismuth subcitrate when used in *'triple therapy'* for H. pylori eradication is 120mg capsules 4 times daily for 10-14 days. The most common adverse effects of bismuth are the blackening of faeces and staining of the teeth and tongue, while less frequent ones include nausea, diarrhoea and taste disturbances. Bismuth tablets should be crushed and chewed before swallowing, and preferably be taken on an empty stomach as its absorption may be altered in the presence of food. It should not be taken by pregnant or lactating women, as it can cross the placenta and is excreted in breast milk. For people with renal impairment, it should be avoided as it can accumulate in the body causing toxicity.

According to the AMH 2012, bismuth can accumulate and cause toxicity with high doses or prolonged use beyond 2 months. Acute bismuth subcitrate overdose results in neurological signs such as tremors and weakness, as well as decreased renal function and severe nephrosis. Encephalopathy is the main chronic toxicity for insoluble bismuth salts, which may result in weakness, fatigue, poor concentration, memory loss, visual/auditory hallucinations, and confusion. Treatment of bismuth toxicity is mainly supportive, with adequate rehydration. Spontaneous recovery from encephalopathy and renal failure occurs weeks to months after cessation of exposure to bismuth.

Weighing up the risks against the benefits, and with the increasing H. pylori resistance towards the established NEXIUM HP7 (esomeprazole/amoxycillin/clarithromycin) therapy, bismuth may yet again be introduced as a game-changer towards fighting H. pylori infections.

References for this article can be found on page 30.

The Use of Desmopressin in Certain Bleeding Disorders

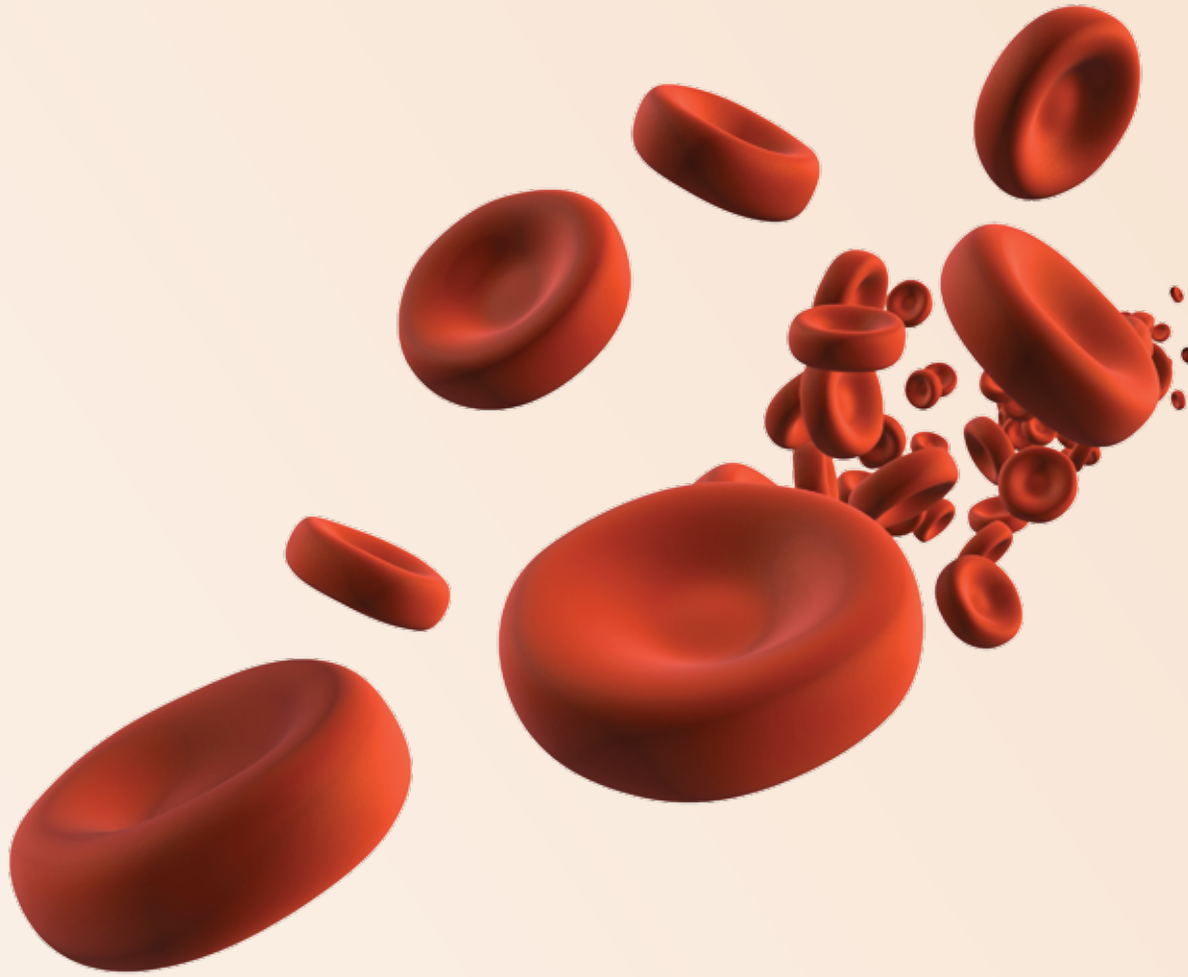
Jiing Siang, Pharmacist
HPS – Toowoomba, St Vincent's Hospital Toowoomba, Queensland

Desmopressin (1-deamino-8-D-arginine vasopressin, DDAVP) is a synthetic derivative of vasopressin, the antidiuretic hormone. It was originally designed for treating diabetes insipidus. Since the first trial was performed in 1977, DDAVP has also been successfully used in the prevention and treatment of bleeding during dental extractions and other surgical procedures in adult and paediatric patients with mild and moderate haemophilia A and von Willebrand Disease (VWD).

There are two forms of haemophilia. Haemophilia A, the most common type, is a deficiency in clotting factor VIII. Haemophilia B is a deficiency in factor IX. Depending on the amount of clotting factor in the blood, there are different levels of haemophilia: mild, moderate or severe. For instance, people with mild haemophilia A can have between 5–50% of the normal clotting factor in their blood. These patients usually only have bleeding problems after serious injury, trauma or surgery.

VWD is also an inherited bleeding disorder. Unlike haemophilia which usually affects only males, VWD affects both genders in equal numbers. It is more commonly encountered and causes mucous membrane and skin bleeding, as well as bleeding with surgical or other haemostatic challenges. It is caused by deficiency or dysfunction of von Willebrand factor (VWF), a plasma protein that circulates in the blood attached to factor VIII. The major function of VWF is so that platelets can adhere, normally to the vessel wall thus improving haemostasis and to maintain normal plasma factor VIII levels.

DDAVP has been found to increase the plasma concentrations of factor VIII and VWF. It also shortens the prolonged activated partial thromboplastin time (aPTT), bleeding time, and has a vasodilatory effect. It enhances platelet adhesion to the vessel wall but has no effect on platelet count or aggregation. In haemophilia A, the factor VIII level should be raised transiently to at least 30% to prevent or control bleeding after a dental extraction. This is more achievable in patients with basal factor VIII levels of greater than 5% (mild haemophilia A) as opposed to 2–5% in moderate haemophilia or <1% in severe haemophilia. DDAVP may be trialled in patients with moderate haemophilia but the patients should be closely monitored. DDAVP is not indicated for haemophilia B as it has no effect on factor IX levels.



To ensure adequate haemostatic response to the drug, a test dose should be given to all mild haemophilia A and VWD patients and their level of VWF antigen measured. The patient's responsiveness to DDAVP treatment is generally consistent over time and within families. In these patients, DDAVP is usually administered intravenously at a dose of 0.3mcg/kg diluted in 50mL saline, and infused over 15 to 30 minutes. This treatment increases plasma levels of factor VIII and VWF by 2 to 5 times above the basal levels within 30 minutes. High VWF levels usually last in plasma for at least 8 to 10 hours. For continued bleeding or postoperative use, about 48 hours must elapse for new endothelial stores of VWF to accumulate, permitting a second injection of DDAVP to be as effective as the initial dose.

For haemostasis, DDAVP can also be given intranasally, and the dose for this is approximately 15 times of that used in diabetes insipidus. Therefore, the regular intranasal preparation (0.1mg/mL) is not sufficient to produce a haemostatic response. A higher-concentration (1.5mg/mL) nasal spray (not available in Australia) is used and this allows home treatment for bleeding symptoms. Intramuscular injections can cause large haematomas in patients with bleeding disorders, and the subcutaneous route is more commonly used in diabetes insipidus.

DDAVP has also been used with success in a variety of acquired bleeding disorders such as acquired VWD. The causes of acquired VWD include medications such as aspirin and NSAIDs, and systemic disorders that can impair platelet function such as uraemia, cirrhosis, lupus erythematosus and multiple myeloma. Side effects such as facial flushing, transient headache, increased pulse rate and drop in systolic blood pressure are mild and transient. They can be minimised if the recommended dosage of 0.3mcg/kg is not exceeded.

The advantages of DDAVP include the reduction in the use of protein based plasma factor concentrates, thereby reducing the risk of immunological and/or infectious complications. As a result, the costs associated with using these plasma factor therapies and the costs incurred when dealing with the complications they may cause, can also be avoided.

References for this article can be found on page 30.

Antimicrobial Stewardship – The Next Step

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The *World Health Organisation* has identified antimicrobial resistance as one of the three greatest threats to human health. Although it has been an issue for a long time now, what has been done to address this? Infection control programs have been very successful in controlling the prevalence of infections caused by multi-resistant organisms, but it is now time to face the problem head on and try to prevent or stop the emergence of these so-called 'super bugs.'

For the past 20 years, the number of new antimicrobial agents approved by the FDA have decreased significantly as seen in Table 1. *The Infectious Disease Society of America* has launched a collaboration titled the *10 x '20 Initiative*, which is aimed at stimulating new research into developing at least 10 new, safe, and effective antimicrobials by 2020. Although this initiative has been backed by key global leaders including US President, Barack Obama, joined with Swedish Prime Minister, Fredrik Reinfeldt, on behalf of the European Union, there still appears to be some struggle in convincing drug companies to invest in this area. The development of new antimicrobials usually takes an average of 8 years from laboratory to market at a cost of around US$800,000,000. Aside from this, new antimicrobials are usually only used for short courses, are usually restricted/regulated due to the cost, and resistance seems to be inevitable. Once resistance develops, the usage of the drug would most definitely be affected. Drug companies tend to find other markets like chronic disease and lifestyle drugs more attractive as the market is more predictable and stable.

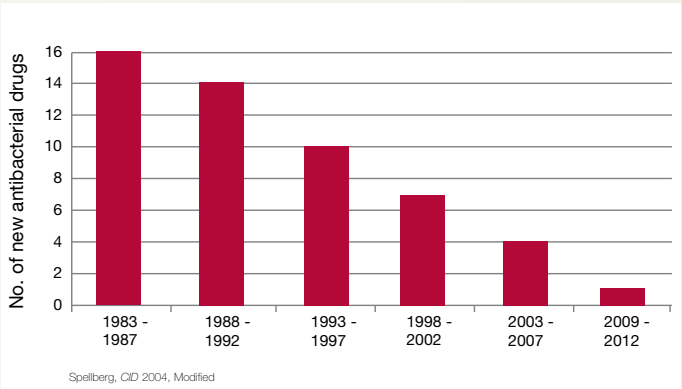

*Table 1. Antibacterial Approvals.**

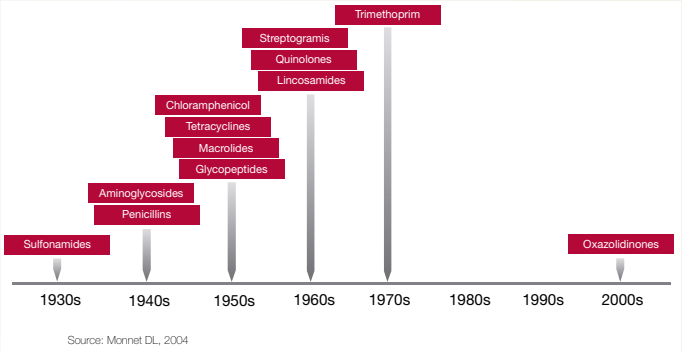

*Table 2. The development of new antibacterial drug classes.**

The first truly effective antibacterial agent, sulfanilamide, gave humanity an advantage in our struggle against microorganisms, even saving Winston Churchill's life during the Second World War! If, however, the current rate of emerging resistance to antimicrobial agents continues, coupled with the decline in the development of new agents, it is possible that we may enter into what some have termed the *'post antibiotic era.'* A case was reported in the *MJA* in 2010 by A. Geethanie et al. where a man in his mid 50's came back from India after elective surgery and was found to have a strain of *Providencia rettgeri* producing the New Delhi metallo-ß-lactamase, the first case in Australia. The isolate was resistant to all ß-lactam antibiotics, including meropenem, as well as to all aminoglycosides, ciprofloxacin, tigecycline and colistin. If the patient had developed a serious infection with this organism there may have been no antibiotic available to treat it, along with the risk of cross-infection within healthcare facilities.

The relationship between antibiotic use and resistance is complicated. It has been shown that the incidence of resistance correlates with the increase in prescribing of antibiotics but there is little data to suggest that a decrease actually results in a decrease in the incidence of resistance to a specific antibiotic. S. Harbarth et al. actually found that there is a lower risk of vancomycin-resistant enterococci associated with intravenous vancomycin use, instead, agents such as broad-spectrum cephalosporins and clindamycin appeared to increase the risk of isolating vancomycin-resistant enterococci. Preventing the emergence of resistant strains does not just involve reducing antimicrobial prescribing, rather we should be looking at prescribing antimicrobials more efficiently; some common strategies include guideline-based prescribing, optimising the dose, timing, and duration of antimicrobials and implementing *Antimicrobial Stewardship* programs.

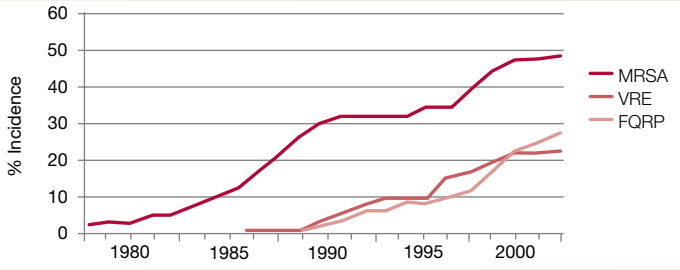

Table 3. Resistant Strains Spread Rapidly situations.*

Studies have shown that up to 50% of antibiotic regimens prescribed in Australian hospitals are inappropriate. *Antimicrobial Stewardship* is defined as 'an ongoing effort by a healthcare institution to optimise antimicrobial use among hospital patients in order to improve patient outcomes, ensure cost-effective therapy and reduce adverse sequelae of antimicrobial use (including antimicrobial resistance)'. The *Infectious Diseases Society of America* and the *Society of Healthcare Epidemiology of America* have found that an efficient *Antimicrobial Stewardship* program has the ability to improve appropriate antimicrobial use; decrease total antimicrobial drug use (22–36%), decrease institutional resistance rates, decrease healthcare costs, and most importantly decrease treatment failures, mortality and length of stay.

A good *Antimicrobial Stewardship* program does not just involve setting up guidelines and restrictions on antimicrobial drug use; according to M. Hulscher et al. 'changing hospital antibiotic use is a challenge of formidable complexity'. The *Australian Commission on Safety and Quality in Healthcare's Antimicrobial Stewardship Advisory Committee* has released a publication on the role of these programs which includes recommendations and strategies on how to implement an effective program. Pharmacists can play a key role in implementing an effective *Antimicrobial Stewardship* program. Experience from the Royal Perth Hospital's *Antimicrobial Stewardship Committee* even suggests that employing an Infectious Disease Pharmacist actually pays for itself in drug cost savings alone and at the same time having safety and quality benefits at no extra cost. Pharmacists are in a position to participate and make positive contributions in the governance of antimicrobials. We also have the means and resources to monitor and report usage data, conduct *Drug Usage Evaluations* and *Quality Use of Medicine* indicator monitoring.

The challenges posed by infections caused by multi-resistant organisms continue to escalate, causing patient morbidity, mortality and increasing healthcare costs. A 2005 report from the *US Centers for Disease Control and Prevention* showed that mortality rate caused by MRSA infections has already overtaken that caused by HIV/AIDS and would continue to increase unless healthcare institutions take steps to limit its spread.

Pharmacists are tasked as members of the healthcare team to ensure that medications are used appropriately. The core principles of *Quality Use of Medicine* align with the main objectives of *Antimicrobial Stewardship*, making sure we optimise the use of antibiotics. A simple query on treatment duration could prompt the busy physician to review the appropriateness of a regimen and may result in cessation of unnecessary doses. This simple intervention can have immediate impact on decreasing healthcare costs, and also decreasing the potential of developing adverse effects, and selective pressure towards resistant organisms.

Please ask your pharmacist regarding a range of services HPS Pharmacies could provide regarding Antimicrobial Stewardship for your hospital or health facility.

References for this article can be found on page 30.

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Pseudomonas Aeruginosa: Treatment and Antimicrobial Resistance

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Introduction

The genus Pseudomonas consists of over 140 species of aerobic, Gram-negative bacilli, with more than 25 species having human association, and mostly linked to opportunistic infections. Pseudomonas aeruginosa (P. aeruginosa) has attracted the most interest due to its high frequency in causing human disease. It is an independent, omnipresent bacterium which is found in the majority of damp environments. This bacterium, although rarely disease-causing in a healthy person, presents a significant danger to hospital patients, in particular cancer patients and burns victims, hence the phenomena of opportunistic infections. The elevated mortality related to infections caused by Pseudomonas is a result of the combined effects of decreased host immune resistance, the antibiotic-resistance of the bacteria, and the synthesis of extracellular bacterial enzymes and toxins.

Treatment Options for P. aeruginosa Infections

A summary of the chemotherapeutic agents used to treat P. aeruginosa infections can be seen in Table 1.

Type of Infection	Drug of First Choice	Alternative Drugs	
Urinary tract infection	Ciprofloxacin[1]	Amikacin	Imipenem
		Aztreonam	Meropenem
		Carbenicillin	Mezlocillin
		Cefepime[2]	Piperacillin
		Ceftazidime[2]	Ticarcillin
		Gentamicin	Tobramycin
Other	Ticarcillin, Mezlocillin or Piperacillin + Tobramycin, Gentamicin or Amikacin[3].	Amikacin	Gentamicin
		Aztreonam	Imipenem
		Ceftazidime[2]	Meropenem
		Cefepime[2]	Tobramycin
		Ciprofloxacin[1]	Trovafloxacin[1]

Table 1. Summary of chemotherapeutic agents used to treat P. aeruginosa infections.

1. Usually not recommended for use in children or pregnant women.
2. The cephalosporins have been used as alternatives to penicillins in patients allergic to penicillins, but such patients may also have allergic reactions to cephalosporins.
3. Neither gentamicin, tobramycin, netilmicin, or amikacin should be mixed in the same bottle with carbenicillin, ticarcillin, mezlocillin or piperacillin for intravenous administration. When used in high doses or in patients with renal impairment, these penicillins may inactivate the aminoglycosides.

Gentamicin is a drug of first choice in the treatment of most P. aeruginosa infections, and is preferred for nosocomial use. As it is an aminoglycoside, it is often chosen for concomitant use against P. aeruginosa with certain other antibiotics, and it prolongs the development of resistance. Aminoglycosides are bactericidal, and act by inhibiting bacterial protein synthesis. The drug binds to the 30S ribosomal subunit and changes protein synthesis, resulting in cellular death. The aminoglycosides have a high affinity for, and act selectively on bacterial ribosomes since they are comprised of a 30S and 50S subunit, while mammalian ribosomes consist of a 40S and 60S subunit.

Ciprofloxacin, a synthetic fluoroquinolone, is also a drug of first choice, but for the treatment of urinary tract infections caused by P. aeruginosa. It is also an alternative treatment option for other P. aeruginosa infections. Ciprofloxacin acts by inhibiting the A subunit of the enzyme bacterial DNA gyrase, which is essential for DNA replication, expression and repair. The fluoroquinolones are selective for bacterial DNA gyrase since eukaryotic cells do not contain bacterial DNA gyrase, and the equivalent mammalian enzyme is structurally dissimilar to DNA gyrase.

Antibiotic Resistance Mechanisms

P. aeruginosa is one of the more antibiotic-resistant bacteria for several reasons, which presents a therapeutic problem. Firstly, the permeability barrier provided by its outer membrane lipopolysaccharide facilitates resistance. It has a lower number of porin channels and hence can reduce the number of antibiotic molecules taken into the cell. In addition, the propensity of the bacterium to colonise surfaces in a biofilm structure causes the cells to be impermeable to therapeutic concentrations of antibiotics. The Pseudomonas strain contains antibiotic resistance plasmids, both R-factors and RTFs, and it has the ability to relocate these genes via transduction and conjugation. It has been found by C. Kendall Stover, Ph.D. (1996) and his research team, that Pseudomonas contains more regulatory genes compared to other bacteria, which allows more effective adaptation to environmental changes.

Further, the bacterium has more 'efflux pumps' compared to other bacteria, and this allows Pseudomonas to expel antibiotics at a greater rate than that at which they are entering the cell. Such pumps expel a range of different antibiotics and hence cause resistance to several antibiotics, simultaneously. The genes involved are called multiple antibiotic resistance genes or mar genes. Drugs can be expelled directly from the cytoplasm into the extracellular environment. Furthermore, amphiphilic substances can be trapped by the pump apparatus while they are partly positioned in the outer face of the cytoplasmic membrane.

Various strains of bacteria including P. aeruginosa have developed resistance mechanisms to the fluoroquinolones in particular, including ciprofloxacin. The three basic mechanisms of resistance are: mutation(s) in DNA gyrase (the target site) which results in decreased binding of the fluoroquinolone, changes in bacterial membrane permeability resulting in a decreased inflow of ciprofloxacin into the cell, or the action of active efflux pumps, where ciprofloxacin that passes into the cell is actively expelled. Ciprofloxacin resistance arises as a result of the selection of mutants that might be prevalent in a population of bacteria. Resistance strategies to ciprofloxacin are coded for by the genes present on the bacterial chromosome, and thus intra- and inter-species relocation of resistance mechanisms to other bacteria does not happen; i.e. resistance to ciprofloxacin has not been found to be linked to plasmids.

Conclusion

Although at this stage P. aeruginosa infections and many other infections are being successfully treated, the evolution of resistant P. aeruginosa strains, as well as the incidence of resistant strains of other bacterial species is of major concern. If action is not taken by the medical field to prevent the spread of antibiotic-resistant bacteria, then uncontainable infection could result. Then, even if new chemotherapeutic agents are found later on, a significant population will already have submitted to, and died from disease in vain, when more thoughtful administration of our current antibiotics would have prevented such situations.

References for this article can be found on page 30.

A Generic Question

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Common questions that a pharmacist is asked are in relation to generic brands. "What are they? What's the difference between them? Do they work differently?" are some of the ways these queries begin. The pharmacist often responds that they "are the same" – but this is not always the best way of dealing with the topic of generics for the first time with a patient or customer. Whilst this statement is correct in general from a medical point of view, extra sensitivity is needed in many cases. The topic can be met by suspicion from a patient who finds it difficult to believe that a generic will provide them with the same health benefits as their previous brand. Additionally, fellow medical staff may also have some questions about whether the effects of generics are exactly the same, and the following points should be kept in mind when discussing this with the curious, considering that they may not have had access to a clear explanation previously.

What's in a name?

The first hurdle is that the term 'generic' is given to alternative brands of medication released after the originating brand. We have already given the patient a reason to doubt quality from the start because in consumer goods, 'generic' invariably means cheaper, and often with the stigma of being of inferior quality, either in terms of ingredients or satisfaction of the user experience. Consequently, this perception transfers to the pharmacy or hospital when the patient is informed they are being given a generic brand. When we consider this, it is not unreasonable for a patient or customer to have initial reservations about using a generic.

One of these things is not like the other.

Simply replying with a response stating that "they are the same as the original brand" can seem dismissive to the patient, or that they are not being told the whole story. After all, the box or bottle looks different, is called a different name, and the actual pill/tablet/capsule looks different – they are clearly *not* the same. It is important to clarify with the patient that the drug or main chemical used *is* the same, but it is made by a different manufacturer, who will give it a different brand name and sometimes choose different colours or prefer different extra ingredients that are used to hold everything together. It may seem like a childish expression, but drawing a parallel that a pill is like a little cake, and needs to be baked with different ingredients to 'stick together' can often illustrate this point quickly in a way that is easy to understand. If we begin talking about excipients and the need for binding agents for stability, the words may be lost on the patient.

Will they work differently?
After explaining the appearance and clarifying that the drug is the same, they may query why one is cheaper, and on the assumption that it is cheaper to make, if it will work just as well. This is an opportunity to enquire with the patient if they have any allergies or perhaps food intolerances. As some people are sensitive to certain colorings or types of ingredients such as gluten, it would be preferable to have a brand which does not contain these ingredients. This is relatively rare as most generics are produced with intolerances in mind. If the patient responds that they have no problem, you can then conclude that they have no medical reason to not have alternative brands, as long as they are comfortable identifying their medications.

The fine print.
The last point to discuss with the patient is that the most effective and safe way to identify their medications is by the name of the drug, not the brand name the company gives their product. Once a patient leaves the hospital or pharmacy they may be familiar with the brand they received, but should they seek their next supply elsewhere, they may be confused by the change. Communicate to the patient that they should not rely on remembering the brand name, or colour/shape of a pill, which is a common way people identify their medications, but rather by the drug/chemical name and dose. They can be empowered with the knowledge that regardless of what the container looks like, they can identify their medication. The drug name and strength is normally found in finer print underneath the large brand name.

No time to chat.
We do not always have the luxury to go into such detail in all cases, but these points can be distilled down, and is an important part of the information needed to be included in counselling for every patient new to taking regular medications, or who indicates any confusion distinguishing their medications. Equally, fellow health professionals can also benefit by having a clearer understanding of the differences between brands. It is worth noting that nursing staff may refer to brand names as being the drug name, which can cause additional confusion.

Exceptions to the rule.
There are a handful of cases where there may be more specific issues relating to generic changes, and these should be discussed with the pharmacist and/or prescriber.

With the introduction of pharmacy chains' *'own brands'*, changes in brands are unavoidable as a pharmacy can no longer keep all brands of the same drug, but can always order a specific brand if needed. If you have a patient or customer that has great difficulty dealing with brand changes and seems unable to distinguish, this can be a red flag to query if the patient requires a dose administration aid (such as a Medico™ or Webster pack™) to assist compliance.

Patient choice and government preference.
At the end of the day, it is the patient's choice which medication they choose and prescribers can indicate on the prescription if brand substitution is not allowed. As pharmacists looking to support the sustainability of the PBS, we have an expectation from Medicare and the Government in general to assist by encouraging the use of generic brands whenever possible. The TGA has strict regulatory guidelines to monitor and approve alternative brands as substitutable which can give you confidence that new brands approved in Australia will serve your patients as well as the brand they had previously. If your patient decides to choose an originator brand, they may be subject to the Brand Price Premium, which is due to the Government only subsidising the amount of the least expensive brand available, and the patient paying the difference.

Taking a few extra moments to address your patient's query can go a long way to helping their understanding of generic brands and ensures we are helping to contribute to supporting quality outcomes.

Syndromes & Symptoms
Neuroleptic Malignant Syndrome

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Neuroleptic Malignant Syndrome (NMS) is a rare but sometimes fatal condition that is thought to affect between 0.02 and 2% of patients taking neuroleptic (antipsychotic) medications, however its incidence is debated. It is thought that the incidence of NMS is decreasing due to changes in prescribing patterns which utilise atypical antipsychotics more frequently than in previous years.

The syndrome is usually characterised by an initial change in mental status, followed by hyperthermia, muscle rigidity (which may be associated with tremor or other dyskinesias), and autonomic instability.

There are a variety of means of diagnosing NMS, with no universally accepted criteria, but it is generally accepted that at least two of four identified features must be present. The *Diagnostic and Statistical Manual of Mental Disorders (DSM IV)* criteria for diagnosis of NMS requires the presence of severe muscle rigidity with elevated temperature in addition to other nonspecific suggestive findings. Laboratory tests that may lend support to the diagnosis include a creatinine kinase concentration above 1000 IU/L, leucocytosis, raised liver enzymes, metabolic acidosis and hypokalaemia although these results can be elevated for other reasons and thus are nonspecific indicators of the syndrome. If fatality occurs it is usually a result of respiratory failure. A patient cannot be diagnosed as having NMS unless they are taking a neuroleptic drug or if they have recently ceased a dopaminergic agent. Diagnosis must exclude other similar conditions such as encephalitis, tetanus, heat stroke, malignant hyperthermia and serotonin syndrome.

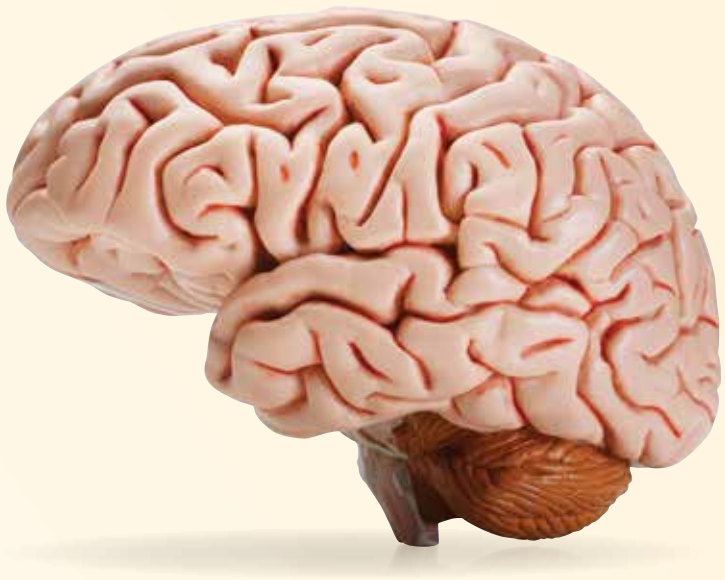
The onset of NMS is idiosyncratic and may occur within hours of taking a neuroleptic drug or after months of administration. It is thought that patients who have experienced NMS with a particular neuroleptic medication may have that drug safely reintroduced, however, there is a higher risk that NMS will recur than with patients who have never experienced the syndrome. While it may take months to occur, once started it can develop over a time of between 24 and 72 hours and can last for up to 10 days.

NMS is associated with all classes of neuroleptic drugs including the atypical antipsychotics (e.g. olanzapine) but when used at recommended doses it is most commonly seen in those taking the older 'typical' antipsychotics (e.g. haloperidol). It has also been seen with low potency D2 receptor antagonists (e.g. metoclopramide) and with the cessation of levodopa or dopamine agonist therapy. In cases in which the syndrome is associated with withdrawal of antiparkinson drugs it is sometimes referred to as 'Neuroleptic Malignant-Like Syndrome'.

Risk factors for development of the syndrome include:

- Previous episodes of NMS
- Agitation
- Dehydration
- High dose of neuroleptic agent
- Lithium administration
- Mood disorders
- Organic brain disorders
- Route of administration (i.e. increased risk with parenteral therapy or depot therapy)

The pathogenesis of the syndrome is still unknown but it is generally thought, among other theories, that a possible cause may be dopamine receptor blockade.



Treatment involves first and foremost ceasing the neuroleptic agent and providing supportive care. Any dopamine antagonists should also be ceased. Supportive care should involve maintaining the airways and circulation, and fluid replacement if necessary with normal saline. If the muscle rigidity is severe and involves the chest wall then intubation, sedation, and paralysis may be necessary. Sedation may also be necessary if the patient is experiencing agitation or confusion. If a patient's temperature exceeds 39°C they should be cooled using methods such as ice packs and tepid sponging.

If the NMS is thought to be the result of cessation of a dopaminergic agent then in addition to supportive care therapy, the dopaminergic agent should be immediately resumed.

If supportive care is not sufficient then drug therapy may be required and should be titrated to clinical effect, i.e. decreased muscle rigidity and temperature. The *Therapeutic Guidelines* recommend the use of bromocriptine (a dopamine agonist) as the first line agent. It should be given orally at a dose of 2.5mg eight hourly and titrated to response. The dose may be titrated up to 5mg given four hourly if necessary. If bromocriptine cannot be used then an alternative agent, dantrolene, can be administered but this agent is considered second line and should only be used in cases in which bromocriptine cannot be used. Dantrolene (a skeletal muscle relaxant) should be given as a daily intravenous dose of 2mg/kg, up to a maximum dose of 10mg/kg/day. It is recommended that a toxicologist should be consulted when treating this condition.

The efficacy of bromocriptine, and dantrolene have yet to be addressed in clinical trials. The use of these agents is still debated and is based primarily on clinical experience and case reports. As such, first line care remains supportive therapy and cessation of the offending agent, with drug therapy reserved for more severe cases.

NMS is a rare condition that can lead to serious complications including coma, renal impairment, respiratory failure, and death. Early diagnosis and treatment are essential to avoid such complications and for resolution of the condition.

References for this article can be found on page 30.

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Hospital Lecture Series
Inhalers: Medications, Indications and Devices

Anne Reeves, Clinical Pharmacist
HPS – Alexander Avenue, South Australia

Introduction

Inhalation therapy has long been practiced in many parts of the world. In China there are records of inhalation treatment of asthma going back to 2600 BC. It was recorded on an ancient Egyptian papyrus in 1554 BC, and in South and Central America tobacco was being used therapeutically and recreationally 2000 years ago. Some methods of inhalation were as simple as throwing herbs onto hot bricks which caused vapourisation of the active ingredient so that it could be inhaled, to the use of pipes for tobacco, and incense burners. The benefit of delivering medication directly to the lungs has been understood for more than two hundred years. The word 'inhaler' was first used by the English physician John Mudge in 1778 to describe his adaptation of a pewter tankard used for inhaling opium vapour to treat cough. The devices have changed, but the principles that were developed are still in use.

The first modern inhalers were developed in 1955 and were pressurised metered dose inhalers (pMDI) which contained isoprenaline and adrenaline. The pMDI produced an atomised spray and allowed for more accurate dosing than previous devices. Over the years these have been further developed with different medications, in 1969 salbutamol and in 1972 beclomethasone, as well as improvements in propellants. Chlorofluorocarbons (CFC) were first used, but they have been phased out due to their destructive effects on the ozone layer and have been replaced with hydrofluorocarbons (HFA), which are less damaging; pMDIs are still the mainstay of treatment for both asthma and Chronic Obstructive Pulmonary Disease (COPD). Dry powder inhalers, which often offer greater convenience to patients and are easier to use, have been developed alongside the pMDI and these have been progressively refined, hence the current plethora of different devices.

Administering medications via inhalation is an ideal way to deliver the active ingredient directly to the area of the lungs where it will work. This manner of topical application often acts more quickly than oral dosing; it allows for smaller doses and significantly reduces side effects as very little of the medication is absorbed systemically. Medications are given by inhaled therapy for several conditions and reasons, including antibiotics for chest infections in cystic fibrosis, iloprost for pulmonary arterial hypertension (not available in Australia), analgesics and anaesthetics. This lecture describes the medications used in inhaled devices for the treatment of asthma and COPD, also known as chronic obstructive airways disease (COAD). While there are oral treatments for these conditions, and some of the medications used in inhalers are also used in nebulisers, we focus on inhalers.

There is some crossover between asthma and COPD, but they are essentially long term conditions involving episodes of shortness of breath (SOB), wheezing, inflammation and infections. Asthma often has an allergic component and may be controlled by identifying trigger factors and avoidance of these factors; and the SOB and wheezing is commonly reversible. COPD is a chronic condition often developed in smokers, poorly controlled asthmatics, and in people who have worked for extended periods in a dusty atmosphere. In this case the condition is not fully reversible and treatment consists of reducing further damage by stopping smoking, improving airway access, and reducing infection and other exacerbations.

Medicine	Device
Preventers – Steroidal	
Beclomethasone *50 or 100mcg*	QVAR Inhaler QVAR Autoinhaler
Budesonide *100, 200 or 400mcg*	Pulmicort Turbohaler
Ciclesonide *80 or 160mcg*	Alvesco Inhaler
Fluticasone *50, 100, 125, 250 or 500mcg*	Flixotide Junior Inhaler Flixotide Inhaler Flixotide Junior Accuhaler Flixotide Accuhaler
Preventers – Non-steroidal	
Sodium cromoglycate *1 or 5mcg*	Intal Inhaler Intal Forte Inhaler
Nedocromil sodium *2mg*	Tilade Inhaler
COPD Medications	
Indacaterol *150 or 300mcg*	Onbrez Breezhaler
Tiotropium *18mg*	Spiriva Handihaler

Medicine	Device
Relievers	
Ipratropium *21mcg*	Atrovent Metered Aerosol
Salbutamol *100mcg*	Airomir Inhaler Asmol Inhaler Ventolin Inhalor
Terbutaline *500mcg*	Bricanyl Turbohaler
Symptom Controllers	
Eformoterol *6 or 12mcg*	Oxis Turbohaler Foradil Aerolizer
Salmeterol *50mcg*	Severent Accuhaler
Combinations	
Budesonide / eformoterol *100, 200 or 400mcg / 6 or 12mcg*	Symbicort Turbohaler
Fluticasone / salmeterol *50, 125 or 250mcg / 25mcg*	Seretide MDI
Fluticasone / salmeterol *100, 250 or 500mcg / 50mcg*	Seretide Accuhaler

Table 1. Asthma and COPD Medications.

Medications

Do you know what medications are used in inhalation therapy and why some combinations are used? What are preventers and relievers? What is their place in the treatment of both asthma and COPD? What are potential side effects? What is the rationale behind combination therapy? This lecture answers these questions and discusses the following medications:

Bronchodilators

- short acting beta agonists
  - · salbutamol
  - · terbutaline
- long acting beta agonists
  - · eformoterol
  - · indacaterol
  - · salmeterol
- the anticholinergics
  - · short acting ipratropium
  - · long acting tiotropium

Corticosteroids

- beclomethasone
- budesonide
- ciclesonide
- fluticasone

Cromones

- cromoglycate
- nedocromil

Devices

Do you know how to use the different devices, why some may be more effective than others in particular situations? And there are many, as seen in Figure 1.

The pMDI, with or without a spacer is the only device, other than a nebuliser which does not rely on inspiratory flow rate, all the others need varying rates of inspiratory flow for effective deposition of medication. The Turbohaler® devices require the greatest flow rate and this can become a problem during exacerbations when lung function deteriorates. If this potential problem is recognised as part of the management plan and an alternative device, e.g. pMDI and spacer is available, the exacerbations may be better controlled and hospital stays avoided, but the important thing to remember is that the most effective device is the one that the patient will use and can use.

The lecture answers some of the above questions, explains the different devices, and provides direction to useful resources and websites which show the available devices and provide instructional videos on how they are used.

References for this article can be found on page 30.

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