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Welcome to our first issue of The HITH Review published under our new name of Ambulatory Care Australia (ACA). In this issue we include information from the Centres for Disease Control and Prevention (CDC) on the first reported case of vancomycin-resistant *Staphylococcus aureus* (VRSA). Other relevant publications include an article from the Victorian HITH Costing study and articles that discuss the costs of specific HITH treatments compared to inpatient treatment.

Most of the articles listed in this review are available from libraries in Australia with some available from journal websites. Copies of articles with an asterisk (★) required for educational or research purposes can be requested from ACA when they are not available from your library. An order form is available on our website.

We appreciate receiving your feedback on The HITH Review and would particularly welcome any contributions. Please contact us if you wish to be included on our mailing list. The HITH Review is available free of charge in hard copy from the ACA or can be accessed on the ACA Web page. Those preferring to receive The HITH Review in electronic format should forward their E-mail address to us.

The support of the Acute Health Division, Department of Human Services is gratefully acknowledged.

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Staphylococcus aureus resistant to vancomycin (VRSA)

Alex Padiglione

CDC. *Staphylococcus aureus* resistance to vancomycin- United States, 2002. Morbidity Mortality Weekly Report 2002; 51:565-88. ★

In June 2002, VRSA was isolated from a swab obtained from a catheter exit site from a 40 year old man with diabetes, peripheral vascular disease, and chronic renal failure, receiving dialysis at an outpatient dialysis centre in Michigan. The patient had been treated for chronic foot ulcers with multiple courses of antibiotics (including vancomycin) over the previous 3 months. In April 2002, the patient developed MRSA bacteremia caused by an infected A-V fistula. The infection was treated with vancomycin, rifampin, and removal of the fistula. In June, the patient developed a suspected catheter exit-site infection, and the temporary dialysis catheter was removed; cultures of the exit site and catheter tip subsequently grew *S. aureus* resistant to flucloxacillin **and** vancomycin (MIC >128 µg/mL) ie VRSA. A week later VRSA, VRE and *Klebsiella* were recovered from a culture of a chronic foot ulcer. The isolate was sensitive to chloramphenicol, linezolid, quinupristin/dalfopristin, tetracycline, and cotrimoxazole. The infection responded to aggressive wound care and antibiotic therapy with cotrimoxazole. Epidemiological investigations showed no VRSA transmission to other patients or staff.

Infection-control practices in the dialysis centre were assessed and found to be consistent with recommended practices. After the identification of VRSA, special precautions were initiated on advice from the Centres for Diseases Control and Prevention (CDC). These included using gloves, gowns, and masks for all contacts with the patient; performing dialysis with a dedicated dialysis machine during the last shift of the day in an area separate from other patients; having a dialysis technician dedicated to providing care for the patient; using dedicated equipment; and enhancing education of staff members about appropriate infection-control practices.

The isolate contained the *vanA* vancomycin resistance gene from enterococci. It also contained the *mecA* gene (found in MRSA).

comment

We have recently seen vancomycin resistance emerge in *enterococci*, posing major infection control problems for our hospitals. However enterococci are otherwise low virulence organisms, which do not pose a threat to the vast majority of the population. *Staph aureus* is of course a much more virulent organism as well as a major cause of hospital- and community-acquired infections. The emergence of vancomycin resistance in staphylococcus are a much greater threat to the health care system.

The first *Staph aureus* with reduced susceptibility to vancomycin was reported from Japan in 1996. The resistance seen then was in the intermediate range (ie high doses of vancomycin may still be successful at treating the infection in some cases), hence these strains have been known as VISA (Vancomycin intermediate *Staph aureus*). These strains have now been isolated from Europe, the USA and Australia (3 hospitals in Melbourne).

This report describes the first documented case of infection of *Staph. aureus* that is fully resistant to vancomycin (VRSA). Resistance has invariably emerged after the introduction of new antibiotics: initially to penicillin in the 1950's and then to methicillin in the 1980's.

It has been known for some time that the *vanA* gene can be transferred to staphylococcus in the lab, but until now this had not occurred in vivo. The fact that this VRSA had the *vanA* gene, and that the patient was also colonised with VRE, suggests that this is what happened in this patient in real life. Fortunately this VRSA isolate was sensitive to a number of other antibiotics, and was able to be successfully treated. In addition, it was sensitive to the newer agents linezolid (Zyvox®) and quinupristin/ dalfopristin (Synercid®).

So what are the implications? So far, there have been no other cases of VRSA, and spread in this case seems to have been checked by strict infection control. However it is only a matter of time before VRSA becomes

more widespread, and laboratory staff need to routinely test isolates for resistance to vancomycin. We will see more use of linezolid (Zyvox®) and quinupristin/ dalfopristin (Synercid®), both of which have significant drawbacks compared to currently used antibiotics. Most importantly it highlights the need to reinforce that strict infection control needs to be a priority for all parts of the healthcare system. We particularly need to be cautious about antibiotic use, regarding them as a precious and limited resource. Inappropriate antibiotic prescribing, such as using a broad-spectrum antibiotic because it has a convenient dosing schedule, is unacceptable.

HITH vs inpatient care – cost savings

Lisa Demos

MacIntyre CR, Ruth D, Ansari Z. *Hospital in the home is cost saving for appropriately selected patients: a comparison with in-hospital care*. Intern J Qual Health Care 2002; 14:285-293. ★

This paper presents the results of the Victorian costing study that compared 924 randomly selected episodes of hospital in the home (HITH) care individually matched to 924 comparable episodes of in-hospital care (IHC). The HITH sample was selected from the Victorian hospital morbidity dataset during the time period of July to December 1997. HITH consisted of two distinct groups, a pure HITH (total substitution) and a mixed HITH (partial episode substitution). Overall HITH was 9% less expensive than IHC ($p=0.04$) and pure HITH was 38% cheaper ($p<0.001$). The mean cost of pure-HITH episodes was 22% lower than mixed-HITH ($p=0.004$). There was no significant difference in the in-hospital mortality in HITH (3.8%) and IHC (5.2%). Pure HITH was associated with a shorter length of stay (LOS) and mixed HITH was strongly associated with a longer LOS.

This Victorian HITH costing study which involved 31 hospitals highlights some of the important points that should be considered when interpreting or undertaking costing studies. HITH treatments or models are not necessarily homogeneous. There were three HITH models of care used in the programs, these included the hospital model, the GP model and the mixed model of care. The GP model of care appeared to be 88% more expensive compared to the other models ($p<0.001$) however the authors noted that the GP model had a small sample size. The combined model of care was shown to be significantly less expensive than the other alternatives (24% cheaper).

The study adjusted costs to eliminate the effects of confounding factors that can influence costs. Using the adjusted costs gave different results to using crude costs. When the adjusted costs were used, HITH was significantly cheaper than IHC whereas when the mean crude costs were used there was no significant difference. The study also provides information on the conditions and treatments that are particularly suitable to HITH.

A review of a paediatric oncology HITH program

Lisa Demos

Miano M, Manfredini L, Garaventa A et al. *Feasibility of a home care program in a pediatric hematology and oncology department. Results of the first year of activity at a single institution*. Haematologica 2002; 87:637-42. ★

This article presents a review of a home care program for children with cancer provided by an Italian tertiary care hospital. Children eligible for the program were required to be stable, non-critical and requiring intravenous therapy, parenteral nutrition, transfusion support, blood examinations, central venous catheter use training management or children requiring palliative and supportive therapy. Forty-five children, age range 4 months to 20 years, were treated in one year.

There were 530 blood withdrawals, 520 antibiotic, antiviral, antifungal or other intravenous therapies, 104 red blood cell or platelet transfusions, 100 pain therapy administrations, 55 training sessions for CVC use, 28 total parenteral nutrition, 27 re-hydrations and 5 CVC medications. These were administered over 881 nurse and/or physician visits replacing 551 outpatient clinic visits and 330 days of hospitalisation. The total home care was 1,364 days and the median duration of home care was 19 days for each child. The average cost per patient given home care was significantly lower than if the patient underwent the same procedures in hospital (2,936 vs 9,785 Euro, $p < 0.001$).

comment

This article reviews one-year's experience of a paediatric hospital based home care program. The report was undertaken to review the feasibility of the program. Costs of the program are provided and contrasted to providing care in hospital. Unlike most other programs this service provides both physician as well as nurse visits to the child's home. The authors also discuss the expansion of the service to include the administration of chemotherapy at home by increasing the number of nursing staff in the program.

Cost of DVT management

Lisa Demos

O'Brien JA, Caro JJ. *Direct medical cost of managing deep vein thrombosis according to the occurrence of complications*. *Pharmacoeconomics* 2002; 20:603-615. ★

This publication estimates the average cost of various deep vein thrombosis (DVT) management options from the US health payer perspective. 29,295 inpatient cases were identified by ICD9 clinical modification codes from 1,077 hospitals across 6 states and divided into 7 subgroups according to complication status. A cost estimate was developed by applying unit costs to the corresponding course of treatment. Cost estimates included initial acute care and that occurring in the following 6 months. Resource use

profiles and unit costs were derived from several statewide inpatient, emergency room and ambulatory care databases, supplemented by national fee schedules, published reports and peer-reviewed literature. The mean 6-month treatment costs for inpatient management ranged from \$US3,906 - \$US17,168 depending on complication status. For outpatient management cost ranged from \$US2,394 to \$US3,369 depending on the frequency of low molecular weight heparin (LMWH) and the need for professional assistance. Self-administered LMWH resulted in the lowest cost.

comment

This is a comprehensive evaluation of the economic costs of DVT management that also includes post acute care management. For home care or outpatient care the costs are broken down to LMWH administered once or twice daily and RN-administered or self-administered. The authors use a large number of patient records to describe the current DVT treatment scenarios, they use average costs to estimate costs of DVT management and they take into consideration complications. The authors discuss the limitations of this analysis noting the possibility of coding errors in the database. Although the costs are based on the US healthcare perspective this is a very useful paper for anyone reviewing the impact of different management strategies on the cost of management of DVT.

Other Relevant Articles:

Boccalon H, et al. Clinical outcome and cost of hospital vs home treatment of proximal deep vein thrombosis with a low-molecular-weight heparin. *Arch Intern Med* 2000; 160:1769-73. ★

Spyropoulos A, et al. Outcomes analyses of the outpatient treatment of venous thromboembolic disease using the low-molecular-weight heparin enoxaparin in a managed care organization. *J Managed Care Pharm* 2000; 6:298-304. ★

Tillman D, et al. Effectiveness and economic impact associated with a program for outpatient management of acute deep vein thrombosis in a group mode health maintenance organization. *Arch Intern Med* 2000; 160: 2926-32. ★

Hull RD, Pineo GF. Economic aspects of deep vein thrombosis treatment and outpatient management. *Home Health Care Consultant* 2000; 7:22-9. ★

Management

Nick Santamaria

Darr K. *Nexus: ethics, law, and management. Acute care hospitals and community health.* *Hospital Topics* 2000; 78:26-9. ★

comment

Do acute hospitals have a responsibility for improving the health of the communities in which they operate? A definite no is the answer provided in this provocative article. In fact the author argues that the responsibility of acute hospitals in the American healthcare system is to ensure that they do not become distracted from their principal acute care role by providing non-acute services such as home care, health promotion or primary health interventions. This argument is supported by a review of the evidence of the negative financial consequences for acute hospitals that have attempted to be more than an acute health care provider to their communities. The author argues that by undermining their financial position by not solely focussing on acute health, these hospitals in effect diminish their value to the community. The article presents Australian readers with a stark economic rationalist perspective on acute healthcare. Its American context challenges the reader to understand the significantly different perspective of health care provision within a principally private system. This brief, well-written article's value to the Australian health professional lies in its ability to confront us with philosophical position on the provision of health care based on economically driven principals. It forces us to question (briefly) some of the driving forces in our own acute care system over the past decade and to wonder at the cost benefits of the resulting initiatives that have emerged.

Wound Care

Nick Santamaria

Ovington LG. *Dealing with drainage: The what, why and how of wound exudate.* *Home Healthcare Nurse.* 2002; 20:368-374.

comment

This is a well-written and informative article on an important area of wound care. Wound exudate has important influences on healing rates in both acute and chronic wounds. The author provides a logical and concise description of the role of exudate in the healing wound, similarly the non-healing wound is characterised by the different composition of exudate. Recent research evidence on the biochemistry of differing wound exudates and their subsequent physiological effects on the healing wound support this information. The author provides practical advice to the clinician on the assessment of exudate in terms of quantity, quality and distinctive characteristics. The management of exudate is discussed in detail and a quick reference list is provided for the reader. Wound dressing products are reviewed and listed in terms of their features and applications. Overall this is a useful and informative article that is up to date and presented in a manner that is accessible to the home care practitioner.

Relevant abstracts from Medline and Cinahl

Maraq NF, Gomez MM, Rathore MH. *Outpatient parenteral antimicrobial therapy in osteoarticular infections in children.* *J Pediatric Orthoped* 2002; 22:506-510. ★

This study reviewed the safety and effectiveness of outpatient parenteral antimicrobial therapy (OPAT) in the management of osteoarticular infections (OAI) in childhood. Using their OPAT database, the authors evaluated the use of OPAT in children younger than 18 years old treated for OAIs between January 1, 1995, and December 31, 1999. One hundred eighty-four OAIs were treated in 179 patients over 5 years.

OPAT involved central venous lines (CVLs) in 110 (59.8%), peripherally inserted central catheters (PICCs) in 71 (38.6%), and peripheral cannulas in 3 (1.6%). One hundred eighteen (64%) OPAT courses were completed without interruption. Re-hospitalisation occurred in 48 (26.1%) courses and occurred earlier with PICC. OPAT complications were catheter-related in 58 (30%) courses, not catheter-related in 60 (32%), and unknown in 10 (5.3%). The mechanical complication rate was 6.3 per 1,000 catheter-days (CVL 4.2, PICC 10.6), and the rate of infectious complications was 2.7 per 1,000 catheter-days (CVL 2.8, PICC 2.4). One hundred sixty-eight (98%) of 172 evaluable OAI were cured. Four (2.2%) patients failed treatment: one had recurrence and three had persistent infection. The authors conclude that OPAT can be safely used to manage OAI in children without compromising outcome. Mechanical complications are more common with PICCs.

Walshe LJ. Malak SF. Eagan J. Sepkowitz KA. *Complication rates among cancer patients with peripherally inserted central catheters.* J Clin Oncol. 2002; 20:3276-81.

Peripherally inserted central catheters (PICCs) are frequently used to deliver outpatient courses of intravenous therapy. However, the rates and risks of complication for this device have not been well-studied. The objective of this study was to determine the incidence and risk factors of PICC-related complications with a 1-year prospective observational study.

All PICCs inserted in adult and paediatric patients at Memorial Sloan-Kettering Cancer Center (MSKCC) were followed prospectively. The device insertion team, inpatient nurses, and various home-care companies and outside institutions collected longitudinal data.

Three hundred fifty-one PICCs were inserted during the study period and followed for a total of 10,562 catheter-days (median placement, 15 days; range, 1 to 487 days). Two hundred five PICCs (58%) were managed by home-care companies and outside institutions, and 146 PICCs (42%) were managed exclusively at MSKCC. For these 205 PICCs, 131 nurses from 74 home-care companies and institutions were contacted for follow-up clinical

information. In all, 115 (32.8%) of 351 PICCs were removed as a result of a complication, for a rate of 10.9 per 1,000 catheter-days. Patients with haematologic malignancy or bone marrow transplant were more likely to develop a complication, whereas those with metastatic disease were less likely.

Complications occur frequently among cancer patients with PICCs, and long-term follow-up is onerous. Despite a high complication rate, the ease of insertion and removal argues for continued PICC use in the cancer population.

List of Medline, Cinahl and other relevant published articles

Allied Health

Brown J, Hasseklus A, Tenenholtz E. *Speech-language pathologists add value to home care.* Home Healthcare Nurse 2002; 20:393-398. ★

Anaphylaxis

O'Hollaren MT. *Anaphylaxis: New clues to clinical patterns and optimum treatment.* Medscape 2002. <http://www.medscape.com> ★

Cost Effectiveness

MacIntyre CR, Ruth D, Ansari Z. *Hospital in the home is cost saving for appropriately selected patients: a comparison with in-hospital care.* Intern J Qual Health Care 2002; 14:285-293. ★

Elderly patients

Allan MA. *Elder abuse: a challenge for home care nurses.* Home Healthcare Nurse 2002; 20:323-330. ★

Ethics

Darr K. *Nexus: ethics, law, and management. Acute care hospitals and community health.* Hospital Topics 2000; 78:26-9. ★

Infections and Antibiotic Therapy

CDC. *Staphylococcus aureus resistance to vancomycin- United States, 2002.* Morbidity Mortality Weekly Report 2002; 51:565-88.

Maraqa NF, Gomez MM, Rathore MH. *Outpatient parenteral antimicrobial therapy in osteoarticular infections in children.* J Pediatric Orthoped 2002; 22:506-510. ★

Ness RB, Soper DE, Holley RL et al. *Effectiveness of inpatient and outpatient treatment strategies for women with pelvic inflammatory disease: results from the pelvic inflammatory disease evaluation and clinical health (peach) randomized trial.* Am J Obstetr Gynecol 2002; 186:929-37. ★

Infection Control

Hibbard JS, Mulberry GK, Brady AR. *A clinical study comparing the skin antiseptics and safety of chloraPrep, 70% isopropyl alcohol, and 2% aqueous chlorhexidine.* J Infusion Nursing 2002; 25:244-249. ★

Line Complications

Walshe LJ, Malak SF, Eagan J, Sepkowitz KA. *Complication rates among cancer patients with peripherally inserted central catheters.* J Clin Oncol. 2002; 20:3276-81.

Miscellaneous

Ratner E. *What is success in home care?* Home Health Care Consultant August 2002; 8. ★ <http://www.mmhc.com/hhcc/>

Ratner E. *Enough but not too much- the home health plan of care.* Home Health Care Consultant 2002 September; 9 ★ <http://www.mmhc.com/hhcc/>

Tamiya N, Yamaoka K, Yano E. *Use of home health services covered by new public long-term care insurance in Japan: impact of the presence and kinship of family caregivers.* Intern J Qual Health Care 2002; 14:295-303. ★

Nursing

Buppert C. *NPs cannot order, certify, or recertify home care or perform care plan oversight.* Medscape 2002. <http://www.medscape.com> ★

McMahon DD. *Evaluating new technology to improve patient outcomes.* J Infusion Nursing 2002; 25:250-255. ★

Sexton JS, Seldomridge L. *The characteristics and clinical practices of nurses who perform home infusion therapies.* J Infusion Nursing 2002; 25:176-181. ★

Snyder K. *Home Health: A nurses responsibility does not end upon recommending a patient go to the hospital.* Home Healthcare Nurse 2002; 20:404. ★

Nutrition

Silver HJ, Wellman NS. *Family caregiver training is needed to improve outcomes for older adults using home care technologies.* J Am Dietetic Assoc 2002; 102:831-836. ★

Swensen S. *Living forward with the Oley Foundation for home parenteral and enteral nutrition.* Infusion 2002; 8(4): 20-3. ★

Obstetrics

Skrablin S, Kuvacic I, Jukic P. et al. *Hospitalization vs. outpatient care in the management of triplet gestations.* Int J Gynecol Obst. 2002; 77:223-9.

Paediatric

Miano M, Manfredini L, Garaventa A et al. *Feasibility of a home care program in a pediatric hematology and oncology department. Results of the first year of activity at a single institution.* Haematologica 2002; 87:637-42. ★

Pain Management

Pullen RL. *Pain management of chronic nonmalignant neuropathic pain.* Home Healthcare Nurse 2002; 20:387-392. ★

Patient Safety

Dwyer K. *Breaks in care in the ambulatory care setting: the risks to patient safety.* Intern J Qual Health Care 2002; 14:259-260. ★

Goss L, Carrico R. *Get a grip on patient safety. Outcomes in the palm of your hand.* J Infusion Nursing 2002; 25:274-279. ★

Peripheral Intravenous Cannula

Callaghan S, Copnell B, Johnston L. *Comparison of two methods of peripheral intravenous cannula securement in the pediatric setting.* J Infusion Nursing 2002; 25:256-264. ★

Foster L, Wallis M, Paterson B et al. *A descriptive study of peripheral intravenous catheters in patients admitted to a pediatric unit in one Australian hospital.* J Infusion Nursing 2002; 25:159-167. ★

Ung L, Cook S, Edwards B et al. *Peripheral intravenous cannulation in nursing.* J Infusion Nursing 2002; 25:189-95. ★

Walshe LJ, Malak SF, Eagan J. et al. *Complication rates among cancer patients with peripherally inserted central catheters.* J Clin Oncol. 2002; 20:3276-81.

Pharmacy and Drugs

Cabaleiro J. *The compounding pharmacist: a home care and hospice partner.* Home Healthcare Nurse 2002; 20:359-362. ★

Nowobilski-Vasilios A. *New drugs and biologicals. 2001-2002: a review for home care practitioners.* Infusion 2002; 8:32-42. ★

Phlebotomy

Ernst DJ, Ernst C. *Phlebotomy tools of the trade: Part 2 surveying the antecubital area.* Home Healthcare Nurse 2002; 20:402-403. ★

Plasma Therapy

Barrell J. *Plasma therapies: how new indications, safety measures, and industry consolidation affect supply and demand.* Infusion 2002; 8:13-18. ★

Telemedicine and Technology

Frantz AK, Colgan J, Palmer K et al. *Lessons learned from telehealth pioneers.* Home Healthcare Nurse 2002; 20:363-366. ★

Kinsella A. *Telenurses today - creating the new picture of home care.* Home Healthcare Nurse 2002; 20: 294-296. ★

Whitten PS, Mair FS, Haycox A et al. *Systematic review of cost effectiveness studies of telemedicine interventions.* Br Med J 2002; 324:1434-7. ★

Venous Thrombosis

Clinical Council on DVT Management. *Treatment of deep vein thrombosis in the outpatient setting (part 1).* Home Health Care Consultant July 2002; 11-18. ★ <http://www.mmhc.com/hhcc/>

Clinical Council on DVT Management. *Treatment of deep vein thrombosis in the outpatient setting (part 2).* Home Health Care Consultant August 2002; 13-20. ★ <http://www.mmhc.com/hhcc/>

Huse DM, Cummins G, Taylor DCA et al. *Outpatient treatment of venous thromboembolism with low-molecular-weight heparin: an economic evaluation.* Am J Managed Care 2002; 8:S10-6. ★

O'Brien JA, Caro JJ. *Direct medical cost of managing deep vein thrombosis according to the occurrence of complications.* Pharmacoeconomics 2002; 20: 603-615. ★

Wound Management

Ovington LG. *Dealing with drainage: the what, why, and how of wound exudate.* Home Healthcare Nurse 2002; 20:368-374. ★

Schaum KD. *Documentation of wound exudate amount leads to dressing reimbursement after discharge.* Home Healthcare Nurse 2002; 20(6):399. ★

Disclaimer:

Whilst every effort is made to reliably report the data and comments from the journal articles reviewed, no responsibility is taken for the accuracy of articles appearing in The HITH Review, and readers are advised to refer to the original papers for full details of the research.