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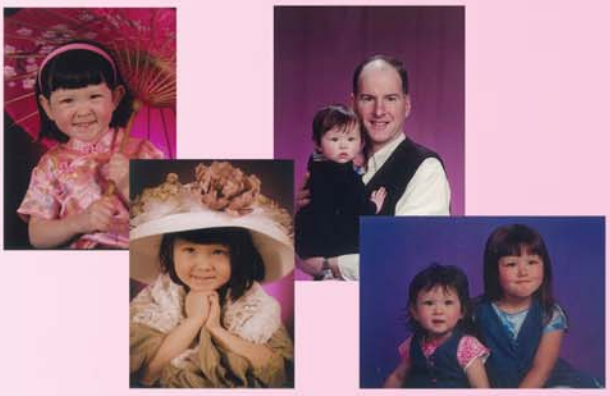

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Community-associated Methicillin-Resistant *Staphylococcus aureus* (CA-MRSA) is Emerging or Just Re-emerging?

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Editor

Prof. Pak-Leung Ho

Staphylococcus aureus is part of the skin and nasal microbial flora. Carriage is acquired soon after birth and reaches peak rates of 40-50% at 6 to 12 years of age before declining to adult rates of 10 to 20%. Among individuals with medical conditions, such as diabetes mellitus, chronic skin conditions, intravenous drug abusers and dialysis patients, higher carriage rates of *S.* aureus have been found. Not surprisingly, *S. aureus* often tops the list of bacterial infections. In the United States, it has been estimated that 300,000 *S. aureus* hospitalisations occurred annually; accounting for 1% of all hospital discharges. Regarding economical impact, in-patients with *S* aureus infection had 3 times the length of hospital stay, 3 times the total charge, and 5 times the risk of in-hospital death than those without this infection[1].

As for influenza virus, antibiotic-resistant *S. aureus* has the ability to cause pandemic infections. During the 1950s, the notorious penicillin-resistant S. *aureus* clone known as phage type PT80/81 emerged and quickly plagued the world with serious hospital- and community-acquired infections[2]. Those isolates were resistant to penicillin, the anti-staphylococcal agent of choice at that time and were deemed responsible for 70 of 86 major outbreaks from 1954 to 1957[2]. In those days, these isolates were noted to be unusually transmissible and virulent, causing a high frequency of skin and soft tissue infections, sepsis and pneumonia in healthy children and young adults. A leukocidin was suggested to be the major virulence factor among the PT80/81 isolates, which was recently confirmed to be Panton-Valentine leukocidin (PVL)-positive[3,4]. The PT80/81 clone waned in the 1960s, following better sanitation and the widespread use of methicillin and other penicillinase-resistant beta-lactams.

Although methicillin resistance has emerged in *S. aureus* since the 1960s and MRSA isolates are now endemic in the developed parts of the world including Hong Kong, their occurrences have largely been confined to individuals with underlying conditions or exposures to the health care environment. Hospital strains of MRSA are PVL-negative. This scenario has changed. Since the late 1990s, a growing number of reports have documented PVL-positive, community-associated methicillin-resistant *S. aureus* (CA-MRSA) among healthy individuals without the classical risk factors. The CA-MRSA strains have DNA fingerprints distinct from those endemic in hospitals. Among emerging CA-MRSA clones, one version known as the Southwest Pacific clone was found to belong to the notorious PT80/81 lineage. Thus, descendents of PT80/81 have acquired methicillin resistance, and are re-emerging worldwide like their ancestors in the 1950s[5]. In Hong Kong, approximately half of the contemporary CA-MRSA strains including the fatal infections were reported to be related to this virulent clone[6].

This issue addresses this emerging infectious threat from CA-MRSA. Professor Yuen reminds us the roles played by *S. aureus* in pandemic influenza history and why this should be a public health priority[7-9]. In the same year when the first CA-MRSA was documented in our locality[10], the Centre for Health Protection was established to

strengthen disease prevention and control in the HKSAR in partnership with local experts. Accordingly, Dr. Thomas Tsang narrates for us the HKSAR's public health responses put in place since 2004, the local CA-MRSA scenario and the challenges ahead. Since January 2007, public health notification of CA-MRSA becomes mandatory in the HKSAR. In the United States, the definition used by the Centers for Disease Control and Prevention is based entirely on epidemiological information. In Hong Kong, a combination of epidemiological, clinical and microbiological criteria is adapted for reporting CA-MRSA. The rationale for the local approach and the laboratory protocol are detailed in the article by Dr. Janice YC Lo. Readers who are interested to find out further about CA-MRSA definitions are referred to a recent review[11].

There are several circumstances under which elimination of *S. aureus* are often considered[12], such as (1) when carriage of *S. aureus* increases the risk of infection (e.g. before prosthetic joint replacement); (2) when patients have recurrent staphylococcal furunculosis by the same strain; and (3) when carriage is linked to the spread of the organism in a community or facility. In a prospective observational study in soldiers, 38% of CA-MRSA carriers comparing to 3% of MSSA carriers were found to develop infection when followed-up over a 8-10 week period[13]. Against this knowledge, Dr. TL Que reviewed the lessons learnt from experiences with decolonisation treatment of *S.* aureus, hospital-acquired MRSA and CA-MRSA. As discussed by Dr TC Wu, the spread of CA-MRSA has ramifications on our approach to managing patients with staphylococcal syndromes. At this stage, the utility of predictors found elsewhere for identifying patients at risk of CA-MRSA infections in our community may be limited. As this organism is more likely than the ordinary "Staph" to cause antibiotic failure, recurrent infections and disease in close contacts, it would be important to consider cultures from purulent wounds for patient education and to guide antibiotic treatment. Looking into the future, it is likely that CA-MRSA will continue to emerge. We hope readers will find this issue useful and educational.

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TYG-AD-008-OCT-07

CA-MRSA as an Emerging Public Health Threat

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Staphylococcus aureus is one of the most successful bacteria ever found in human. It can survive in the inanimate environment for up to 7 months because of its resistance to desiccation. It regularly colonised the anterior nares of 30% of the global population and the disrupted skin integument in over 60% of such patients[1]. Though it is the most important cause of purulent infections involving skin and soft tissue, bone and joint, surgical wound or indwelling devices, it can cause almost any form of localised or systemic illness. Diagnosis often relies on the Gram stain of the pus collected from the lesion which showed numerous white blood cells with clusters of gram positive cocci. Incubation of the pus on agar medium for 24 hours would usually show heavy growth of golden yellow bacterial colonies which can coagulate rabbit plasma. Thus it is often referred by laboratory staff as coagulase positive Staphylococci. Of course such a positive culture from any normally sterile body fluid usually has clinical significance.

Most isolates of *Staphylococcus aureus* nowadays are resistant to Penicillin G first introduced in the 1940s. The resistance is due to the acquisition of a plasmid gene carrying the enzyme penicillinase which hydrolyses and destroys Penicillin G. In 1957, a strain of hospital acquired penicillin resistant *Staphylococcus aureus* (Phage Type 80/81 PRSA) triggered a global outbreak in hospitals. This strain caused sepsis in 30% of the colonised patients and had even affected health care workers[2]. The introduction of the methicillin group of antibiotics including cloxacillin in the 1960s has largely brought this infection under control but this was soon followed by the emergence of hospital acquired methicillin (oxacillin) resistant *Staphylococcus aureus* (HA-MRSA) in 1961 due to its acquisition of a chromosomal gene called *mec*A[3]. The *mec*A encodes an enzyme, a transpeptidase called PBP2a which plays a key role in the synthesis of the bacterial cell wall. But this mutated PBP2a has a poor affinity for all beta-lactam antibiotics including methicillin or cloxacillin. These antibiotics can no longer bind the enzyme and stop the bacterial cell wall synthesis. This problem of resistance is completely out of control in most hospitals around the world except the Netherlands and the Scandinavian countries[4]. The same is true in the public hospitals of the Hong Kong Special Administrative Region (HKSAR), MRSA constitutes up to 60% of hospital isolates of *Staphylococcus aureus* in all clinical specimens including blood cultures. Thus it is understandable why vancomycin was increasingly used which in turn fuels the emergence of vancomycin resistant enterococci and in some cases vancomycin resistant Staphylococci.

Despite the fact that MRSA has been dominating the hospitals for 40 years, this was largely confined to health care settings including the elderly's nursing homes. However in 1993, a new form of MRSA called community acquired MRSA (CA-MRSA) appeared in the Aborigines of Western Australia[5]. In the USA and Europe, CA-MRSA also emerged in 1997 to 1999 among otherwise healthy individuals without heath care risks. By now, over 50% of the skin and soft tissue infection seen at the Emergency Rooms of USA are caused by CA-MRSA. We saw the first case in HKSAR in 2004[6]. As in the case of the overseas isolates, our HKSAR isolates were initially only resistant to the beta-lactams including cloxacillin but the more recent isolates are becoming resistant to many other groups of antibiotics including macrolides(eg. erythromycin, clarithromycin and azithromycin), clindamycin, tetracyclines and aminoglycosides. These isolates are characterised by the presence of genes carrying a virulent factor called Panton Valentine Leukocidin (PVL) and the gene cassettes called SCC*mec* type IV and type V[7]. These genes can be detected by PCR and is now the gold standard for ascertaining the identity of CA-MRSA.

What is most frightening is not the ugly purulent skin and soft tissue lesions which usually respond to drainage and dressing, but that CA-MRSA can cause necrotising pneumonia with a high mortality of over 30% even in normal young immunocompetent hosts who were co-infected by seasonal influenza virus[8]. This reminds us of the high mortality of 30% in young soldiers who were co-infected by pandemic influenza virus and *Staphylococcus aureus* in 1918. Remember that the overall mortality of the 1918 pandemic was around 2 to 3%. If we fail to control the spread of CA-MRSA in our population and a new pandemic influenza really comes, the result would be more disastrous than SARS and the 1918 H1N1 pandemics. This combination of CA-MRSA and pandemic influenza would be the most fatal plague of the new millennium.

Many public health experts are pessimistic about the control of CA-MRSA because they have failed in the control of HA-MRSA[9]. They ignored the fact that the epidemiologists in the Netherlands and Scandinavia had done an excellent job to control HA-MRSA simply because they adopt a search and kill strategy when the disease was still very sporadic[4]. For epidemics due to antimicrobial resistance, it appears that once the isolation rate goes above a few percents in clinical specimens, it would almost be impossible to do anything. HKSAR is now at the start of the CA-MRSA epidemic with the non-Chinese population being over-represented at this stage.

This would be very important if this issue is on the political and public health agenda. The classification of CA-MRSA as a notifiable disease is an important first step. For the general public, they should always be treated and covered for purulent skin lesions. For attendees at clinics and hospitals with no history of hospitalisation in the past one year, not on dialysis or residing in old people's home, their purulent skin lesions must be cultured for MRSA. Once the disease is confirmed and notified to the Department of Health, diligent contact tracing, education and decolonisation must be performed on the contacts. The public should be taught on hand hygiene and wound care and to avoid the risk factors for CA-MRSA. All doctors who prescribed antibiotics to patients must warn them that they are most prone to be colonised by CA-MRSA or any other resistant bacteria while their normal flora are being destroyed by the antibiotics. They should be taught on the regular use of alcoholic hand rub for hand hygiene while on antibiotics. Every patient being prescribed with antibiotics should receive an education pamphlet on hand hygiene and infection by resistant bacteria. They should consider wearing mask especially if they have respiratory symptoms. As a long term goal, we must reduce the unnecessary consumption of antibiotics. Antibiotics should not be prescribed indiscriminately for running nose or cough. Compliance to infection control measures at hospitals must be strengthened to stop CA-MRSA from replacing HA-MRSA. This is a war that we have to fight now than be sorry later.

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Dermatological Quiz

Dermatological Quiz

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Dr. Lai-yin Chong

Fig 1a *Excoriated papular lesions at the buttock*

Fig 1b *Vesicles and erythematous erosions at the forearm*

A 45-year-old man complained of recurrent intensely pruritic skin lesions at trunk and limbs for one year. The mucosae were intact. His past health was good and there was no significant family history. On physical examination, there were symmetrical involvement of trunk and limbs with erythematous excoriated papules. On close examination, there were also a few vesicles. He had been treated as eczema and scabies without any significant response.

Questions:

1. What is your preliminary diagnosis?
2. How do you confirm the diagnosis?
3. What important and commonly associated systemic disease should be looked out for?
4. What are the treatments?

(See P. 20 for answers)

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Laboratory Diagnosis of CA-MRSA

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This article has been selected by the Editorial Board of the Hong Kong Medical Diary for participants in the CME programme of the Medical Council of Hong Kong (MCHK) to complete the following self-assessment questions in order to be awarded one CME credit under the programme upon returning the completed answer sheet to the Federation Secretariat on or before 31 December 2007.

Case study

A 62-year-old gentleman with a past history of varicose veins and associated ulcers was admitted to the hospital for a one-day history of left calf swelling, pain and redness. The diagnosis was calf abscess, and incision and drainage was undertaken, yielding 5 ml of pus, which grew methicillin-resistant *Staphylococcus aureus* (MRSA). The patient's last contact with the health care setting was 5 years ago and the diagnosis of community-associated methicillin-resistant *Staphylococcus aureus* (CA-MRSA) infection was made. As a result, empirical cloxacillin was changed to intravenous vancomycin. The subsequent clinical course was uneventful, and the patient was discharged 2 weeks after admission.

Background

The definition of CA-MRSA infection is continuing to undergo evolution. Since its initial recognition based on epidemiological criteria, hence the term "community-associated", information on various aspects of this infection is being accumulated. Clinically, it has been recognised that CA-MRSA strains have a propensity to cause skin and soft tissue infections of considerable severity, and in some cases necrotising pneumonia. Laboratory characterisation has also revealed specific features exhibited by these strains. As for epidemiological associations, infections found to fulfil clinical and laboratory criteria are increasingly documented within hospital settings.[1,2]

Bacteriology

S. aureus is a Gram positive bacterium commonly encountered in the clinical setting, either as an agent of infection or colonisation. Clinical specimens from which the detection of *S. aureus* may indicate active infection include superficial or deep wound swabs, respiratory specimens, blood cultures, etc. For the detection of colonisation, nasal, throat, axilla and other superficial swabs are cultured. Regarding susceptibility to antimicrobials, currently, most *S. aureus* isolates are resistant to penicillin, mediated by the production of β-lactamase. As for resistance to penicillinase-stable penicillins, such as cloxacillin, strains harbouring such resistance are termed MRSA and are mainly found in hospital settings until 1990's. The mechanism for methicillin resistance in *S. aureus* is mainly due to the presence of the *mec*A gene, encoding an altered penicillin-binding protein with decreased affinity to various penicillinase-stable penicillins. Less frequently, resistance to methicillin may be due to hyperproduction of β-lactamase or methicillinases.[3]

Since the first recognition in the 1990's of community-acquired MRSA infections typically with skin and soft tissue abscesses and necrotising pneumonia, various studies have been performed to characterise the infecting strains. In 2002, whole genome sequencing data of a CA-MRSA strain, MW2, was first reported.[4] It was associated with fatal septicaemia and septic arthritis in a 16-month-old American-Indian girl in 1998 in North Dakota, USA. Subsequently, a worldwide collaborative study has shown that CA-MRSA strains share two unique molecular features: harbouring staphylococcal cassette chromosome *mec* (SCC*mec*) type IV and positive for the Panton-Valentine leucocidin (PVL) gene.[5] SCC*mec* is a genetic element containing the *mec*A gene. Strains carrying types I to III SCC*mec* are mainly hospital-related. Conversely, type IV strains in its simple truncated form are postulated to confer survival advantage to the strain in the community setting, where antimicrobial selective pressure is much lower than in the hospital setting. More recently, type V SCC*mec* was described to be harboured by *S. aureus* strains which behaved similarly to type IV strains, causing typical CA-MRSA infections.[6] Regarding PVL, this is a bacterial toxin acting on leucocytes, and has been found to be associated with recurrent, often severe primary skin infections and necrotising pneumonia.[7]

Laboratory recognition

Laboratory detection of *S. aureus* in clinical specimens plays a role in the definitive diagnosis of the aetiology of an infection, and provides the opportunity for determination of antimicrobial susceptibility of the isolate, guiding appropriate therapy and contributing to baseline epidemiological information. In the clinical microbiology laboratory, *S. aureus* is considered as a potential pathogen when isolated from any specimen, and identification and susceptibility results will be

reported. Laboratory identification of *S. aureus* isolates is relatively simple, relying mainly on macroscopic and microscopic morphological findings, together with a positive coagulase test.

Antimicrobial susceptibility testing is mainly undertaken in laboratories in Hong Kong based on the method recommended by the Clinical and Laboratory Standards Institute (CLSI) of the United States.[8] A positive β-lactamase test will indicate resistance to penicillin, while resistance to other antimicrobials, including methicillin, is usually tested using the disk diffusion test. The presence of methicillin resistance is indicated by resistance to the agent cefoxitin as a surrogate. Cefoxitin resistance has been shown to be highly sensitive and specific for the presence of the *mecA* gene in staphylococci. Methicillin resistance that is mediated by β-lactamase hyperproduction will be detectable by a positive β-lactamase test together with the disk diffusion test for oxacillin demonstrating resistance, while the isolate will be shown to be cefoxitin susceptible.

CA-MRSA diagnosis

On isolating any MRSA strains with clinical and epidemiological suspicion of CA-MRSA, further laboratory characterisation needs to be undertaken to support the diagnosis. SCC*mec* typing is performed by determining the combination of two attributes: the class of the *mec* gene complex, and with the type of the *ccr* (chromosomal cassette recombinase) gene complex. The former comprises classes A to C, and the latter comprises types 1 to 3. The technique employed is polymerase chain reaction (PCR), either using individual reactions or in a multiplex format.[9-11] In addition, the presence of the PVL gene is also detected by PCR.[5] The turnaround time of these molecular characterisation tests is one day. Currently in Hong Kong, MRSA strains harbouring SCC*mec* type IV or V, together with the presence of the PVL gene, are designated CA-MRSA. Although CA-MRSA strains are generally considered to be susceptible to most non-β-lactam antibiotics (Figure 1), multi-resistant phenotypes are not uncommonly encountered, such that the presumptive designation of non-multi-resistant MRSA strains as CA-MRSA is not reliable.

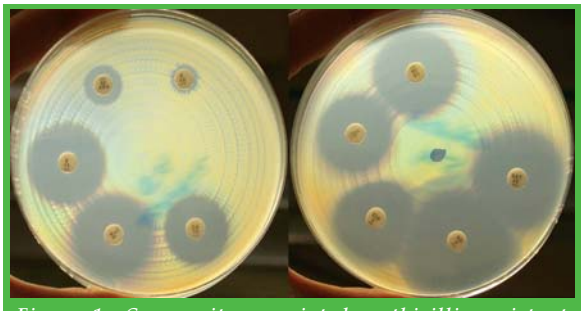

Figure 1. Community-associated methicillin-resistant Staphylococcus aureus strain (note golden colour) showing resistance to β-lactams and susceptibility to multiple antimicrobials. Key: Resistant to penicillin (P) and cefoxitin (FOX); Susceptible to erythromycin (E), clindamycin (DA), gentamicin (CN), tetracycline (TE), chloramphenicol (C), ciprofloxacin (CIP), rifampicin (RD) and cotrimoxazole (SXT).

Epidemiological typing

Further typing of CA-MRSA strains is possible using various methods, including pulsed-field gel electrophoresis (PFGE), multilocus sequence typing (MLST) and *S. aureus* protein A (*spa*) typing.[5,12] These methods are employed when it is necessary to delineate epidemiological relationships among CA-MRSA strains isolated from different sources, such as in outbreak settings. Typing data can also provide information on the evolution and spread of strains in a locality. PFGE can produce typing information that is comparable among laboratories only if exactly the same protocol is used. As for MLST and *spa* typing, the data obtained are objective and amenable to inter-laboratory comparison, since the information is DNA sequence-based. Between these two latter methods, *spa* typing is more discriminative than MLST. In our experience, the most common SCC*mec* type IV CA-MRSA strains in Hong Kong are of MLST sequence type 30 (the Southwest Pacific clone), constituting over a third of all CA-MRSA strains detected. The majority of these strains are of *spa* type t019. Such strains have also been designated as HKU100.[13] Regarding SCC*mec* type V strains, the most prevalent MLST sequence type is 59, and most are of *spa* type t437.

Screening for carriers

One important aspect in the control of CA-MRSA is the screening of close contacts of patients for carriage of the strain. In Hong Kong, nasal and axilla swabs are obtained. In the laboratory, these are inoculated onto selective medium containing antimicrobials to suppress the growth of competing organisms. Any suspected MRSA isolates will be subjected to identification, susceptibility testing and molecular characterisation tests.

Epilogue

For the patient mentioned in the beginning of this article, the MRSA strain isolated was resistant only to penicillin and penicillinase-stable penicillins, and was susceptible to other classes of antimicrobials, including erythromycin, clindamycin, co-trimoxazole, tetracycline, gentamicin, ofloxacin, chloramphenicol and vancomycin. Molecular characterisation revealed that the strain harboured SCC*mec* type IV, and was positive for the PVL gene. Typing of the strain showed that it was of MLST sequence type 30, and *spa* type t019. Nasal and axilla swabs from close contacts were obtained for screening, and one asymptomatic family member was found to harbour MRSA, which was subsequently characterised to have the same antibiogram and molecular characteristics as the index patient. Intranasal mupirocin and hibitane baths were prescribed, and subsequent repeat screening after the decolonisation regimen showed that the carriage was eliminated.

In order to achieve CA-MRSA control, the laboratory plays an important role in the diagnosis of the infection and screening for carriage of the organism. Clinicians are encouraged to send specimens for microbiological

investigations whenever *S. aureus* infections are suspected, so that antimicrobial susceptibility testing and molecular characterisation can be undertaken to guide therapeutic options and epidemiological investigations. Maintaining a close liaison of the clinical microbiologist with the attending clinician and the epidemiologist is paramount for the effective control of CA-MRSA.

Note: The Microbiology Laboratory of the Public Health Laboratory Services Branch, Centre for Health Protection, Department of Health offers molecular characterisation tests free of charge for MRSA isolates suspected to be CA-MRSA. Contact information of the laboratory can be found at: http://www.chp.gov.hk/files/pdf/grp-specimenhandbook-en-2004122802.pdf.

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MCHK CME Programme Self-assessment Questions

Please read the article entitled "Laboratory Diagnosis of CA-MRSA " by Dr. Janice YC Lo, and complete the following self-assessment questions. Participants in the MCHK CME Programme will be awarded 1 CME credit under the Programme for returning completed answer sheets via fax (2865 0345) or by mail to the Federation Secretariat on or before 31 December 2007. Answers to questions will be provided in the next issue of The Hong Kong Medical Diary.

Questions 1-10: Please answer T (true) or F (false)

1. Community-associated methicillin-resistant Staphylococcus aureus (CA-MRSA) is clinically distinctive in that it does not cause symptomatic disease.

2. CA-MRSA infection may still be suspected in patients with contact history with hospital settings.

3. CA-MRSA infections started to be recognised since 1990's.

4. CA-MRSA infection is a notifiable disease in Hong Kong.

5. All CA-MRSA strains are only resistant to beta-lactam antibiotics and susceptible to other antimicrobials.

6. Suspected CA-MRSA infections should be treated with cloxacillin.

7. In Hong Kong, MRSA strains harbouring SCC*mec* type IV or V, and positive for the Panton-Valentine leucocidin gene, are designated as CA-MRSA.

8. On detecting a CA-MRSA case, screening of close contacts will be initiated.

9. In Hong Kong, decolonisation of CA-MRSA carriers is not undertaken.

10. The laboratory plays an important role in the diagnosis and control of CA-MRSA infections.

ANSWER SHEET FOR DECEMBER 2007

Please return the completed answer sheet to the Federation Secretariat on or before 31 December 2007 for documentation. 1 CME point will be awarded for answering the MCHK CME programme (for non-specialists) self-assessment questions.

Laboratory Diagnosis of CA-MRSA

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Name (block letters):_____ HKMA No.: _____

HKID No.:___ ___ - ___ ___ ___ ___ X X (x)

Other Membership No. (please indicate): _____

Contact Tel No.:_____

Answers to November 2007 issue

Clinical Update: Vascular Abnormalities of Skin and Soft Tissue

1. F 2. F 3. F 4. T 5. F 6. T 7. T 8. F 9. T 10. T

Colonisation and Decolonisation of *Staphylococcus aureus* - What Have We Learnt?

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Dr. Tak-lun Que

MRSA is an endemic problem in hospitals and institutions in most of the developed countries including USA, UK and Hong Kong, with figures of up to 10% or more of in-patients with previous history of admission to hospital may be colonised with MRSA quoted in some overseas papers. Locally there are only a few papers on this issue, with figures quoted ranging from 3 to 6 % of patients with history of hospitalisation / institutionisation showing MRSA colonisation. The figure doubles in some of the high risk group such as those with a long history of hospital stay or prolonged bedriddenness. In an earlier paper from a local teaching hospital, 3159 new isolates of MRSA were found over the period from 1988 - 1994. Another most commonly quoted data for MRSA are the MRSA rate (which refers to the proportion of *Staphylococcus aureus* that are MRSA), the overall MRSA rate in most HA hospitals are about 30%. We have very few data concerning MRSA in the private sector; recently one of our private hospitals also reported a figure very similar to the public hospitals.

The most important means for control of MRSA remains Standard Precaution and Contact Precaution. The emphasis of hand hygiene using disinfectant soap or alcoholic based hand rub has succeeded in slowing down the increase of MRSA cases in the hospitals. The control measures were further strengthened by including the inanimate objects around the patients as potentially contaminated and require similar infection control measures when one touches them. Despite such measures the MRSA problem remains static, or is even slowly progressive.

The use of eradication therapy remains a controversial subject, but the basic principle behind this is actually quite simple. The number of MRSA cases in a hospital is a balance between the number of MRSA cases admitted and the number of MRSA cases discharged. In theory, the more MRSA cases remaining in the hospital will imply an increased chance for the pathogen to spread in the hospital, thus active reduction of MRSA carriers in the hospital may be beneficial. Eradication of MRSA carrier state may also prevent progression from colonisation to development of clinical infection.

The eradication treatment protocol itself is not difficult. It usually comprises a combination of daily bath and shampoo with a disinfectant detergent (chlorhexidine gluconate most commonly recommended, other alternatives such as triclosan, or octenidine dihydochloride, with varying degree of efficacy) and topical application of mupirocin nasal ointment two to three times daily to the inner surface of each nostril (mupirocin resistance has been reported and other alternatives such as chlorhexidine and neomycin cream have also been used). One may also need to consider adding a systemic antibiotics (usually oral rifampicin +/- a second antibiotics) to eradicate throat colonisation. There are even reports of attempts to use tea tree oil, or Manuka Honey for eradication therapy.

In the real life situation, incorporation of the MRSA eradication protocol into the hospital's daily routine is much more complicated. A lot of questions need to be addressed. First of all we need to decide the optimal scale of a eradication programme, the scale can vary from individual patient to ward, department, hospitals, cluster or even territory-wide level. Also we need to define the group of patients in the section who need the MRSA eradication therapy. Usually this means patient finding using the "Active Surveillance Culture" (ASC), i.e. we may need to actively search for cases, rather than simply deal with the MRSA patients found in routine culture.

If one really wishes to carry out ASC, then the first question will be the choice of specimen collection and culture protocols. Few frontline doctors / nurses will remember that the methodology for routine culture is very different from ASC. Routine culture will only pick up the pathogens showing predominant growth, and detection of colonisation may be delayed or missed completely if culture results obtained in the course of routine clinical care are the primary means of identifying colonised patients, whereas ASC will specially looks for a target pathogen and aims at detecting it even when it presents at small number on body surface.

Another important part of the protocol is the anatomical site for taking the surveillance culture. The nasal swab is the most commonly used specimen, with a sensitivity of 40+ to 90+%. Usually one will add another swab, chosen from one of the other commonly used specimens, including axilla swab, perineal swab, and throat swab. One may also include any areas of abnormal or broken skin (wounds, sores etc) and others specimens such as sputum, ET tube aspirate, stool or indwelling devices.

After locating the patient colonised with MRSA, the next problem is the choice of eradication regimens and how to ensure eradications etc. We have already described the eradication therapy earlier in this article.

After completion of eradication therapy, and after the antimicrobial effect of the eradiation therapy has subsided, one will need to repeat surveillance culture for three times, at least one week apart.

There is no eradication therapy that can guarantee 100% success in eradication of MRSA from carriers. One can usually expect better results in applying eradication therapy to staff, figures quoted range from 90% to 100% for staff. The success rate is usually lower in patient carriers, with rates quoted from 50% or less to over 70%. Another word of caution is that if we follow the patients with a longer period, with up to one-third of patients may eventually demonstrate MRSA colonisation again. Some researchers have taken an even closer look of the problem. They find that in eradication failure cases, household contacts are frequently also carrying MRSA, and household environment / surfaces are also frequently contaminated with MRSA. And eradication of MRSA from household contact and decontamination of household surface may lead to an increase in the chance of successful eradication.

Even if we have a near perfect eradication scheme, when we detect one case of MRSA carrier and before we apply control measures, the MRSA might have already spread. Questions on importance of suggestions such as "Admission ward for infection control purpose", "Contact Tracing of MRSA case in hospital" remain unanswered. Furthermore, there is always a risk of further transmission of MRSA in our hospital setting (remembering that MRSA is endemic in our hospitals), thus eradication does not reduce the need for proper infection control measures in the hospitals.

Arguments for implementation of colonisation eradication frequently refer to the reduced rates of MRSA transmission in the Netherlands, Belgium, Denmark, and other Scandinavian countries. The Scandinavian countries are most aggressive in actively screening for MRSA and applying treatment to try to eradicate the carrier state. Whereas the rest of European countries take a more conservative approach, and coincidentally the number of MRSA cases are also much higher. But one should also remember that these countries also have very strong control in the use of antibiotics. There are also examples of ICU and other special units removing the problems of MRSA after implementation of aggressive control measures against MRSA, including ASC and eradication therapy.

The eradication therapy is not widely practised in UK and USA, it is not without reasons, experts have shown concerns about the protocol being not fool proof in picking up all the MRSA carriers and the eradication therapy do not have very high percentage of success in patients. Yet it may lead to a false sense of security in frontline staff leading to lapse of infection control measures. Also one should bear in mind that MRSA is not the only pathogen with risks of causing hospital acquired infection (HAI) (there is a long list of potential HAI pathogens including Extended Spectrum Beta Lactamase (ESBL)-positive Gram negatives, Multiple Resistant *Pseudomonas aeruginosa* (MRPA), Multiple Resistant *Acinetobacter baumannii* (MRAB), Vancomycin Resistant Enterococci (VRE), just to name a few). If we concentrate on detection and eradication of MRSA alone and missed the proper infection control routines, it is almost certain that we may produce more harm to our patients. Furthermore, wide-spread use of mupirocin cream maybe associated with development of resistance to this useful drug.

The emergence of community-acquired MRSA poses new uncertainty and new challenges to the control of MRSA.

It is quite obvious that eradication of colonisation alone does not solve the problem of MRSA. Reviews of literatures shows that most of the successful MRSA control programmes utilised a combination of intervention strategies, including measures like standard and contact precautions, use of contact precautions until patients are culture-negative for MRSA, improvements in hand hygiene; environmental measures, enhanced cleaning, active surveillance cultures (+/- routine surveillance) to actively hunt for carriers, attempts to decolonisation therapy, administrative support, judicious use of antimicrobials; improvements in communication about patients with MRSA within and between health care facilities and tracking of these patients, education, etc. all are important components for successful control.

Successful control of MRSA in Hong Kong needs a comprehensive programme covering various aspects of infection control, a multidisciplinary team, and territory wide effort are required. Eradication is an important component of the whole programme, but one needs to understand that to eradication alone is definitely not the answer to the problem of MRSA.

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Clinical Aspects and Treatment of CA-MRSA Infections

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Introduction

Community acquired methicillin-resistant *Staphylococcus aureus* (CA-MRSA) infection refers to an MRSA infection with onset in the community in an individual without established MRSA risk factors such as recent hospitalisation, surgery, dialysis, residence in a long-term care facility, presence of a permanent indwelling catheter or previous isolation of MRSA. CA-MRSA differs from their health care-associated (HA) counterparts from an epidemiological, genotypic, and phenotypic perspective. CA-MRSA strains have disproportionately affected children and young adults and have easy transmission in settings where people are in close contact such as households[1,2,3]. Furthermore, the community isolates have high prevalence of genes encoding Panton-Valentine leukocidin (PVL), which is rarely identified in HA-MRSA isolates[1,3,4,5,6]. PVL is an exotoxin associated with skin abscess formation and necrotising pneumonia although its role in the pathogenesis of CA-MRSA infection has not been fully elucidated[7,8]. PBP2a, a penicillin-binding protein with decreased affinity to penicillin, is encoded by the gene mecA, which is carried on a mobile genetic element called staphylococcal cassette chromosomal (SCC) mec. At least 6 types of SCC*mec* have been identified and were numbered from I to VI. HA-MRSA strains harbour SCC*mec* type I, II and III, which are often resistant to multiple non-beta-lactam antibiotics whereas CA-MRSA isolates mostly harbour the SCC*mec* type IV and V, which are typically susceptible to multiple non beta-lactam antibiotics, including co-trimoxazole, doxycycline, minocycline and clindamycin[1,2,3,4,9]. The spectrum of disease caused by CA-MRSA appears to be similar to that of MSSA. Skin and soft tissue infections (SSTIs) represent the majority of the CA-MRSA diseases burden. Less commonly, it has been associated with severe and invasive infections, including necrotising fasciitis and necrotising pneumonia.

Clinical Presentations

Skin and Soft Tissue Infections

Abscesses and furuncles with or without accompanying cellulitis are the commonest reported presentations of CA-MRSA infection. The skin lesions may sometimes be confused with spider bites by the patients and the physicians. It is characterised by the development of primary necrotic lesions of the skin and soft tissues that progress to abscesses formation later. CA-MRSA associated impetigo and folliculitis have also been reported. The severity of CA-MRSA SSTIs varies from mild superficial infection to deeper soft tissue infection requiring hospital admission[2,4,9,10]. Severe complications such as necrotising fasciitis, osteomyelitis, bacteraemia and sepsis syndrome have been reported although most of the infections usually remain confined to the skin and soft tissues (Figure 1). It is noteworthy that recurrent skin infections and clustering within the household are relatively common phenomena seen in CA-MRSA SSTIs[1,3].

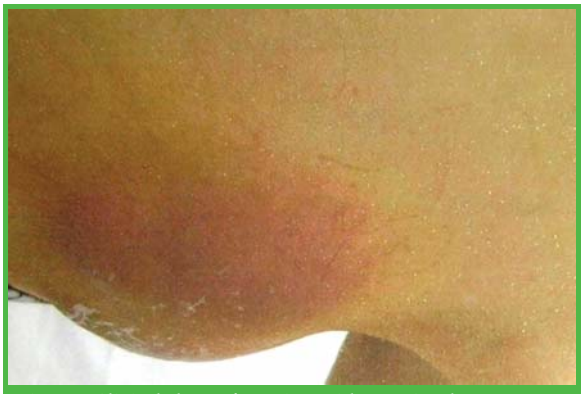

Figure 1. Clinical photo of a patient with a MRSA abscess

Necrotiszing Pneumonia

Severe necrotising pneumonia is another clinical manifestation strongly associated with CA-MRSA stains[5,6,11]. It is commonly seen in children and healthy young adult. Unlike HA-MRSA pneumonia, this disease is characterised by leucopenia, haemoptysis, high fever and multiple lobar infiltrate. Rapid progression to septic shock, acute respiratory failure and death are commonly seen. Diffuse necrotic haemorrhagic pneumonic change was frequently seen in autopsies. Preceding influenza or influenza-like prodrome was commonly associated with the disease. In fact, the relation between influenza and severe staphylococcal pneumonia has been well recognised. Influenza and other viruses can damage the respiratory epithelium and predisposes to staphylococcal infections.

Clinical Management

The emergence of MRSA in the community heralds a

need for new approaches to the management of SSTIs and other syndromes compatible with S. aureus infection such as necrotising pneumonia following an influenza-like illness[12,13]. The suspicion of CA-MRSA should be particularly heightened by a history of a household contact or failed response to the first line antibiotic treatment although many of them have none of these risk factors.

For SSTIs, clinicians are encouraged to collect specimens for culture and susceptibility testing from patients with abscesses or purulent skin lesions, particularly those with **NARES** (**N**ot responsive to first-line antibiotic; **A**typical body site or clinical features; **R**ecurrent SSTI; **E**xtensive infection in multiple sites; **S**pread of infections among close contacts)[12]. Culture and susceptibility results are not only useful for management of individuals but also help to determine local prevalence of CA-MRSA and monitor trends in susceptibility of *S. aureus* to non-beta-lactam agents.

The treatment of SSTI depends on an assessment of the type and severity of the clinical presentation (Figure 2). In general, incision and drainage continue to be the mainstay therapy for abscesses and furuncles. Empirical antimicrobial therapy is recommended as an adjunct to surgical incision and drainage to some patients with purulent SSTI and presence of the following factors: 1) severe and rapid progression of the infection 2) presence of systemic symptoms and signs 3) presence of associated cellulitis 4) presence of co-morbidities 5) extremes of age, 6) location of the abscess which cannot be drained easily or that can be associated with severe complications such as face and periorbital areas. As MSSA is still more prevalent than MRSA in Hong Kong, the choices for empirical therapy of uncomplicated SSTIs in outpatient settings includes penicillinase-resistant penicillin (e.g. cloxacillin), first generation cephalosporin and oral beta-lactam/beta-lactamase inhibitor combinations (such as amoxicillin-clavulanate), which have good coverage for both MSSA and Group A streptococcus. When there is no or only little clinical improvement, culture should be obtained (if not taken yet) and alterative antibiotic therapy with CA-MRSA coverage should be considered. However, the optimal antibiotic therapy for suspected or confirmed CAMRSA is not clear[9,14,15]. Local susceptibility data should be used to guide to the antibiotic treatment. A study in Hong Kong reported that 25 of 29 CA-MRSA isolates were susceptible to all but 1 or 2 antibiotic agents in addition to cloxacillin but all 29 isolates were susceptible to cotrimoxazole, minocycline, doxycycline, and vancomycin1. In the same study, clindamycin resistance displaying constitutive phenotype was found in a few isolates but none had inducible MLSB phenotype, which can be detected by the D-zone test. Isolates with inducible MLSB phenotype that are erythromycin resistant and are initially susceptible to clindamycin can develop clindamycin resistance during the course of clindamycin therapy. Treatment failure with clindamycin may happen in infection with inducible MLSB isolate.

Table 1 lists oral agents that are useful in outpatient management of uncomplicated CA-MRSA SSTIs.

Cotrimoxazole (trimethoprim-sulfamethoxazole) has been reported to be useful in the treatment of *S. aureus* infections, including MRSA[16]. However, Group A streptococcus (GAS), one of the commonest organisms causing SSTIs, is usually resistant to cotrimoxazole. Thus clinicians should avoid using cotrimoxazole as the sole empirical therapy for SSTIs of unknown cause. In addition, cotrimoxazole is contraindicated in women in the third trimester of pregnancy or in infants less than two months of age. Doxycycline and minocycline are long-acting analogues of tetracycline and possess much better activity and susceptibility profile for staphylococcus than tetracycline. Therefore, they are recommended for MRSA SSTIs. Like co-trimoxazole, they are not recommended as empirical monotherapy for SSTIs of unknown cause because of their limited activities against GAS. They are contraindicated in pregnant women and young children. Clindamycin has been widely used in SSTIs, including necrotising fasciitis because of its good soft tissue penetration, good activity against gram positive coccus such as beta-haemolytic streptococci and staphylococcus, and potential inhibition of toxin production. As mentioned above, D-zone test should be performed to detect the inducible MLSB phenotype. In fact, increasing clindamycin resistance has been reported recently. Moxifloxacin, a newer fluoroquinolone, has enhanced potency against *S. aureus* as compared with ciprofloxacin and levofloxacin. However, a major limitation of fluoroquinolone use is that MRSA strains readily develop resistance which may lead to treatment failure and relapse[17]. In addition, fluoroquinolone is not recommended in pregnant women and young children. Linezolid, an oxazolidinone, is indicated for the treatment of SSTIs and hospital-acquired pneumonia due to MRSA. However, its use is limited by high cost and potential haematological side effects.

Patients with severe CA-MRSA infections require hospital admission and intravenous antibiotic therapy[12,13]. Vancomycin is still considered the first line treatment for severe infections caused by MRSA. Other potentially useful intravenous antibiotics include clindamycin, minocycline, linezolid and daptomycin (Table 2).

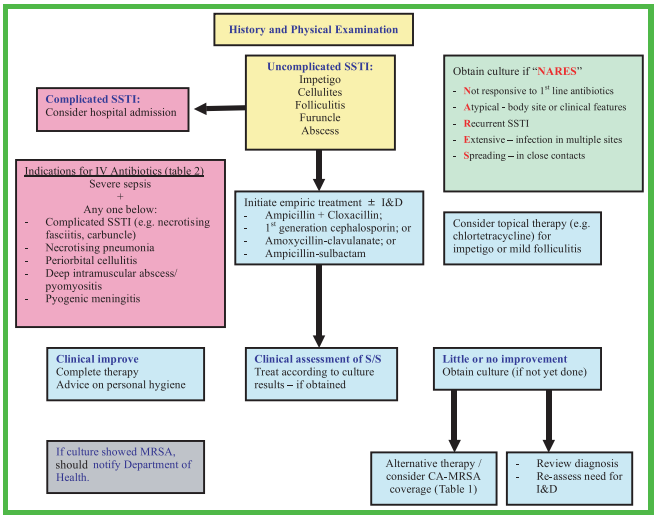

Figure 2. Guideline for clinical management of skin and soft tissue infections (SSTIs) and clinical syndromes compatible with staphylococcal infections.

Conclusion

MRSA is well known as a cause of hospital associated infection and is now emerging as an important infection in the community with the strains distinct from nosocomial ones in term of epidemiology, genotype and phenotype. The community strains are commonly harbouring gene encoding PVL and SCC*mec* IV and V. Unlike hospital strains, CA-MRSA strains are usually susceptible to many non-beta-lactam antibiotics. SSTIs represent the majority of CA-MRSA disease burden. Severe and invasive diseases caused by community strains are less commonly seen, including necrotising pneumonia, necrotising fasciitis, pyomyositis, and osteomyelitis and sepsis syndrome. A decreased in the threshold for obtaining cultures to document MRSA is warranted especially for those with risk factors (i.e. NARES). Purulent skin and soft tissue infections can generally be managed with surgical incision and drainage with or without oral antibiotics. Patients with severe infection require in-patient care and intravenous antibiotic therapy.

Table 1. Oral Antimicrobial agents for outpatient therapy of uncomplicated CA-MRSA SSTI

Agents-note (1)	Potential advantages	Precautions	Usual dose for adult Usual	Usual Dose for Children
Cotrimoxazole	Oral	Not for patients with sulfur allergy, women in the third trimester and infants less than 2 months	960mg BD	Trimethoprim, 8-12mg/kg/day, and sulfamethoxazole, 40-60mg/kg/day, in two divided doses
Doxycycline	High skin concentration	Not for children <12yrs or pregnant women	200mg once, then 100mg BD	-
Minocycline	As above	As above	100mg BD	-
Clindamycin	Inhibit toxin production	Diarrhoea caused by C. difficile Note (2)	300-450mg TDS	30mg/kg of body weight/ day,in three or four divided doses
Moxifloxacin	Oral	Resistance may develop during therapy	400mg QD	-

(1) Clinicians should consult complete drug prescribing information. Antibiotic therapy should be modified according to results of culture and susceptibility testing. Information available at present showed that most CA-MRSA isolates in HKSAR are susceptible to the above oral antibiotics1. The duration of therapy for most SSTI is 5 to 7 days; longer therapy may be necessary depending on severity of infection and clinical response. Oral antibiotics are not indicated for MRSA carriage/colonisation.
(2) If clindamycin is considered, isolate resistant to erythromycin but apparent "sensitivity" to clindamycin should undergo laboratory testing for inducible clindamycin resistance using the "D" test. Organisms that show flattening of the clindamycin zone adjacent to the erythromycin disk should be reported as resistant to clindamycin.
Abbreviations: BD, twice daily; QD, once daily; TDS, three times daily.

Table 2. Parenteral Antimicrobial agents for severe CA-MRSA infection

Agents (note 1)	Potential advantages	Precautions	Usual dose for adult Usual	Usual dose for children
Vancomycin	Long experience of use	Red-man syndrome	1gm Q12H	40mg/kg/day, in three to four divided doses
Clindamycin (Note 2)	Inhibit toxin production	Diarrhoea caused by *C. difficile*	300mg Q8H	30mg/kg/day, in three divided doses
Minocycline	High skin concentration	Not for children <12yrs or pregnant women	100mg Q12H	-
Linezolid	High tissue concentration	Myelosuppression, mostly with prolonged use	600mg Q12H	10 mg/kg every 8-12 hr

(1) Clinicians should consult complete drug prescribing information. Antibiotic therapy should be modified according to results of culture and susceptibility testing.
(2) If clindamycin is considered, isolate resistant to erythromycin but apparent "sensitivity" to clindamycin should undergo laboratory testing for inducible clindamycin resistance using the "D" test. Organisms that show flattening of the clindamycin zone adjacent to the erythromycin disk should be reported as resistant to clindamycin.

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Epidemiology of CA-MRSA and the HKSAR's Public Health Response

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Surveillance Mechanism and Data Source

Community-associated methicillin resistant *Staphylococcus aureus* (CA-MRSA) was first reported in Hong Kong in 2004[1]. Since 2004, a monitoring group was formed, under the coordination of the Department of Health's Centre for Health Protection (CHP) and the Centre of Infection of the University of Hong Kong, to conduct laboratory-based surveillance for CA-MRSA[2]. The participating microbiology network comprised 17 sites, including five public hospital laboratories, six private hospital laboratories, and six private community laboratories. This network was estimated to cover half of the Hong Kong population. The laboratories screened clinical information in laboratory request forms and identified MRSA isolates with a non-multiresistant antibiogram. Suspected CA-MRSA isolates were referred to the Centre of Infection for further molecular characterisation.

Since January 2005, all hospital microbiologists in Hong Kong were encouraged to report CA-MRSA cases to this monitoring system. The CHP also received voluntary reports of CA-MRSA infection from public hospitals and general practitioners. In late 2006, five Accidents and Emergency Departments (AED) in public hospitals began a programme that routinely collected wound swabs from patients with purulent skin and soft tissue infection for culture of MRSA. Since January 2007, CA-MRSA infection was listed as a statutory notifiable infectious disease in order to strengthen surveillance and implement public health measures more effectively[3].

The surveillance case definition of CA-MRSA is shown in Box 1[4]. CA-MRSA infection is diagnosed by laboratory via demonstrating presence of Panton-Valentine leucocidin (PVL) gene and positive Staphylococcal cassette chromosome *mec* (SCC*mec*) type IV or V, usually in patients without significant exposure to health care facilities within the past one year.

Local Epidemiology

Figure 1 shows the monthly reported cases of CA-MRSA during the period January 1, 2005 - June 30, 2007. The average monthly incidence was higher after than before January 2007, when statutory notification came into effect (11.7 vs. 1.6 cases, $p<0.01$). Due to limited data, no conclusion on seasonal pattern can be drawn.

During January 1 - June 30, 2007, the CHP recorded 70 cases of CA-MRSA infection. This corresponds to an annualised population incidence rate of 2.0 per 100,000 per year (2.6, 2.1, and 0.9 per 100,000 among age groups <18 years, 18-64 years, and >65 years respectively). Approximately 30% of notifications came from the private sector. Cases were more or less evenly distributed geographically (Hong Kong Island 26%, Kowloon 30%, New Territories East 19%, New Territories West 26%).

No statistically significant sex predilection was observed among the 70 case-patients (38 males and 32 females). The majority (54/70, or 77%) were adults aged 18-64 years, while 12 (17%) were children under 18. The median age was 34.5 years. The youngest patient was a 3-month-old girl, while the eldest case was 102 years old. In terms of ethnicity, Chinese accounted for 61% (43/70), Filipinos 23% (16/70), and other ethnic groups 16% (11/70). No occupation pattern was seen among ethnic Chinese cases. 37% (10/27) of non-Chinese cases were domestic helpers.

Of the 70 cases, 66 were sporadic, the remaining four came from two family clusters each involving two family members. The majority of cases were healthy; only four patients had underlying medical conditions (e.g., diabetes mellitus, chronic eczema on long term steroid, obstructive sleep apnoea, chronic hepatitis B infection). During one year before illness onset, 16% (11/70) of cases reported antibiotic usage, and 14% (10/70) had engaged in contact sports. Two (3%) had history of contact with known CA-MRSA patients. There was one (1.4%) intravenous drug user.

Almost all (68/70, or 97%) CA-MRSA case-patients presented with skin and soft tissue infections such as skin abscesses, boils, carbuncles, or furuncles, of which 50% (35/70) were found in the buttock, perineum, or lower limbs. Four (6%) had skin and soft tissue infections at multiple sites. Systemic symptoms such as fever, chills and rigor were present in 33% of the cases. Two (3%) patients suffered more serious non-cutaneous complications. A 9-year-old boy had pneumonia caused by CA-MRSA, and a 52-year-old female developed septicaemia following cellulitis of left ankle. None of the 70 CA-MRSA cases was fatal.

Concerning clinical management, 45 (64%) cases were hospitalised for CA-MRSA infection, 21 (30%) were managed as outpatients, and the remaining four (6%) were admitted for other reasons. Sixty-two (88%)

patients received antibiotics as empirical treatment, and 52 (74%) required surgical management (e.g., aspiration of abscess, incision and drainage, surgical debridement, masurpialisation, flap surgery).

Molecular analysis of the CA-MRSA isolates showed that 71% (50/70) were of SCC*mec* type IV and the remaining 29% (20/70) were type V. SCC*mec* type IV was predominant among non-Chinese cases (26/27, or 96%), while SCC*mec* type V was more commonly found among Chinese cases (19/43, or 44%) compared with non-Chinese cases (1/27, or 4%).

Contact tracing in connection to the 70 CA-MRSA case-patients identified about 320 household and other close contacts. Some 400 nasal, skin and wound swabs were taken from them and cultured for CA-MRSA. Fourteen (5%) asymptomatic close contacts tested positive for the organism.

Public Health Measures

For every notified case of CA-MRSA, the CHP conducts a series of public health measures to investigate and contain the spread of the infection. The index patient is interviewed for detailed clinical and exposure history, with particular reference to possible risk behaviours and factors. Wound swabs are taken from the patient for bacteriological investigations. Household and close contacts (i.e., defined as having frequent body contact with case-patients) are identified for each case-patient. Close contacts are screened for MRSA colonisation status. Empirical decolonisation therapy is given to both cases and close contacts. Decolonisation regimen consists of application of 2% mupirocin ointment (Bactroban) twice daily to both nostrils, and a daily wash or bath using 4% chlorhexidine gluconate (Hibiscrub) for five consecutive days. No systemic antimicrobial therapy is given. Furthermore, education on personal and home hygiene measures is also delivered by public health nurses.

At the community level, public education campaigns are conducted focusing on personal hygiene and proper use of antibiotics. Posters and pamphlets on CA-MRSA have been designed to create community awareness and put across more detailed knowledge. For health care professionals and infection control practitioners working in both the public and private sector, the CHP promulgates clinical guidelines for the management of CA-MRSA and organises seminars and forums to foster knowledge of this infection. Antibiotic prescription guideline is also provided to doctors to promulgate proper prescription practices. Most of the above information is accessible at the CHP's website (www.chp.gov.hk).

Discussion

There appears to be an increasing reported incidence of CA-MRSA over the past two years in Hong Kong. The extent to which this trend has resulted from changes in surveillance practice during this period is uncertain. The proportion of clinically more serious CA-MRSA cases (e.g., pneumonia, septicaemia, meningitis, fatal) has fallen after January 2007 compared with before (2.9% vs. 6.3%). Nonetheless, a longer period of observation is required to conclude that statutory notification has increased the sensitivity of surveillance in detecting milder cases, especially when the possible influence of seasonal factors is not to be discounted.

The transmission dynamics of CA-MRSA infection in Hong Kong are not well understood, and there are apparent differences among local cases compared with Western countries. The majority of local CA-MRSA cases occur among healthy adults. Filipinos seem to be over-represented as an ethnic group, but there is no documented transmission arising from Filipino domestic helper. No occupational group is found to be at special risk. Risk factors for transmission from overseas studies (e.g., MSM[5], intravenous drug use[6,7], contact sports[8-10], correctional facilities[11,12]) are either absent or present in only a small proportion of cases in Hong Kong. Further studies are needed to elucidate local risk factors for infection.

Intra-familial transmission CA-MRSA is well documented. In the present series, the probability of intra-familial transmission resulting in clinical cases is around 3% (2 families out of 68). Family clusters tend to be small - two cases in each of the two family clusters in 2007[13]. The first local family cluster of CA-MRSA was detected in 2005, involving two adolescent siblings of a Nepalese family. Their other three siblings all had history of skin abscesses in the past one year, without laboratory confirmation of CA-MRSA infection. Two family clusters occurred in 2006, involving a brother-sister pair and mother-son pair, all with skin and soft tissue abscesses[14]. Onset dates within the family clusters were separated by five to twelve weeks.

The clinical presentations of CA-MRSA infection in Hong Kong generally resemble those described in the literature. Skin and soft tissue infections are the most frequent clinical manifestations[15-17]. Less commonly, necrotising pneumonia, empyema, sepsis syndrome, pyomyositis, osteomyelitis, necrotising fasciitis, and disseminated infections with septic emboli may occur[18-22]. Two fatal cases were recorded in Hong Kong during 2005-06. The first was a 37-year-old Chinese lady who developed meningitis. Her cerebrospinal fluid and blood culture yielded CA-MRSA and she died despite antibiotics treatment 12 days after symptom onset[23]. The second fatal case was a 30-year-old Chinese lady with a right facial swelling that progressed to septicaemia within two days. Blood culture and wound swab yielded CA-MRSA. She succumbed five days after symptoms onset[24].

Public health measures to control CA-MRSA have yielded mixed results in different countries. The Netherlands, which has one of the lowest prevalence of MRSA in the world, has attributed its success to a national "search and destroy" policy, in combination with restrictive antibiotic use[25]. There is no unifying practice of using decolonisation regimens for CA-MRSA patients and their contacts. Experts in the United States consider the use of decolonisation regimens

for patients with recurrent MRSA infection, or to abort outbreak in places where ongoing MRSA transmission has occurred[26,27]. Various decolonisation strategies have been used but experts have differing opinions on their effectiveness[28,29]. These include various combinations of systemic antimicrobials, mupirocin nasal ointment, and chlorhexidine body washes. Mupirocin has excellent anti-staphylococcal activity and has proved effective in eradicating of MRSA carriage from patients[30]. However, mupirocin resistance appears to be increasing worldwide[31], and mupirocin resistant CA-MRSA cases are reported overseas recently[32].

The current public health measures in Hong Kong to control CA-MRSA (i.e., statutory notification, intensive laboratory surveillance, decolonisation therapy to case-patients and contacts, guidance to health care professionals, community education) are on the more stringent side of the international scale. Nonetheless, it remains to be seen how far this 'search-and-destroy' strategy would work. The crude prevalence of CA-MRSA carriage among close contacts of CA-MRSA cases is around 5% in the present series. This percentage is likely several times higher than the local general population. A local study found carriage rate of MRSA (not CA-MRSA) among first year university students and their family members to be 1.7% and 0.9% respectively[33]. Another local study (2006) found no CA-MRSA carriage among elderly people living in residential care homes for the elderly[34]. In comparison, major CA-MRSA outbreaks have been reported in the US and Canada[36,37]. Some US cities such as Atlanta, Baltimore, and Chicago have reported CA-MRSA incidence rates of 18 - 164 per 100,000[15,37]. At this point, it appears that population carriage rate of CA-MRSA in Hong Kong is still at a level amenable to case-based interventions, and that enhanced home hygiene and eradication of CA-MRSA carriage in contacts of case-patients is epidemiologically meaningful. On the other hand, the increasing case-notification rate for CA-MRSA is a cause for concern. Other warning signs to look out for include a rising proportion of CA-MRSA among MRSA isolates, as well as transmission in institutional settings. In conclusion, CA-MRSA remains a challenging infection and we are now at a critical stage in its evolution and control in Hong Kong.

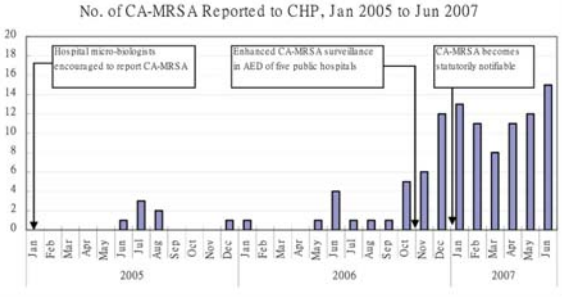

Figure 1: Number of CA-MRSA notifications received by the Centre for Health Protection (January 1, 2005 - June 30, 2007)

Box 1: Surveillance Case Definition of CA-MRSA

i. Clinical criteria:
- Skin / soft tissue infections (e.g. infected eczema / boil / abscess); OR
- More serious infections (e.g. blood stream infections or pneumonia)

ii. Epidemiological criteria:
- No permanent indwelling catheters or medical devices that pass through the skin into the body AND no medical history in the past year of:
  - Hospitalisation
  - Admission to nursing home, skilled nursing facility, or hospice
  - Dialysis
  - Surgery

iii. Laboratory criteria
- Isolation of MRSA strain from any clinical specimen with the following characteristics:
  - Staphylococcal cassette chromosome mec (SCC*mec*) type IV or V; AND
  - Positive for Panton-Valentine leucocidin (PVL) gene

Confirmed case
A clinically compatible case that is laboratory confirmed.

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Answer to Dermatological Quiz

Answer :

1. Dermatitis herpetiformis

2. A skin biopsy together with direct immunofluorescent study (IMF) should be performed. The direct IMF is best done at the perilesional or normal skin of forearm or buttock, which shows the characteristic granular or linear IgA deposit at the basement membrane zone.

3. More than 90% of patients have gluten enteropathy, though only around 20% have bowel symptoms. 1% of patients may subsequently develop lymphoma (commonest: T-cell Non-Hodgkin lymphoma)

4. Dapsone is the drug of choice if tolerated. Though the response is rapid and dramatic, it is not really a diagnostic test. Strict gluten free diet is now generally advised. In patients with good compliance, maintenance dapsone may be taken off after 2-3 years of dietary restriction. It is important to remember that systemic steroid is not useful and not indicated in this disease.

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The Prince of Wales Hospital Acute Burns Unit Protocol

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The Burns Unit at the Prince of Wales Hospital is the largest and busiest in the territory and receives patients from its own direct catchment area and from referring hospitals which includes a significant number of patients injured in the Mainland.

Burns management can be complex and lengthy but the priority in acute burns management is simple and is to reduce mortality and morbidity by adherence to basic principles of trauma care with some modifications. Much depends on speedy first aid, accurate assessment of the severity of the burns injury and timely referral to a specialised burns unit where definitive treatment can be given. This article aims to provide an overview of the acute management of the burns patient

- First aid
- Initial Assessment at the local hospital
- Transferring the patient to Burns facilities/ units
- Overview of specialist care in our Burns Unit including fluid resuscitation
- Recommendations for dressing minor and moderate burns

First aid

The aim of first aid is to minimise the extent of the injury particularly in terms of contact time. Whilst using caution to ensure your own safety, stop the burning process.

- If the patient is on fire, then get him to 'stop, drop and to put out the fire or else smother the fire with a thick blanket or towel. Remove burnt clothes and cool the burnt areas with water for up to half an hour.
- Remove the patient from electrical contact.
- For chemical burns, remove soiled clothing and flush affected areas with running water for as long as tolerated.

Ensure that the patient is kept warm for transfer to the emergency department.

Initial assessment

The assessment of the patient in the emergency department is essentially the same as for any trauma patient with treatment priorities based on the stability of the vital signs. The primary survey aims to detect life- threatening injuries particularly inhalational injury. It is important to realise that burns are not simply skin injuries, there may be other injuries related to the event e.g. explosions or the sequelae from running away, jumping out of windows to escape the fire.

- **Airway:** evaluate the stability of the cervical spine and immobilise as necessary. Consider endotracheal tube intubation and ventilation if indicated.
  - Inhalational injuries can be rapidly lethal. A high index of suspicion is required - history of fire in an enclosed space, singed nasal hairs, burns or soot in the upper airway, change of voice etc. Prophylatic intubation is preferable to an emergency airway.
- **Breathing:** 100% oxygen for all burns >20% TBSA or involving a flame/flash mechanism.
- **Circulation:** check peripheral circulation and insert 2 large-bore peripheral lines. Commence IV resuscitation with Hartmann's solution for adults TBSA >15% or children TBSA > 10% (see later for comprehensive regime)
- **Disability:** neurological evaluation using the AVPU method or GCS, which provides an indicator of the adequacy of cerebral oxygenation and perfusion.

Secondary Survey

The secondary survey aims to detect severe injuries requiring a thorough head-to-toe examination of the patient. A history should be elicited - the minimum is an 'AMPLE' history which includes **a**llergy history, **m**edications, medical **p**roblems, **l**ast meal time and the **e**vent i.e. the mechanism of injury, time of injury, time of extrication and fluids or other treatment given during transport.

Assessment of the burn

The effect of a burn injury on an individual patient depends on:

- Area and depth of burn
- Presence of inhalational injury. Viewing the upper airway with a flexible endoscope is useful.
- Age of patient and the presence of concomitant medical problems
- Special areas (eyes, hand / genitalia) as well as circumferential burns of the limbs, neck and chest have added significance.

The **size of the burn** is important as it is related to the magnitude of the inflammatory process which causes fluid shifts from the vascular compartment, thus directly affects the acute fluid resuscitation required. Various

methods to estimate the percentage of the body surface which is burnt have been described. The simplest method is the "Rule of Nines" which divides the body surface into areas of nine percent (9%) or multiples of 9% (Figure 1). An alternative way assumes that the closed palm of the patient is equal to approximately 1% of the body surface and is most useful for assessing scattered burns. The most accurate assessment is made using the Lund and Browder chart particularly in children as it takes into account the relative changes in proportions of head and legs in the growing child (Figure 2); charts also allow an easy way to chart and record the distribution and depth of the burns. Whichever method is used, it is very important not to include simple erythema in the estimation of the burn injury - erythema is a reversible hyperaemia which is not associated with tissue damage and as such it will not give rise to pathophysiological changes.

The **depth of the burn** determines the likely course of healing. The depth of the burn is best described in descriptive terms, simply classified as being **full** or **partial -thickness** burns with the latter further subdivided into superficial partial thickness and deep partial thickness (Figure 3). It is possible to make an estimate of the depth of the burn from the clinical appearance (Table 1) but burns evolve particularly over the first 24 hours and are often heterogeneous in nature. The assessment of burn depth can be difficult and affects subsequent decisions regarding surgical management of the burn and choice of dressing but accurate assessment in the emergency setting is not a priority beyond recognising that full thickness injuries require referral for specialist treatment.

General measures for the burns patient include:

- Decompression: remove all rings, watches and jewellery and tight clothing. Check the circulation of the limbs with circumferential burns; if there are elevated compartmental pressures, escharotomy or fasciotomy may be needed (though rarely required in the emergency department).
- Foley catheter insertion is useful for monitoring of hourly urine output, detection of haemoglobinuria or myoglobinuria in major burns.
- Nasogastric tube should be inserted in burns patients > 20% TBSA for early enteral feeding.
- Pain relief and anxiolytics should be adequate: intravenous morphine is preferable to intramuscular injection
  - Adult: 1-4 mg intravenously every 2-4 hours
  - Children: 0.2mg/kg for the first dose and titrate the dose subsequently
- Immediate wound care: as a temporary measure wrap the wound in clean and dry/moist dressings. Continued cooling is not recommended after the first half hour. Avoid any antimicrobial cream / lotion as this may affect the assessment by the burns physician
- Other general measures include tetanus toxoid / immunoglobulin as required.

Transferring patients to Burns facilities/ units

The timely transfer of a burns patient is a vital step in the management. There is a set of agreed criteria for the transfer of patients to specialised units that should be adhered to.

Admission criteria for Specialised Hospital Burns Care Facilities (RHTSK, TMH, KWH, QEH)

- Burns > 5% BSA
- Burns that involve and threaten functional / cosmetic impairment of the face, hands, feet, genitalia, perineum and major joints
- Full thickness burns
- Electrical / chemical burns
- Burns associated with inhalational injury
- Circumferential burns of limbs / chest
- Burns at the extremes of age (children and elderly)
- Burn injury in patients with pre-existing medical disorders which could complicate management, prolonged recovery, or affect mortality
- Any burns patient with concomitant trauma

Referral criteria for Transfer to Burns Unit (PWH/QMH)

- Burns > 20% BSA
- Burns associated with inhalational injury requiring ICU admission
- Burns which have major cosmetic and/or functional implications
- Burn injury in patients with SIGNIFICANT pre-existing medical disorders which could complicate management, prolonged, or affect mortality

The decision to transfer a patient can become more difficult when there are serious associated injuries. The treatment of these may require precedence over the treatment of the burn, e.g. an intra-abdominal injury, major long bone fracture, open chest injury or intracranial bleeding. A decision should be made jointly with a senior clinician in the referring hospital and a senior specialist in the burns unit. Once a decision has been made to transfer a patient to the burns unit it is essential that the patient has been properly stabilised before transfer particularly with regards to the airway. It is essential to include all available information about the nature of the injury as well as the physical findings and extent of the burns. In addition there should be a clear set of notes documenting resuscitation measures, drugs given and blood results.

Doctor-to-doctor contact is essential to ensure the safe transfer of the patient. This is particularly the case where a patient has been intubated in the referring hospital. It must be recognised that the communication should be a two-way process and the burns unit should inform the referring hospital of the outcome of treatment of the burns patient not only as a matter of professional courtesy but also from the point of view of continuing medical education.

Management at the specialist units

At the Burns facility/unit, the wound is assessed by the burns surgeon and should be re-assessed after it has been cleansed with either normal saline or antiseptics

such as Betadine or Hibiscrub solution before the definitive dressings; loose skin/tissues should be trimmed and big blisters de-roofed. Clinical photos for documentation are taken on admission and regularly during the patient's stay. Partial thickness burns tend to be exudative for the first 48 hours and the dressing regime reflects this:

- Face - paraffin oil for superficial/mid-dermal burns, whilst for deeper burns Bactigras (chlorhexidine-infiltrated tulle) and saline-soaked gauze secured with crepe bandage are used for the first 48 hours. An ophthalmological consultation is advisable. The hair is shaved if the scalp is involved for proper assessment and for toileting.
- Perineum - silver sulphadiazine (SSD) or variant
- Trunk & limbs - the 'standard; dressing is Bactigras saline-soaked gauze for the first 48 hours.
- Hand - for more superficial burns, the hand can be placed inside a sterile/ clean plastic bag with either SSD or other antimicrobial such as mupirocin whilst for deeper burns the fingers are individually dressed and splinted in position of safely. Elevation is essential.
- Foot- elevation and ankle splint as necessary.

Fluid Resuscitation

Fluid is given to compensate for expected losses (redistribution from intravascular volume to tissue space as well as true excretory/ exudative losses) and as a general rule, the threshold for IV fluid therapy for adults is a burn surface area > 15% whilst for children it is > 10%. In our unit, the Parklands formula is used as a guide.

First 24 hours

- Adult 2-4 ml Hartmann's / % burn / kg
- Children 3-4 ml Hartmann's / % burn / kg

Maintenance fluids are needed in children (but not adults):

- 100 ml per kg up to 10kg body weight
- 50 ml per kg from 10kg to 20kg
- 20 ml per kg for every kg over 20kg

One half of the estimated amount of the resuscitation part should be given in the first 8 hours, and the rest in the remaining sixteen hours whilst maintenance is given evenly throughout the 24 hours. The resuscitation period starts from the time of the burn and any deficit due to delay should be calculated and given along with the first two hours of fluid if practical.

Second 24 hours

a)	Adult	0.5 ml albumin / % burn / kg D5 solution for maintenance
b)	Children	0.5 ml albumin / % burn / kg Half D5 / NS solution for maintenance

Monitoring of resuscitation

The adequacy of resuscitation needs to be continuously monitored by a combination of measures in order to be able to adjust treatment accordingly - the Parklands formula (or other formulas) is simply a guide, a starting point.

- General condition of the patient
- Blood pressure, pulse rate, pulse oximetry, temperature
- Hourly urine output is the most important indicator
  - Adult 0.5-1.0 ml/kg/hour
  - Children or <30kg 1.0-1.5 ml/kg/hour
- Modify IV rate if 2 consecutive hours too much or too little urine

Myoglobinuria or haemoglobinuria requires IV mannitol (1gm/kg iv, 20% solution) and urinary alkalinisation with NaHCO3 to keep urine rate of 75-100 ml/hour and to maintain urinary pH>6.5 without the plasma pH exceeding 7.45. The urine pH should be monitored 4 hourly and acid-base balance / serum electrolytes 6-hourly. Invasive measures such as CVP or pulmonary artery wedge pressure can be used if indicated but are generally used in the intensive care setting:

Dressing Guidelines for Minor and Moderate Burns

The following should be adhered to when choosing the appropriate dressing for a burns patient:

1) Use the most appropriate dressing for the particular burn and ensure that the patient is not allergic to any dressing you use.
2) Use a dressing that both the patient and staff find acceptable and with which both will comply.
3) Use a dressing that is cost effective, i.e. do not use expensive dressings if the burn requires frequent dressing changes. Try to aim for a dressing that will need minimum change, i.e. 2-5 days (unless infected).
4) Consider changing the type of dressing as the burn character changes in particular exudates control.
5) Decrease the dressing bulk as soon as the wound will allow. This allows for greater freedom of movement as well as reducing the 'sick role' effect of bulky dressings on patients.

There are a large number of wound dressings available on the market today and new products will be developed. Existing products will be used in different ways and knowledge of burns and wound healing will continue to expand. Our dressing practices must remain open to change.

Dressing guidelines when no surgery required or in the pre surgery stage

Superficial (and intermediate) partial thickness burns

Superficial burns are often very painful and usually highly exudative in the initial stage. They also change characteristically rapidly, e.g. from being highly to minimally exudative. Intermediate burns can also be painful and exudative initially and may also go through stages of sloughing; some of these burns will require surgery.

The 'Ideal dressing' (which does not exist) will be a comfortable, moderately to highly absorptive dressing that will require minimal dressing changes as each

dressing change is painful. Dressings for deeper injuries should also help to debride the wound. Changing the type of dressing may be necessary, as the burn wound heals/progresses.

There are a wide variety of different dressings with little to choose between them in uncomplicated partial thickness burns:

- Alginates, foams, hydrogels
- Biological dressings such as porcine skin
- Silver based dressings such as Aquacel, Acticoat or other antimicrobials e.g. mupirocin to treat or prevent infection
- Bactigras and other tulle products with or without adjuncts e.g. sofratulle
- Hydrocolloids (not for when there is infection)
- Polyurethane films (when almost healed)

NB: silver sulphadiazine (SSD) cream should be avoided as an acute burns dressing particularly without a specialist assessment of the injury - SSD and other similar topical cream form an eschar which can hinder the accurate assessment of the depth of a burn.

Deep Partial Thickness and Full Thickness Burns

These burns will require surgical debridement and skin grafting to reestablish the surface layer. Dressings aim to keep the wound clean and free of infection and avoid excessive build up of slough (which prevents accurate wound depth assessment as well as increasing the risks of infection).

Common dressing choices include:

- Antimicrobials (preferably specific to any cultivated microbes)
- Hydrogels or hydrocolloids (for de-sloughing small burns only)

The Prince of Wales Hospital Burns unit is extremely active in its burns prevention programmes as well as in research. It works closely with the Hong Kong Burns Association (HKBA) formed in 2003 to help patients resume a normal productive life; in 2005 the unit together with the HKBA, setup a website (http://www.hkburns.org) that aims to educate the public to help reduce the number of incidents involving the more vulnerable patients at both ends of the age spectrum.

Table 1 Features of burns of various depths.

Descriptive	Features: Colour, blisters, capillary refill, sensation	Anatomical
Very superficial		Epidermis only. Rapid healing with no scar
Superficial partial thickness	Pink May blister Capillary refill present Painful	Epidermis and superficial dermis destroyed. Good potential for healing.
Deep partial thickness	Red/pale May blister Poor refill May have pain	Some dermal remnants spared from which re-epithelialisation can occur.
Full thickness	White/Charred No refill No sensation	Entire thickness of skin destroyed with no prospect of healing other than contraction.
Very deep		Deep structures such as muscle, tendon or bone involved.

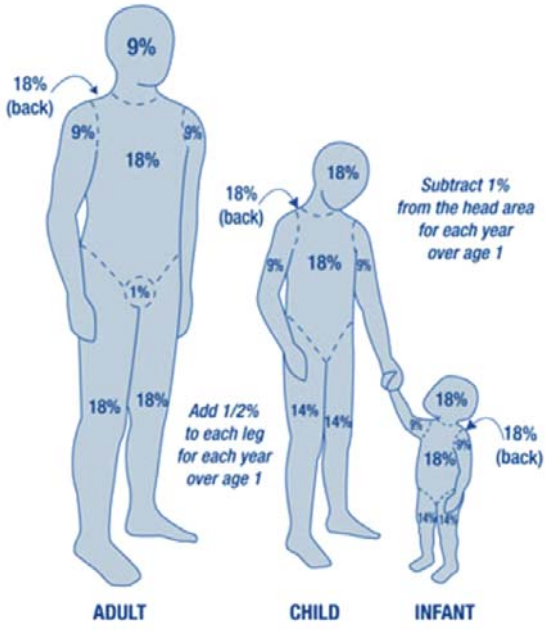
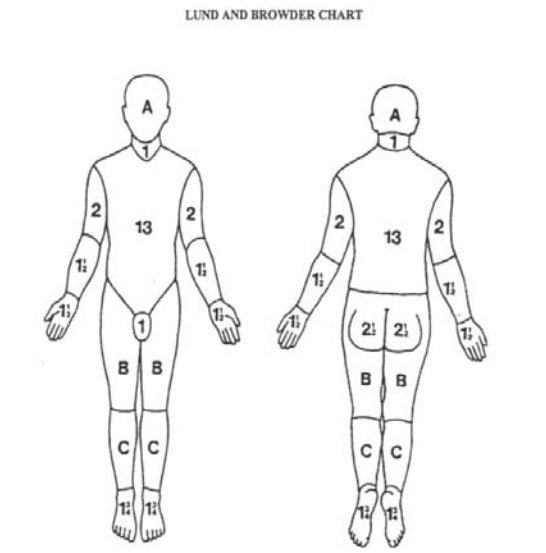


Fig 1. The Rule of Nines is simple but modifications are required if it is used in children.



RELATIVE PERCENTAGE OF BODY SURFACE AREA AFFECTED BY GROWTH.

AREA	AGE 0	1	5	10	15	ADULT
A = ½ of Head	9 ½	8 ½	6 ½	5 ½	4 ½	3 ½
B = ½ of one Thigh	2 ¾	3 ¼	4	4 ½	4 ½	4 ¾
C = ½ of one Leg	2 ½	2 ½	2 ¾	3	3 ¼	3 ½

Fig. 2. The Lund and Browder chart is more accurate and allows a permanent record of the burn to be kept in the notes.

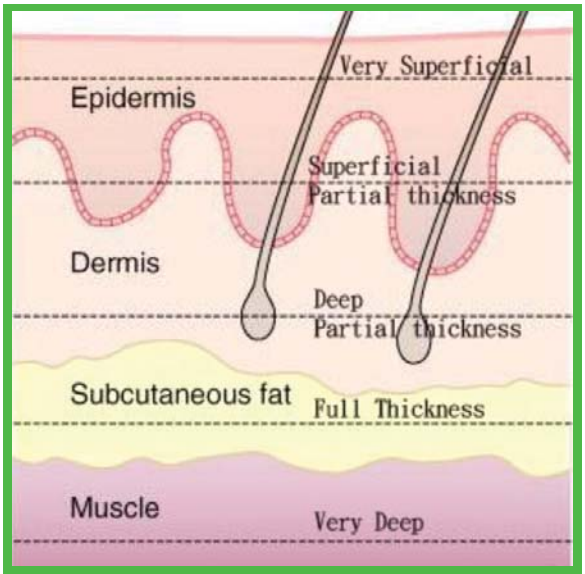


Fig. 3. A schematic diagram of the structure of the skin demonstrating the various depths of burns.

Recent publications include:

1. Wong P, Choy VY, Ng JS, Yau TT, Yip KW, Burd A. Elderly burn prevention: A novel epidemiological approach. Burns. 2007 Aug 10; [Epub ahead of print]
2. Burd A. Evaluating the use of hydrogel sheet dressings in comprehensive burn wound care. Ostomy Wound Manage. 2007 Mar;53(3):52-62.
3. Burd A, Ahmed K, Lam S, Ayyappan T, Huang L. Stem cell strategies in burns care. Burns. 2007 May;33(3):282-91.
4. Chiu TW, Ng DC, Burd A. Properties of matter matter in assessment of scald injuries. Burns. 2007 Mar;33(2):185-8.
5. Burd A, Ahmed K. Mosquito-net burns and the prevention hexagon. Burns. 2007 Mar;33(2):261-3.
6. Burd A, Pang PC, Ying SY, Ayyappan T. Microsurgical reconstruction in children's burns. J Plast Reconstr Aesthet Surg. 2006;59(7):679-92.
7. Wong P, Burd A. Meta or better: analysis of early excision. Burns. 2006 Aug;32(5):662. Epub 2006 Jun 15.

Skin Cancer in Hong Kong

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Classification of skin cancer

There are approximately 30 histologically distinct types of skin cancer and it is estimated that basal cell carcinoma (BCC), squamous cell carcinoma (SCC) and malignant melanoma (MM) make up almost 99% of the total cases. It is a common practice to classify skin cancers into two groups: melanomas and non-melanoma skin cancer (NMSC) due to different biological behaviour of the two groups. It has to be emphasized that while most of the NMSCs (all BCCs and some SCCs) do run a relatively benign course, most of the rare types of NMSCs, (e.g. the skin appendageal cancers and the cutaneous sarcomas) could be very aggressive.

Skin cancers can be primary or secondary. It can also be classified histologically (Table 1).

Table 1. Histological classification of primary skin cancer

Structures	Tissue/ cell type	Examples	
		Common	Rare
Epidermis	Keratinocytes	BCC SCC	
	Melanocytes	Melanoma	
	Merkel cells		Merkel cell ca*
Dermis	Fibroblasts		Dermatofibrosarcoma protuberans (DFSP)a*
	Endothelial cells		Angiosarcoma*
			Kaposi's sarcoma
	Schwann cell		Malignant peripheral nerve sheath tumour (MPNST)
Adnexa	Sebaceous glands		Sebaceous ca
	Sweat glands - Apocrine		Extra-mammary Paget's disease (EMPD)*
	- Eccrine		Malignant eccrine poroma
	Hair follicles		Malignant pilomatrixoma
Skin associated lymphoid tissue[b]	Langerhans cells T-cells Mast cells		Cutaneous Langerhans cells sarcoma Mycosis fungoides* Systemic mastocytosis

Remarks: a. The origin of DFSP is controversial. Origins from histiocytes, fibroblasts and neural cells have been suggested.
b. This comprises of Langerhans cells and keratinocytes in the epidermis, T-cells and mast cells.
*c. * denotes the more commonly seen rare tumours.*

Clinical features

In general, the incidence of skin cancer increases with increasing age. MM tends to affect a younger age group compared to BCC (> 40 years) and SCC (> 55 years). Sun exposure is an important risk factor - episodes of severe childhood sunburn is associated with an increased risk of MM while the accumulated sun exposure is more significant for BCC and SCC which have predilection for the head and neck areas (86% and 66% respectively). Patients with fair skin or *xeroderma pigmentosa* are at higher risk. NMSC share some other common risk factors such as immunosuppression and arsenic exposure. Abnormal skin with chronic inflammation (e.g. radiation dermatitis, chronic sinus or ulcer), dysplasia or carcinoma in-situ (premalignant skin conditions) are at risk of malignant transformation, most commonly into SCC. While the presence of risk factors often aids in finding an underlying cause, the absence of any risk factors is also significant in that skin cancers in these patients tend to be more aggressive. Table 2 shows the clinical features of the common skin cancers. Figures 1-3 shows the various appearances of the common types of skin cancers.

Apart from the common skin cancers, it is also important to be able to identify the premalignant or precursor lesions so that appropriate treatments could be offered promptly:

- Premalignant lesions with dysplasia or carcinoma-in-situ (Table 3), cancers arising from pre-malignant lesions are usually more aggressive.
- Precursors of skin cancers (Table 4, Figure 4) are benign lesions that could become malignant.

Epidemiology

BCC is thought to be the most common human cancer, but its true incidence is unknown. Under-registration of skin cancer, especially NMSC, is a well-recognised problem and the Australian, American and British cancer registries do not have figures on its incidence. Hospital-based studies are another potential source of epidemiological information but are not truly representative of the studied region as they are not population-based[1]. Table 5 shows the epidemiological data of melanoma in HK and other countries in year 2003[2-4] although true comparisons between different countries can be problematic due to the use of inconsistent classification schemes in the different cancer registries.

Compared to HK, the incidence of MM is approximately 30 times more common in the UK and US and almost 100 times more common in Australia. In general, skin cancers in the non-Caucasians usually present later and have a worse prognosis[5-6], and with the exception of BCC - a larger proportion occurs in non-sun-exposed sites.

Inevitably, most of the information available comes from populations/ countries where skin cancer is prevalent and in comparison, we have little knowledge of its clinical behaviour in the Hong Kong Chinese. It should be noted that amongst the different populations, the

Table 2. Clinical features of the common skin cancers

Cancer	Morphological type		Clinical features	Biological behaviours
	Chinese	Caucasians		
BCC	Nodular Nodulocystic Superficial Morphoeic 80% Pigmented	Same < 5% Pigmented	Pearly Transparent Smooth surface Rolled edge May ulcerate Pigmented in the pigmented skin	Slow growing Locally desctructive Rarely metastasise
SCC	Well to poorly-differentiated	Same	Well-differentiated: - Hyperkeratosis - Firm and hard - Resembles keratoacanthoma Poorly-differentiated: - No signs of keratinisation - Fleshy, granulomatous - Ulcerate with everted edge - Surrounding erythema	The poorly-differentiated form is more aggressive
MM	52% Acral lentiginous (ALM) 21% Superficial spreading (SS) 7% Nodular 21% Unclassifiable	60% SS 30% Nodular 7% LMM < 2% ALM	MacKie's major and minor signs: Major: - Change in size, shape, colour Minor: - Diameter >5mm - Inflammation - Sensory change - Crusting, bleeding	The most aggressive

Table 3. Premalignant lesions

Type	Lesions	Histology and clinical details	Risk of malignant transformation[a]	Treatment
Melanocytic	Lentigo maligna LM	Melanoma in-situ. It presents as a slow growing light brown patch over sun-exposed areas. As it grows, the colour and border may become more irregular. Amelanotic LM presents as a red patch and can be difficult to diagnose.	5-50%	- Excision (treatment of choice) - RT or cryotherapy (higher recurrence rate)
Non-melanocytic	Actinic keratosis	Squamous dysplasia	10% in 10 years	- Excision (treatment of choice for Bowen's) - Curettage and cautery - Cryotherapy (widely used for AK) - Photodynamic therapy - Topical Imiquimod (Aldara), 5-fluorouracil (Efudix)
	Bowen's disease	SCC in-situ. It presents as a well-demarcated scaly red plaque usually over the legs. There may be multiple sites and lesions might ulcerate.	3-20%	
	Leukoplakia[b]	Spectrum of changes: < 10% dysplasia and SCC	1-6%	- Biopsy and close monitoring - Excision
	Erythroplakia	Spectrum of changes: > 90% dysplasia and SCC	50%	

Remarks: *a. These figures should be interpreted with caution: there is considerable variation between studies that could be due to many factors including, subject variations and difference in the lengths of the studies.*
b. The term leukoplakia carries no histological connotation and is not a specific disease entity. It is a non-specific clinical term for mucosal white patches. The underlying histology ranges from benign changes to frank malignancy.

Table 4. Benign lesions with malignant potential

Type	Lesions	Risk of developing melanoma	Treatment
Melanocytic	Atypical naevus syndrome	8x that of the general population. The syndrome is defined by the presence of >100 dysplastic naevi. Strictly speaking, it is not a precursor of melanoma as most melanomas associated with ANS arise de novo, rather it is a marker of risk.	Monitoring. Prophylactic excision does not improve survival.
	Giant congenital naevus	At least 100x. It is defined as congenital naevus over 20 cm in size or 5% of the TBSA.	Early excision
Non-melanocytic	Naevus sebaceous	Risk of malignant transformation (to BCC, SCC or adnexal tumours) is 5-15%. It is a harmartoma composed predominantly of sebaceous glands that presents as a yellowish velvety hairless patch usually over the scalp or face.	Excision

Table 5. Epidemiology of melanomas in HK and in different countries in 2003

		Hong Kong	U.K.	U.S.A.	Australia
M: F ratio		1: 0.71	1:1.14	1: 0.64	1: 0.65
Incidence rate[a]		0.5	13	16.2	46.9
Incidence relative to that of HK		1	26	32.4	93.8
Mortality rate		0.3	2.4	2.7	5.6
Mortality/ incidence ratio (M/I)	All	0.60	0.18	0.17	0.12
	M	0.57	0.25	0.19	0.14
	F	0.60	0.15	0.13	0.09

Remarks: *a. Age-adjusted incidence rate (per 100,000 population)*

higher the incidence of skin cancer, the lower the mortality/ incidence ratio - whether the higher mortality rate is due to a lack of awareness of the problem or different biological behaviours is unclear.

From the available data, it is found that in Hong Kong:

- NMSCs present ~ 20 years later than their Caucasian counterparts[7].
- Multiplicity and the presence of a predisposing factor are less common.
- A greater proportion of BCCs are pigmented (80%)
- The acral lentiginous type of MM is more common (51.7%), only 20% are superficial spreading[8].
- MM are thicker on presentation (> 3mm in 81.5% and > 9mm in 37% of the cases).

Principles of management

The aims are to minimize the mortality, morbidity and the chance of recurrence through early detection and treatment. The patient should be involved in the decision-making process through effective communication. Early detection is the single most important modifiable factor that affects the mortality. This is achieved by:

- Familiarity with the appearance of the common malignant lesions, and the diversity of the manifestation of various types of cancer.
- Early referral to an experienced clinician.
- Early biopsy. It is important to know when and how to perform a biopsy. The quality of a biopsy affects the accuracy of the histopathological diagnosis.
- Correlation of the pathology report with the clinical findings. Review of slides or re-biopsy might be required sometimes.
- Follow up the patients even if the lesions appear benign clinically or histopathologically.

Treatment

Treatment should be tailored individually depending on the following factors:

- Tumour-related factors:
  - Histological type of the cancer.
  - The presence of any poor prognostic factors (Table 6).
  - Staging of the tumour (Table 7).
  - The relationship of the tumour to the underlying and adjacent structures. This affects the operability of the tumour and the reconstruction.
- Treatment-related factors. Every treatment modality carries with it its own benefits and drawbacks.
- Patient–related factors. This includes age, co-morbidities, mobility, symptoms and patient's wishes as affected by the degree of concern of the aggressiveness of the tumour and the cosmesis. It is important not to assume that the elderly or males do not have cosmetic concerns. Most patient desire to appear normal, regardless of their age and sex.

General follow-up guidelines include:

- Melanoma:
  - In situ No follow up required.
  - < 1mm Every 3 months for 3 years.
  - >1mm + Every 6 months for 2 years.
- SCC: 5 years for the high risk group.
  - 95% recurrence and 95% metastases occur within 5 years.
- BCC:
  - There is some controversy with some following up for 5 years or more. It may be more important for 'high risk' patients.

The British Association of Dermatologists has published a series of guidelines on the management of the common skin cancers, with the collaboration of various other organizations[9-11]. Table 8-9 show some the salient points from the guidelines.

Unlike the circumferential margins, there are no fixed guidelines for the depth of the excisional margin because it depends on the aggressiveness of the tumour and the anatomical features of the affected site. However, the clearance of the deep margin is usually more critical than that of the circumferential margins. The minimum depth is the full thickness of the skin and a cuff of normal subcutaneous tissue beyond the lesion. It is often desirable to excise the lesion down to the next non-involved anatomical layer. For the more aggressive lesions, it is a common practice to excise the lesions down to the deep fascia.

Biopsy

Although histopathology examination is the definitive diagnostic test for skin cancer, it is by no means a wholly objective test and even experts may disagree on the histopathological diagnoses[12]. It is important to provide as much information as possible (e.g. history, clinical appearance, site and type of biopsy, previous biopsy or treatment.) when making a request and be cautious when interpreting reports. Do not hesitate to contact the pathologist for discussions if there are any doubts or inconsistencies.

Some non-invasive diagnostic methods such as dermatoscopy and confocal microscopy are useful adjuncts but cannot replace biopsy. A lesion should be biopsied when:

- It shows malignant features.
- A positive diagnosis of a benign lesion could not be made clinically.
- A benign looking lesion that behaves abnormally.
- An ulcer that fails to heal or shows signs of healing within a reasonable time.

Biopsy should not delay the referral of lesions suspicious of MM.

Biopsies can be excisional or partial:

- Excisional biopsy:
  - When melanoma is suspected.

- When the patient desires lesion removal regardless of histology.

- Partial Biopsy (punch or incisional) are subject to sampling error but may be considered:
  - When the lesion is extensive or in an anatomically important area.
  - When surgery is not the treatment of choice (e.g. mycosis fungoides) or when surgery is not the only effective treatment (e.g. BCC).
  - When the biopsy is used to determine the extent of lesions that are large, ill-defined or lesions known to have significant subclinical extension (e.g. EMPD, angiosarcoma and DFSP).

Shave biopsies are not recommended - the full thickness of the skin should be included.

Some practical hints include:

- Never inject local anaesthesia directly into the lesion.
- Avoid crushing or cauterising the specimen that can cause artefacts.
- Take biopsy from the active areas (edge of the lesion, areas with the darkest pigmentation, the most nodular area) and take multiple samples if the lesion is large, polymorphic or multiple.It is important to document exactly where the biopsies had been taken from. This is especially important when the lesion is large or when the patient has multiple skin lesions or field changes.
- For incisional biopsies, place the incision along the resting skin tension line.
- With the exception of Moh's surgery, incisions should be perpendicular to the skin surface. Stepping and bevelling of the incision margins should be avoided.
- Orientate specimens for the pathologist by placing marking sutures at one margin. It may also be useful to place an extra marking suture close to the important areas such as the epicanthi.
- Avoid dehydration of the specimens. Fix the specimens quickly with formalin. If lymphoma is suspected, send the specimen fresh to the lab immediately unless it is placed within a special transport medium.

Medico-legal issues

In a study on litigations involving skin cancer in America[13], the most common complaints were failure to diagnose (54%), failure to biopsy (48%) and misdiagnosis of the pathological specimens (20%). 70% of the cases involved the BCC (25%), MM (24%) and SCC (20%). Overall, the alleged doctors lost in 34% of the cases and 20% of the cases resulted in settlement.

Another study had shown that a false-negative diagnosis of melanoma was the single most common reason for filing malpractice claims against pathologists[14]. Often the misdiagnoses were Spitz naevus and dysplastic naevus. 83% of the cases involved shave, punch or incisional biopsies.

All lesions that are clinically suspicious should be biopsied and should a patient choose not to have a biopsy (or whenever the recommended form of treatment has been declined), the reasons should be documented carefully.

It is vital to have a tracking mechanism in place to ensure that all the biopsy reports are seen and proper actions taken in a timely fashion. It is important to arrange for follow up for patients who did not have a biopsy because of low clinical suspicion, who had a negative pathology report on a lesion which has not been excised completely and who had non-excisional treatment for lesions believed to be pre-malignant.

- Malignant/ pre-malignant conditions mistaken as benign conditions.
  - DFSP - keloid.
  - Amelanotic melanoma - pyogenic granuloma.
  - Well-differentiated SCC - keratoacanthoma.
  - Bowen's disease - psoriasis.
  - Desmoplastic melanoma - scar, dermatofibroma.
  - Recurrence through an old scar - hypertrophic or keloid scar.
  - EMPD - perineal eczema, psoriasis, intertrigo.
- The presence of the signs suggestive of benign lesions cannot be used to exclude malignancy.
  - A lesion with hair (the 'hair sign') is most likely to be benign but there are reports of the presence of hair in a malignant lesion.
  - A slow growing lesion could still be malignant, e.g. BCC.
  - A mobile lesion could be malignant.
- An evolving skin cancer might not have the typical appearance of a skin cancer and often recurrent lesions might not have the typical appearances of the primary cancer (Figure 5).
- An advanced skin cancer might not show the typical appearance and appears as an ulcer (Figures 6-7).
- Spitz naevus resembles melanoma histologically and usually occurs in childhood. Beware of a report of spitz naevus in an adult and excise the whole lesion if possible.

Skin cancer service in Hong Kong

The provision of treatment for skin cancer in Hong Kong is scattered between various specialties and settings. There are no agreed referral, treatment and registration policies. There are no regional agreed standards to ensure the quality of service. Patients often have to attend different clinics to get the multidisciplinary care they need. The chain of management is often broken from the initial diagnosis to treatment to follow-up.

The volume of cases to each individual unit or clinic is often not high enough to build up the expertise of skin cancer care and to allow development of the service. Therefore there may be a place to develop a regional multidisciplinary skin cancer centre in Hong Kong to ensure an adequate volume of cases to build up the expertise and to merit resources. A regional skin cancer centre would allow one stop patient care, improved treatment and training facilities, research opportunities and efficient monitoring of the quality of service.

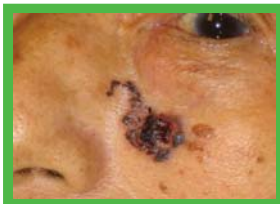

Figure 1a. An ulcerated BCC

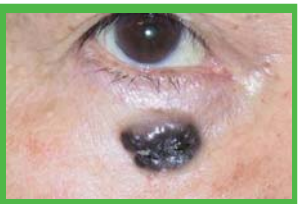

Figure 1b. Nodular BCC

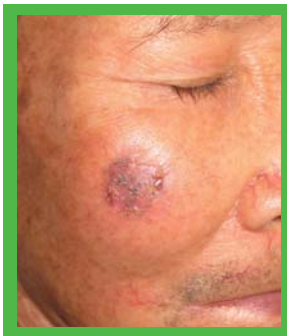

Figure 1c. Morphoeic BCC

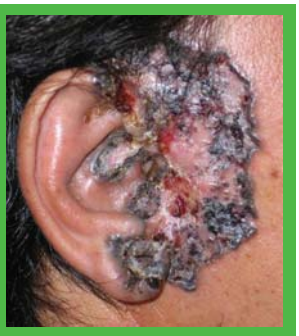

Figure 1d. Multifocal BCCs with central healing ("Field fire BCC")

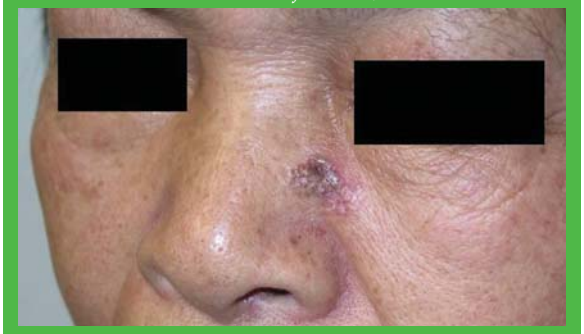

Figure 1e. BCC with atypical appearance

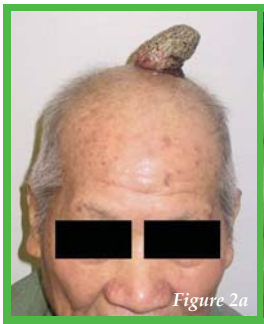

Figure 2a

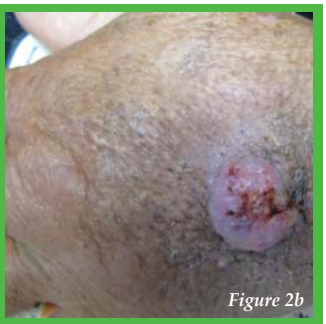

Figure 2b

Figure 2c

Figure 2d

Figure 2a-d. The appearance of SCC varies depending on its degree of differentiation. Figure 2a shows a well-differentiated SCC with a cutaneous horn. Cutaneous horn is not a specific disease entity. It could present with SCC or actinic keratosis. Figure 2d shows a poorly differentiated SCC

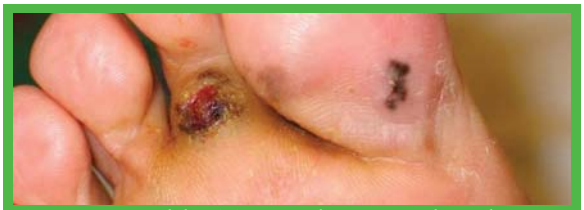

Figure 3a. Acral lentiginous melanoma on the 2nd toe. A suspicious pigmented lesion on the great toe

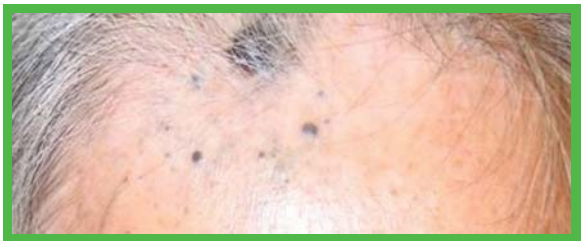

Figure 3b. Melanoma with satellite lesions

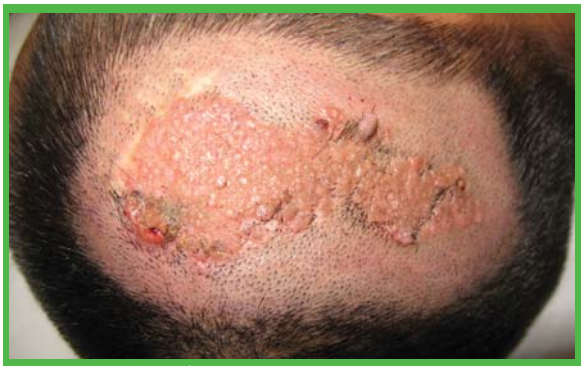

Figure 4. SCC in a sebaceous naevus

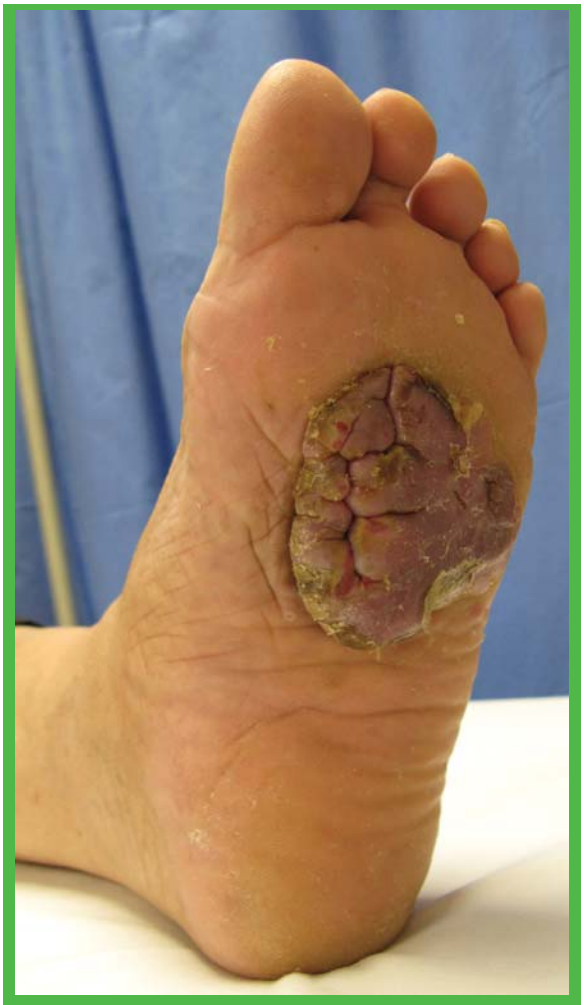

Figure 5. Recurrent melanoma

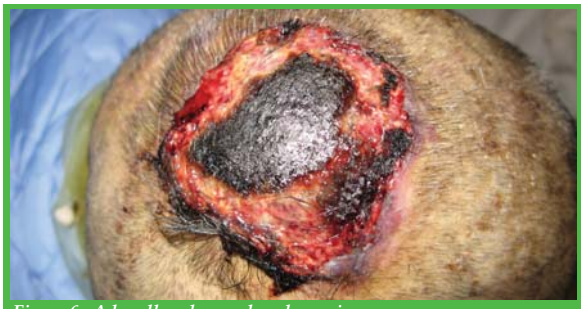

Figure 6. A locally advanced scalp angiosarcoma

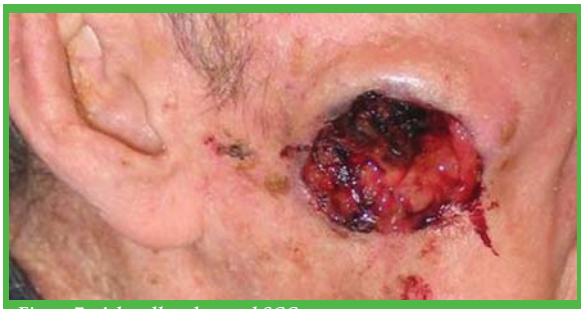

Figure 7. A locally advanced SCC

Table 6. Poor prognostic factors for NMSCs

Type	Macroscopic		Microscopic		Others
	Site	Size	Depth/ type	Differentiation/ other	
SCC	1. Non- UV related: - Skin damaged by other causes - radiation, burns, chronic sinus/ ulcers - Non-sun exposed sites 2. From Bowen's disease	> 2cm	> 4mm Beyond the dermis	Broders' grade 3 - 4 Perineural invasion	Recurrence + Immuno-suppression
BCC	Situated around embryonic fusion planes: Nasolabial fold, ala base, medial and lateral epicanthi, around the EAM	> 2cm	Morphoeic Infiltrative Multifocal		

Table 7. Staging for melanomas (the AJCC staging system)

Stages	T	N	M	Risk
0 - IIA	Ulcerated: 2mm Non-ulcerated: 4mm	X	X	Low
IIB	Ulcerated: > 2, < 4mm Non-ulcerated: > 4mm	X	X	Intermediate
IIC - IV	> 4mm	+/-	+/-	High

Table 9. Recommended excision margins

Type	Risk	Margins[a]	Rate of complete excision
BCC	Low risk	3mm 5mm	85% 95%
	High risk	3mm 5mm 13-15mm	66% 82% > 95%
	Recurrence	5-10 mm	-
SCC	Low risk	4mm	95%
	High risk	≥6mm	-
MM	In situ	2-5mm	-
	< 1mm	1cm	-
	1-2mm	1-2cm	-
	> 2mm	2-3cm	-

Remarks: *a. Margins measured at the time of surgery, not the histological margin*

Table 8. Treatment

Type	Staging/ Ix	Skin lesion		Regional LN	Metastases
		Resectable (primary / recurrent)	Unresectable (palliative only)		
MM	≤ IIA: - No staging Ix ≥ IIB: - LFTs, LDH, CBP - CXR - US/ CT/ MRI: abdo, pelvis	Surgery	- CO_2 laser - Isolated limb perfusion - RT not indicated	1. Clinically no palpable nodes: - No elective LND 2. Suspicious nodes (clinical or radiological): - FNAC - Open biopsy 3. Node positive - Block dissection	Resectable: - Surgery Unresectable: - Chemo RT: - Bone, brain, skin
SCC	High risk group: US for the regional LN	Surgery[a]	- Radiotherapy		-
BCC	None	Surgery[b], RT > 90% cure	- Radiotherapy	-	-

Remarks: *a. Other treatment options for primary cutaneous SCC: Curettage & cautery and cryotherapy - for small and low risks tumour only*
b. Other treatment options for BCC: Cryotherapy - not for morphoeic, large or lesion at high risk sites. Curettage & cautery less desirable.

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The Federation Soccer Five Tournament 2007

Matches of the Soccer Five Tournament were held on 13, 20, 28 October and 10, 11 November 2007 at the Hong Kong International Trade and Exhibition Centre (HKITEC), Kowloon Bay.

Results from matches held on 10 November 2007			
HK Ophthalmological Society (White Team)	vs	Hong Kong Medical Association (Team 2)	1:0
Jacobson (Hong Kong Team)	vs	AstraZeneca	3:0
Alcon	vs	Hong Kong Orthopaedic Association	4:1
Zuellig Pharma	vs	Bayer (Team 2)	1:1
Hong Kong Medical Association (Team 1)	vs	Hong Kong University	3:2
Solvay	vs	Jacobson (KLN)	1:2
HK Ophthalmological Society (White Team)	vs	Jacobson (Hong Kong Team)	3:2
Alcon	vs	Bayer (Team 2)	3:2

Results from the final matches held on 11th November 2007			
Queen Elizabeth Hospital	vs	Chinese University of Hong Kong	4:1
Bayer (Team 1)	vs	Janssen	2:3
Hong Kong Dental Association	vs	HK Ophthalmological Society (Blue Team)	3:4
Pfizer (Team 2)	vs	Pfizer (Team 1)	0:0
Queen Elizabeth Hospital	vs	Janssen	1:2
Hong Kong Dental Association	vs	Pfizer (Team 1)	1:7
HK Ophthalmological Society (Blue Team)	vs	Pfizer (Team 2)	2:1

Champions 2007 Pfizer Corp., Team 2

First Runner Up 2007 HK Ophthalmological Society, Blue Team

Second Runner Up 2007 Pfizer Corp., Team 1

News from Member Societies:

Hong Kong Society of Paediatric Dentistry

Updated office-bearers for the year 2007-2008 are as follows: President: Prof. Stephen H.Y. WEI, Hon. Secretary: Dr. Celine Hung-lei CHEONG, Hon. Treasurer: Dr. Albert LEE

Hong Kong College of Health Service Executives

Updated office-bearers for the year 2007-2008 are as follows: President: Dr. Hok-cheung MA, Secretary: Mr. Anders Chi-man YUEN, Treasurer: Dr. Shao-haei LIU

Hong Kong Thoracic Society Limited

Updated office-bearers for the year 2007-2008 are as follows: President: Dr. Wai-ming CHAN, Secretary: Dr. Cheuk-yin TAM, Treasurer: Dr. James Chung-man HO


Prof. Kunihiko TAMAKI

Asian Dermatological Association

The Asian Dermatological Association (ADA) was incorporated on the 21st November 1986 in Hong Kong. Twenty years ago when ADA was first established, it was chaired by Professor Atsushi Kukita, with the view to correlate the efforts of a group of dermatologists, to promote the study of and to encourage the advancement of dermatology all over the world, especially in Asian countries.

It is also our aim to promote and foster the dermatologists and other medical professionals from all Asian countries in the study of and the acquisition, dissemination and application of knowledge and information concerning dermatology. Eventually, it is hoped that researches can be stimulated, public interest can be aroused, and public education in dermatology can be more sophisticatedly provided.

In order to help to achieve the above, the Asian Dermatological Congress is held every three years. The 8th Asian Dermatological Congress (ADC) will be held on 1 - 4 October 2008 in Seoul, Korea. It is the biggest event of the Association and will definitely attract a lot of dermatologists from the world to exchange experts' opinions.

We look forward to seeing you all in the 8th ADC in Korea!

The Hong Kong Society for Immunology

The Hong Kong Society for Immunology was established in 1996 by a group of immunologists. The objectives of this society are: 1) to provide a forum for the collection and dissemination of information related to immunology for the purpose of promoting and advancing the study of immunology; 2) to represent the professional interests of persons working in immunology or related areas; 3) to serve as a body for interacting with other professional organisations, in Hong Kong and overseas, and with the community at large. Recently we held an Immunology Symposium jointly organised by the Department of Pathology, the University of Hong Kong and a dinner symposium co-organised with the Hong Kong Society of Rheumatology, Clinical Immunology unit, CUHK. We will have our Annual General Meeting in April 2008. Please visit our website http://www.immunology.hk and find out more.

Chairman: Dr. Yong Xie

The Hong Kong College of Family Physicians - Annual Scientific Meeting

"Family Physicians and Our Community"

On behalf of the Annual Scientific Meeting Organising Committee, I am delighted to inform you that our College's Annual Scientific Meeting (ASM) 2008 will be held from 24 May 2008 to 25 May 2008. The venue of the meeting will be at the Hong Kong Academy of Medicine Jockey Club Building.

Since our establishment in 1977, our college has greatly influenced the growth and practice of many doctors working in the community. In order to further strengthen our field, ongoing improvements in teaching, training and research are essential. Without doubt the upcoming ASM 2008 will provide opportunities for family medicine and other specialty doctors, plus health care professional colleagues to share and learn new ideas, thus further promoting health in our community.

We now cordially invite you to submit abstracts for paper presentations and posters at ASM 2008. Instructions for abstract submission are available at our College's website (www.hkcfp.org.hk). I look forward to meeting you at ASM 2008 and the fellowship conferment ceremony.

Dr. Winnie W. Y. Chan
Chairlady
ASM Organising Committee

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1
★ HKMA Structured CME Programme at Queen Elizabeth Hospital Year 07/08 (IX) - A & E and Anaesthesia ★ HKMA Tennis Tournament 2	3	★ FMSHK Officers' Meeting ★ Seminar on Psycho-Spiritual Care (Code No. SCNSG-07-05) 4	5	★ HKMA Council Meeting 6	7	★ Refresher Course for Health Care Providers 2007/2008 (IV) - Primary Care Approach to Patients with Palpitation ★ Joint Annual Scientific Meeting of Hong Kong Society for Coloproctology & Hong Kong Society of Minimal Access Surgery 8
★ HKMA Tennis Tournament ★ HKMA Structured CME Programme at Kwong Wah Hospital Year 07/08 (IX) - Gastroenterology 9	10	★ HKMA Newsletter Editorial Meeting 11	★ FMSHK Executive Committee Meeting ★ Hong Kong Neurosurgical Society Monthly Academic Meeting - Special Lecture: Management of Neurogenic Bladder 12	★ HKMA Structured CME Programme with Hong Kong Sanatorium & Hospital Year 2007 (XII) 13	14	15
★ HKMA Tennis Tournament ★ Friendly Football Match with LegCo ★ HKMA Family Sports Day 16	17	★ Workshop on Neonatal Touch and its updated information (Code No. SE-NT-0107) 18	19	20	21	22
★ HKMA Tennis Tournament 23	24	25	26	27	28	29
30	★ FMSHK Annual Dinner - New Year's Eve on Broadway ★ HKMA 87th Anniversary Ball 31					

Medical Diary of December

Date / Time	Function	Enquiry / Remarks
2 SUN 2:00 pm	**HKMA Structured CME Programme at Queen Elizabeth Hospital Year 07/08 (IX) - A & E and Anaesthesia** Organised by: The Hong Kong Medical Association & Queen Elizabeth Hospital Speaker: Dr. H.Y. LEE & Dr. K.W. LAI # Lecture Theatre, G/F., Block M, Queen Elizabeth Hospital, Kowloon	Miss Viviane LAM Tel: 2527 8452 (Registration Fee is required) 3 CME Points
7:30 pm (9,16,23)	**HKMA Tennis Tournament** Organised by: The Hong Kong Medical Association Chairman: Dr. C.W. CHIN # Kowloon Tong Club	Ms. Dora HO Tel: 2527 8285
4 TUE 8:00 pm - 10:00pm	**FMSHK Officers' Meeting** Organised by: The Federation of Medical Societies of Hong Kong # Gallop, 2/F., Hong Kong Jockey Club Club House, Shan Kwong Road, Happy Valley, Hong Kong	Secretariat Tel: 2527 8898 Fax: 2865 0345
6:30 pm	**Seminar on Psycho-Spiritual Care (Code No. SCNSG-07-05)** Organised by: College of Nursing, Hong Kong	Secretariat Tel: 2572 9255 Fax: 2838 6280 3 CNE Points
6 THU 8:00 pm	**HKMA Council Meeting** Organised by: The Hong Kong Medical Association Chairman: Dr. K CHOI # HKMA Head Office, 5/F., Duke of Windsor Social Service Building, 15 Hennessy Road, Wanchai, Hong Kong	Ms. Christine WONG Tel: 2527 8285
8 SAT 2:30 pm	**Refresher Course for Health Care Providers 2007/2008 (IV) - Primary Care Approach to Patients with Palpitation** Organised by: The Hong Kong Medical Association & Our Lady of Maryknoll Hospital Speaker: Dr. Y.T. HUNG # Training Room II, 1/F., OPD Block, Our Lady of Maryknoll Hospital, 118 Shatin Pass Road, Wong Tai Sin, Kowloon	Ms. Clara TSANG Tel: 2354 2440 2 CME Points
9:00 am - 12:15 pm	**Joint Annual Scientific Meeting of Hong Kong Society for Coloproctology & Hong Kong Society of Minimal Access Surgery** Organised by: Hong Kong Society for Coloproctology # Minimal Access Surgery Training Centre, 2/F, Multicentre Block B, Pamela Youde Nethersole Eastern Hospital, 3 Lok Man Road, Chai Wan	Miss Christina LO Tel: 2595 6416 Fax: 2515 3195 Email: cloyy@ha.org.hk
9 SUN 2:00 pm	**HKMA Structured CME Programme at Kwong Wah Hospital Year 07/08 (IX) - Gastroenterology** Organised by: The Hong Kong Medical Association & Kwong Wah Hospital Speaker: Dr. M.C. WONG & Dr. W.M. CHAN # Seminar Room, G/F., Block D, Queen Elizabeth Hospital, Kowloon	Miss Viviane LAM Tel: 2527 8452 (Registration Fee is required) 3 CME Points
11 TUE 8:00 pm	**HKMA Newsletter Editorial Meeting** Organised by: The Hong Kong Medical Association Chairman: Dr. H.H. TSE # HKMA Head Office, 5/F., Duke of Windsor Social Service Building, 15 Hennessy Road, Wanchai	Ms. Tammy TAM Tel: 2527 8941
12 WED 8:00 pm - 10:00 pm	**FMSHK Executive Committee Meeting** Organised by: The Federation of Medical Societies of Hong Kong # Council Chambers, 4/F., Duke of Windsor Social Service Building, 15 Hennessy Road, Wanchai, Hong Kong	Secretariat Tel: 2527 8898 Fax: 2865 0345
7:30 am	**Hong Kong Neurosurgical Society Monthly Academic Meeting - Special Lecture: Management of Neurogenic Bladder** Organised by: Hong Kong Neurosurgical Society Chairman: Dr. Gilbert LEUNG Speaker: Dr. Jennifer SIHOE # Seminar Room, G/F, Block A, Queen Elizabeth Hospital, Kowloon	Dr. Y.C. PO Tel: 2990 3788 Fax: 2990 3789 2 CME Points
13 THU 2:00 pm	**HKMA Structured CME Programme with Hong Kong Sanatorium & Hospital Year 2007 (XII)** Organised by: The Hong Kong Medical Association & Hong Kong Sanatorium & Hospital Speaker: Dr. K.W. LO # HKMA Dr. Li Shu Pui Professional Education Centre, 2/F., Chinese Club Building, 21-22 Connaught Road Central, Hong Kong	Miss Viviane LAM Tel: 2527 8452 (Registration Fee is required) 1 CME Point
16 SUN 9:30 am	**Friendly Football Match with LegCo** Organised by: The Hong Kong Medical Association Chairman: Dr. K CHAN & Dr. T CHAN # Siu Sai Wan Sports Ground	Ms. Dora HO Tel: 2527 8285
1:30 pm	**HKMA Family Sports Day** Organised by: The Hong Kong Medical Association Chairman: Dr. M.H. IP # Stanley Ho Sports Centre	Ms. Dora HO Tel: 2527 8285
18 TUE 6:30 pm	**Workshop on Neonatal Touch and its updated information (Code No. SE-NT-0107)** Organised by: College of Nursing, Hong Kong	Secretariat Tel: 2572 9255 Fax: 2838 6280 2 CNE Points
31 MON 8:00 pm	**FMSHK Annual Dinner - New Year's Eve on Broadway** Organised by: The Federation of Medical Societies of Hong Kong Chairman: Dr. S.K. CHAN # Run Run Shaw Hall, The Hong Kong Academy of Medicine Jockey Club Building, 99 Wong Chuk Hang Road, Aberdeen, Hong Kong	Ms. Paulina TANG Tel: 2821 3512 Ms. Karen CHU Tel: 2821 3515
8:00 pm	**HKMA 87th Anniversary Ball** Organised by: The Hong Kong Medical Association Chairman: Dr. T.C. SHIH & Dr. Y.S. CHAN # Conrad Hong Kong, Pacific Place, 88 Queensway, Hong Kong	Ms. Candy YUEN Tel: 2527 8285

Meetings

11-12/1/2008	**Hong Kong Surgical Forum, Winter 2008** Organised by: Department of Surgery, Li Ka Shing Faculty of Medicine, University of Hong Kong Medical Centre; Queen Mary Hospital & Hong Kong Chapter of the American College of Surgeons # Underground Lecture Theatre, New Clinical Building, Queen Mary Hospital, Pokfulam, Hong Kong Enquiry: Forum Secretary Tel: 2855 4885 Fax: 2819 3416 Email: hksf@hkucc.hku.hk Website: http://www.hku.hk/surgery
11-12/7/2008	**Hong Kong Surgical Forum, Summer 2008** Organised by: Department of Surgery, Li Ka Shing Faculty of Medicine, University of Hong Kong Medical Centre; Queen Mary Hospital & Hong Kong Chapter of the American College of Surgeons # Underground Lecture Theatre, New Clinical Building, Queen Mary Hospital, Pokfulam, Hong Kong Enquiry: Forum Secretary Tel: 2855 4885 Fax: 2819 3416 Email: hksf@hkucc.hku.hk Website: http://www.hku.hk/surgery

Courses

12/1/2008 9:00 am - 10:00 am	**G B Ong Lecture - A Quarter Century of Liver Transplantation Orator: Ronald Busuttil, Professor and Executive Chairman, Department of Surgery, University of California Los Angeles, Los Angeles, California, USA** Organised by: Skills Development Centre, Department of Surgery, Li Ka Shing Faculty of Medicine, The University of Hong Kong & the American College of Surgeons, Hong Kong Chapter # Underground Lecture Theatre, New Clinical Building, Queen Mary Hospital, Pokfulam, Hong Kong Enquiry: Forum Secretary Tel: (852) 2855 4885 / 2855 4886 Fax: (852) 2819 3416 E-mail: hksf@hkucc.hku.hk Website: http://www.hku.hk/surgery
18-22/1/2008 9.00am -5.30pm 23/2/2008 2.00pm-3.30pm	**Course on Epidemiology and Control of Infectious Diseases** Organised by: Stanley Ho Centre for Emerging Infectious Diseases, School of Public Health, The Chinese University of Hong Kong # Prince of Wales Hospital, Shatin, N.T Tel: 2252 8812 Fax: 2635 4977 Email: ceid@med.cuhk.edu.hk Website: http://ceid.med.cuhk.edu.hk
25,26,27/1/2008	**Advanced Trauma Life Support (ATLS) Provider Course** Organised by: Skills Development Centre, Department of Surgery, Li Ka Shing Faculty of Medicine, The University of Hong Kong & the American College of Surgeons, Hong Kong Chapter # Skills Development Centre, Department of Surgery, Li Ka Shing Faculty of Medicine, University of Hong Kong Medical Center, Queen Mary Hospital, Pokfulam, Hong Kong Enquiry: Program Manager Tel: (852) 2855 4885 / 2855 4886 Fax: (852) 2819 3416 E-mail: qmhsdc@hkucc.hku.hk Web site: http://www.hku.hk/surgery
25/1/2008 1,15,22,29/2/2008 7,14,28/3/2008 11/4/2008 6:30pm to 9:30pm	**Certificate Course in Ward Management - Module II: "Managing resources in health service" (Code No. TC-WM-0107II)** Organised by: College of Nursing, Hong Kong Enquiry: Secretariat Tel: 2572 9255 Fax: 2838 6280
14,15,16/3/2008	**Advanced Trauma Life Support (ATLS) Provider Course** Organised by: Skills Development Centre, Department of Surgery, Li Ka Shing Faculty of Medicine, The University of Hong Kong & the American College of Surgeons, Hong Kong Chapter # Skills Development Centre, Department of Surgery, Li Ka Shing Faculty of Medicine, University of Hong Kong Medical Center, Queen Mary Hospital, Pokfulam, Hong Kong Enquiry: Program Manager Tel: (852) 2855 4885 / 2855 4886 Fax: (852) 2819 3416 E-mail: qmhsdc@hkucc.hku.hk Web site: http://www.hku.hk/surgery
28/3/2008 5.30pm-8.30pm, 1-3/4/2008 6.30pm-9.30pm, 6/5/2008 6.30pm-7.30pm	**Course on Nosocomial Infection and Control Measures in Hospital** Organised by: Stanley Ho Centre for Emerging Infectious Diseases, School of Public Health, The Chinese University of Hong Kong # Prince of Wales Hospital, Shatin, N.T Tel: 2252 8812 Fax: 2635 4977 Email: ceid@med.cuhk.edu.hk Website: http://ceid.med.cuhk.edu.hk
8,15,22,29/4/2008, 13,20,27/5/2008, 3/6/2008 6.30pm-9.30pm 10/6/2008 6.30pm-8.30pm	**Course on Common Viral Infections** Organised by: Stanley Ho Centre of Emerging Infectious Diseases, School of Public Health and Department of Microbiology, The Chinese University of Hong Kong # Prince of Wales Hospital, Shatin Tel: 2252 8812 Fax: 2635 4977 Email: ceid@med.cuhk.edu.hk Website: http://ceid.med.cuhk.edu.hk
4/2008-6/2008	**Course on Application of Geographic Information System (GIS) In Public Health** Organised by: Stanley Ho Centre for Emerging Infectious Diseases, School of Public Health, The Chinese University of Hong Kong # Prince of Wales Hospital and CUHK Campus, Shatin, N.T Tel: 2252 8812 Fax: 2635 4977 Email: ceid@med.cuhk.edu.hk Website: http://ceid.med.cuhk.edu.hk
2,9,16,23,30/5/2008 6,13,20,27/6/2008 6:30pm to 9:30pm	**Certificate Course in Ward Management - Module III: "Managing risk at workplace" (Code No. TC-WM-0107III)** Organised by: College of Nursing, Hong Kong Enquiry: Secretariat Tel: 2572 9255 Fax: 2838 6280

Upcoming Certificate Courses of the Federation of Medical Societies of Hong Kong

Date	Course No	Course Name	Co-organiser	Target Participants
3 Jan 08 - 31 Jan 08	C127	催眠治療臨床應用課程	香港復康會適健中心	從事醫療及護理工作的專業人士

ZYVOX – proven efficacy in nosocomial pneumonia, including those due to MRSA

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- An analysis of hospital ICU patients found that inadequate therapy for nosocomial infections in ICU patients is an important determinant of hospital mortality[2]

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- **ZYVOX achieves excellent lung tissue penetration[4]**
- **ZYVOX is well tolerated with a proven safety profile[5,6]**

Detailed prescribing information available upon request.

REFERENCES 1. Combes A, Figliolini C, Trouillet J-L, et al. Chest 2002;121:1618-23. 2. Kollef MH, Sherman G, Ward S et al. Chest 1999;115:462-74. 3. Wunderink RG, Rello J, Cammarata SK et al. Chest 2003;124:1789-97. 4. Stalker DJ, Jungbluth GL. Clin Pharmakinet 2003;42:1129-40. 5. Perry CM, Jarvis B. Drugs 2001;61:525-51. 6. Zyvox Package Insert. Kalamazoo, MI, USA: Pharmacia & Upjohn Company; 2003.

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