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ANZHSN Bulletin

'New health technologies identified through the Australia and New Zealand Horizon Scanning Network (ANZHSN)'

In This Issue...

Australian Government
Department of Health and Ageing

Horizon Scanning for 2008

This first Newsletter of the 2008 year documents a continuing activity by HealthPACT in Horizon Scanning for Health Technology. At the February meeting 25 emerging technologies were discussed and considered and the newsletter covers a selection of these including point of care testing for influenza, renal transplantation using incompatible blood group donors and a number of other interesting and emerging technologies. A number of interesting technologies were considered by HealthPACT but due to space constraints are not included in this bulletin but can be accessed via the Horizon Scanning web site (details on the back page).

This brief summary gives an overview of the continuous work of HPACT as the peak Committee for Australia/New Zealand dealing with Horizon Scanning for non-drug, non-vaccine health technologies. HPACT remains committed to diffusing information on new and emerging technologies and to receive advice on how to improve diffusion of the information produced by HPACT.

HPACT continues to be a major contributor to EuroScan and to be actively involved in developing international methods for assessment of new and emerging technologies. Ongoing discussions within the EuroScan membership has suggested that previous descriptions of horizon scanning as an early warning system have lead to confusion. EuroScan has suggested that horizon scanning now be referred to as "early alert and awareness" systems.

With best regards,
Professor Brendon Kearney AM
Chair, HealthPACT

Kidney transplantation using incompatible blood group donors

Living donor kidneys present an advantage over cadaveric donor kidneys as their use reduces recipient waiting periods, demands on dialysis resources, initial and long term organ functionality and patient survival rates (1). Although using living donor kidneys in addition to cadaver organs increases the number of kidney transplants, there is still a significant strain on prospective kidney recipients who are forced to wait until a suitable blood group donor is available. Kidney transplantation across incompatible blood groups was introduced as a novel methodology to address this pressure.

HOW IT WORKS

When performing kidney transplantation across incompatible blood groups, there is a high risk of immediate, rapid graft loss due to antibody-mediated rejection. Early attempts to address the risk associated with incompatible blood group transplantation employed plasmapheresis (PEX) for antibody removal. This was followed by the use of splenectomy in the mid 1980's which reported improved results, leading to the conclusion that removal of the spleen combined with PEX in patients with very high levels of antibodies wards off graft rejection (2).

Immunosuppressant protocols vary slightly; however each protocol recognises the importance of immunosupression, prior to both ABO-compatible and incompatible kidney transplantation, for optimal graft survival. Takahashi (3) noted five components of immunosuppressive therapy for ABO-incompatible kidney transplantation: removal of anti-A and anti-B antibodies, pharmacotherapy for T and B cell inhibition, splenectomy or suppression of antibody production with anti-CD20 monoclonal antibodies, anticoagulation therapy and inducing accommodation (by antibody removal and immunosuppression, both pre- and post-operatively, as well as immediately prior to surgery).

THE EVIDENCE

In a 10-year multicentre experience 50 patients underwent ABO-incompatible kidney transplants. Kidney donors were of blood type A2 (n = 47) or A2B (n = 3) and recipients were O (n = 31) and B (n = 19) type. Cadaveric (n=46) and living donor (n= 4) kidneys were used. The characteristics of the ABO-incompatible transplants were as follows; A2 to O transplants 62% (n = 31), A2 to B transplants 32% (n = 16) and A2B to B transplants 6% (n = 3). The control group consisted of 640 consecutive ABO-compatible cadaveric kidney transplants over the same period. Immunosuppressant therapy was the same for the experimental and control groups. No patients receiving a live A2 kidney were given induction therapy. Two fatalities that were reported in patients occurred at 1 and 12 months, with the first death due to bacterial endocarditis. The 2-year post-transplant graft survival rate was 94% in A2-incompatible transplants and 88% for ABO-compatible transplant. Four (22%) cadaveric grafts were lost due to rejection at 0.5, 21, 27 and 41 months. Before the introduction of titre history patient selection criteria (pre 1991), 19/28 (68%) had a functional graft one month postoperatively, all of the kidneys had failed or suffered dysfunction by 10 days post-transplant. During this time patients with early graft loss were noted to have elevated anti-A IgG titres. All of the live-donor kidney transplants were still functioning 71 months after the graft took place. A major predictor of graft success was antibody levels at baseline, that is those patients with 'low' anti-A titres were less likely to reject their donor kidney (4).

Two other studies were included for assessment in this summary (1,5). Gloor et al. (2003) conducted a non-randomised comparative study investigating the use of ABO-incompatible live-donor kidney transplants to treat patients with end stage kidney disease (ESKD). The non-randomised comparative multicentre study by Takahashi et al. (2006) investigated 564 patients who received ABO-incompatible kidney transplants. Eighty per cent of donor-recipient relationships were biological, with parent-child donation being the most common (70%).

FUTURE STEPS

Based on the level of evidence available and potential uptake of the technology, kidney transplantation using incompatible blood group donors will proceed to a Horizon Scanning Report.

Written by Caryn Perera and Deanne Leopardi, ASERNIP-S

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Point-of-Care testing for Influenza: Executive Summary

Nichols et al (1) defined point-of-care testing (POCT) as "laboratory testing conducted close to the site of patient care by clinical personnel whose primary training is not in the clinical laboratory sciences." POCT is intended to be used by clinicians or nursing staff at the bedside to facilitate patient management and to enable treatment decisions to be made rapidly. POCT for influenza is intended to allow the rapid diagnosis of infection with the influenza virus in high-risk patients. This is to facilitate appropriate treatment of positive cases through the administration of neuraminidase inhibitors or antivirals in a timely fashion, with the aim of reducing morbidity and mortality.

The gold standard for the diagnosis of influenza is viral isolation and culture, however results are not available for 2-3 days or longer (range 2-14 days).

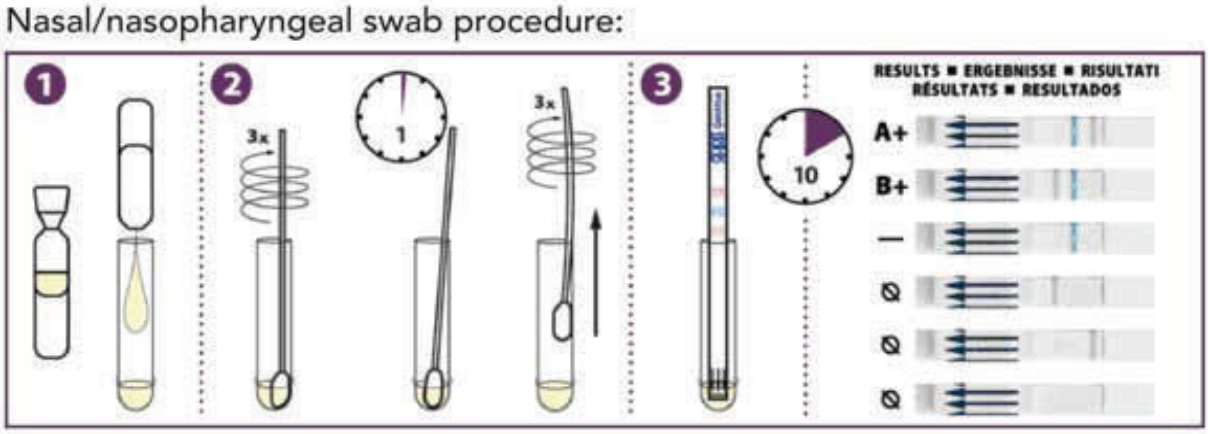
There are several rapid influenza diagnostic tests available that are capable of detecting the presence of either influenza A, influenza B, or influenza A and B. Influenza A POCT kits are capable of testing whether or not a patient has been infected with influenza A. This includes both the *human* influenza strains and *avian* influenza A. POCT is only capable of identifying the *strain* not the *subtype* of influenza. Further pathology testing is required to ascertain whether or not the influenza subtype is *human or avian.*

In general, all of the POCT kits, when compared to viral culture or RT-PCR, reported high test specificity (94.5-100% without stratification by age) and moderate-to-low sensitivity. Thus, a *negative* POCT result does not rule out the possibility of influenza as a diagnosis, and all negative patients should undergo conventional viral culture or other diagnostic tests to confirm the presence or absence of influenza infection.

Results for individual POCT kits were highly variable. The variable sensitivity values obtained with POC tests may be a reflection of the population that was tested. POCT has been reported to be more sensitive when used to diagnose children, as a consequence of increased viral shedding in children for longer periods of time. In addition, the study by Agoritsas et al (3) reported that the sensitivity of POCT kits is affected by sample collection methods, with superior test sensitivity obtained when using nasopharyngeal swabs (85%) compared to nasopharyngeal washes (69%) or nasal swabs (78%). POCT kits designed to diagnose both influenza A or B performed poorly in terms of sensitivity in the diagnosis of influenza B, however this may due to the low prevalence of that strain.

Several high level studies were included for assessment that reported on the effect of POCT on patient management. For patients who received POCT for influenza, studies reported a significant decrease in the number of additional pathology tests ordered when compared to patients who received standard care. When only influenza positive patients from the two groups were compared, the majority of studies reported a significant decrease in the amount of time spent in the emergency department, a decrease in the administration of antibiotics and an increase in the administration of antivirals in patients who received POCT. Although all of the included studies reported on the immediate effect of POCT for influenza on patient management within the emergency department or hospital, none of the studies reported on whether POCT, followed by appropriate treatment, affected the duration or severity of the influenza infection.

Several economic studies on the use of POCT for influenza were assessed. A cost-effectiveness analysis determined that not giving antiviral therapy is the most expensive and the least effective strategy, costing US$471 per patient. Time lost from productive work accounts for the majority of this cost. The strategies of (1) testing followed by treatment for positive patients or (2) no antiviral therapy, were found to increase costs and to decrease health. The authors concluded that the only two cost-effective



The QuickVue influenza test A + B (2)

Point-of-Care testing for Influenza: Executive Summary (cont..)

strategies were either *not* testing, or of treating *all* patients with either amantadine or zanamivir. The choice of whether to treat with the antiviral or neuraminidase inhibitor depends on the prevalence of influenza B infection. As the proportion of influenza B increases in comparison to influenza A, treatment with zanamivir is favoured (4).

It remains to be determined whether or not POCT has a role in the rationing of either anti-retrovirals or neuraminidase inhibitors at times of pandemic infection when these drugs may be in short supply.

Written by Linda Mundy, AHTA

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Infrared spectroscopy for diagnosis of acute pancreatitis

Acute pancreatitis is the inflammation of the pancreas which occurs with a rapid onset and may be caused by several mechanisms. The pancreas produces proteolytic enzymes that are normally in an inactive form within the pancreas. If the enzymes become active within the pancreas, autodigestion of the pancreas may result, leading to intrapancreatic inflammation followed by extrapancreatic inflammation in more severe cases. This may result in severe systemic effects including organ failure or death

HOW IT WORKS

Infrared spectroscopy (IRS) measures the absorption or transmission of infrared light through a test sample. If a variety of infrared frequencies are used the absorption or transmittance spectrum of the sample can be measured. The spectrum obtained is reliant on the constituents present in the sample and thus can be interpreted as a fingerprint of the components within the sample. Petrov et al (1) propose to use IRS in the 800–1000 nm range to obtain a "fingerprint" of serum components in acute pancreatitis patients. It is claimed that these spectra are specific and are capable of distinguishing between mild and severe acute pancreatitis allowing patients to be triaged due to their clinical needs.

THE EVIDENCE

An initial study prospectively recruited 64 patients with acute pancreatitis, 112 patients with acute abdominal symptoms that were of non-pancreatic origin and 40 healthy subjects. The subjects had blood samples taken for conventional serum amylase analysis and IRS testing. The serum sample was analysed by a standard scanning spectrometer in the range of 800 to 1000 nm with a 2 nm step. The results were passed through an algorithm to classify the subjects according to their disease status. The IRS technicians were blinded to the patient diagnoses. Of the 64 patients with acute pancreatitis, 14 (22%) were classified as having severe acute pancreatitis and two of these patients died. When compared to the control subjects the patients with acute pancreatitis showed a lower median IR absorbance (p=0.02). When compared to the reference tests, IRS showed a sensitivity and specificity of 91%, a positive predictive value of 85% and a negative predictive value of 94% (1).

A second study by the same investigators (2) examined whether IRS could be used to triage patients into mild or severe cases of acute pancreatitis. Again the technicians performing the IRS tests were blinded to patient diagnoses. A total of 167 patients with acute pancreatitis were recruited for this study, 133 patients were classified as mild, and 34 were classified as severe acute pancreatitis. Seven (21%) of the severe acute pancreatitis classified patients died but there were no deaths in the mild acute pancreatitis group. IRS performed better or equal to the other two testing modalities except at 48 hours post admission. Given that the aim of IRS is to allow the early triage of patients to facilitate appropriate treatment, the lower accuracy at 48 hours post admission may not be a negative factor when assessing the feasibility IRS.

FUTURE STEPS

Given the early stage of development and research into IRS for acute pancreatitis HealthPACT recommended that this technology be monitored for further information in 12 months.

Written by Adrian Purins, AHTA

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SMART—Scalable medical alert response technology for monitoring patients in a hospital emergency department

The SMART device is designed to be used as a patient monitoring and management device that remotely and wirelessly gathers vital health information from patients waiting for treatment at a hospital emergency department (ED). If adverse events are detected hospital staffs are notified allowing prompt, directed action to be taken for the deteriorating patient.

HOW IT WORKS

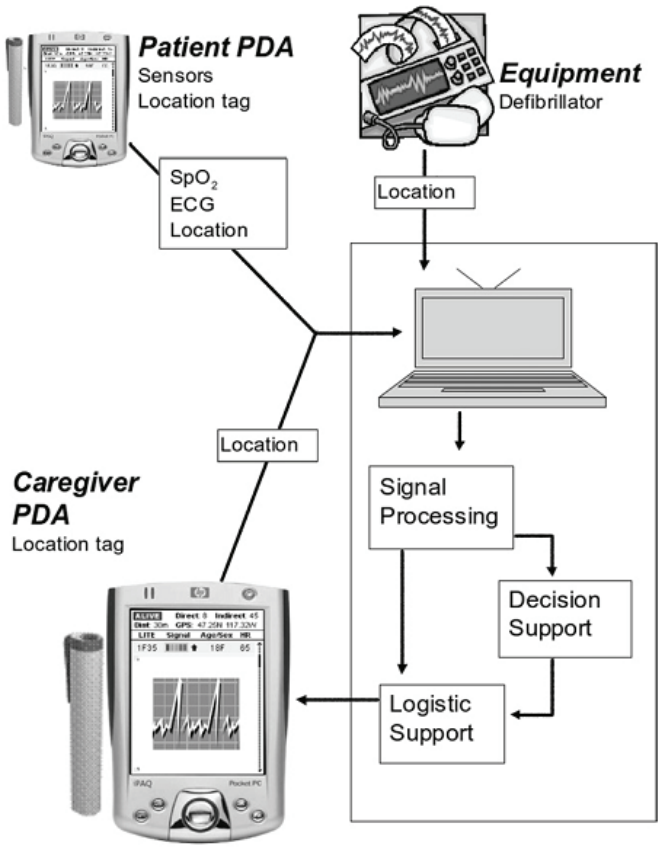
The SMART system provides an integrated package including wireless patient monitoring (electrocardiogram, blood oxygen saturation (SpO_2), and positioning within the ED), a stationary terminal for staff to access patient parameters, a targeted warning function, and a wireless interface for mobile staff (a pocket PC with patient data displayed). In addition to hospital based monitoring, the SMART system aims to be scalable to suit large scale disasters. This is facilitated by the systems portability and wireless capability. The system is designed to effectively allow the same patient management systems to operate both at a disaster site and within the relevant receiving hospitals adjacent to the disaster area.

THE EVIDENCE

The SMART system was tested in a functioning hospital ED for a 9 month period. A paramedic coordinated the trial and was responsible for monitoring the data presented at SMART central and, if necessary, sending notification to caregivers who would then attend to patients as required. Patients were triaged as usual and those deemed of lower than Category 1 (most severe category) were eligible for the trial and only patients presenting with respiratory or cardiovascular symptoms were accepted into the trial. After admission to the trial each patient was fitted with the patient portion of the SMART system consisting of an ECG, SpO_2 monitor, and location tag. Of 189 eligible patients, 151 were entered into the trial and of these 6 were subsequently withdrawn for various reasons including one who found the SMART device irritating. Of the patients fitted with a SMART device 93% said they would wear one again if required, and 65% reported feeling safer with the device on.

The tracking system used to locate the patient within the ED worked well with some minor problems where the patient's location was lost temporarily. This was in all cases corrected when patients moved into a new zone.

The SMART system determined the re-triage of 3 patients during the trial. One patient was initially triaged into category 3 and, after a SMART alert for premature ventricular contractions, was re-triaged and admitted to the ED. A second case was admitted to the ED and, subsequently, to the hospital after a SMART alert for bradycardia was sent. With the third case, the SMART system alerted staff to the discrepancy between the ECG and SpO_2 heart rates; this patient had junctional tachycardia.



SMART components: Caregiver PDAs, location sensors and patients PDAs with ECG ad SP02 sensors are wirelessly connected to SMART Central where all data are processed (1).

FUTURE STEPS

Based on the early state of development in this technology and its potential for a large impact on hospital ED patient care, HealthPACT recommended that this technology be monitored in 12 months.

Written by Adrian Purins, AHTA

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Percutaneous compression plate

Intertrochanteric fractures occur between the greater and the lesser trochanter and are the most common type of hip fracture. Symptoms associated with intertrochanteric hip fractures include substantial pain and discomfort, particularly during movements, such as when attempting to flex or rotate the hip. Surgery is the most common treatment for these fractures, however, not all patients are suitable for surgical treatment.

HOW IT WORKS

Surgical treatment consists of obtaining a stable reduction by closed or open methods, followed by fixation of the fracture using specially designed plates and screws (1). Fixation of intertrochanteric hip fractures is usually performed using a compression (CHS) or dynamic (DHS) hip screw (2). The CHS is composed of a metal plate attached to the outer side of the femur with screws and a large secondary screw (lag screw) placed through the plate into the neck and head of the hip. This allows for impaction/compression at the fracture site while also allowing for sliding of the lag screw and impaction of the fracture. The intramedullary nail is an alternative fixation method in which a nail is placed directly into the marrow canal of the bone (1). A lag screw is then placed through the nail and up into the neck and the head of the hip. In both the CHS and intramedullary nail a temporary guide wire or a separate bone screw can be temporarily or permanently left in place.

The PerCutaneous Compression Plate (PCCP), also known as the Gotfried plate, is a minimally invasive fixation alternative for patients with intertrochanteric hip fractures. The PCCP comprises a fixed-length plate, three cortical shaft screws and two dynamic neck screws with a sliding mechanism similar to the CHS (inserted at 135°) (3). The PCCP is inserted via two small incisions (2-3 cm) and is assembled within the patient (3,4).

THE EVIDENCE

Patients (n=104) with stable intertrochanteric fractures were randomly assigned to undergo treatment with either PCCP or CHS following closed reduction of their fractures. Device related complications were reported in 2 patients in the PCCP group and 4 patients in the CHS group. The complications included one case of osteonecrosis (resulting in revision to hemiarthroplasty) and one device failure by varus collapse and cutting out within 7 days, resulting in revision using the CHS. In the CHS group, intraoperative complications of fracture of the lateral cortex of the femur at the level of the greater trochanter (n = 1) and loss of fracture reduction were reported (n = 1). Two additional CHS patients experienced cutting out of the hip screw. In 1 patient removal of the implant and arthroplasty was performed while the other patient died before action could be taken. There was no significant difference between the 2 groups. Eighteen deaths were reported, 5 in the PCCP group and 13 in the CHS group (p = NS). Cause of death was not reported (3).

Functional recovery was measured using a pain score and weight bearing test. There was no significant difference in pain between groups from day 1 to 24 weeks postoperatively, with the exception of less pain (p = 0.04) in the PCCP group at 6 weeks (3.9 vs 5.8 on the Visual Analogue Scale). At 6-months, 1 patient underwent removal of the PCCP due to mild pain despite healing of the fracture. In terms of the ability to bear weight on the injured or uninjured leg, there was no significant difference between groups from day 1 to 24 weeks postoperatively, with an exception occurring at 6 weeks when patients in the PCCP group were able to bear significantly more weight on both the injured and uninjured leg (p = 0.04 and p = 0.006 respectively). At 6-weeks the mean amount of weight on the injured leg was 87 kg for PCCP group patients and 71 kg for CHS group patients, while the amount of weight on the uninjured leg was 97 and 93 kg in PCCP and CHS groups, respectively. The PCCP did not lead to significantly better postoperative mobilisation or shorter hospital stay.

Two other randomised studies were included for assessment in this summary (4, 5).

FUTURE STEPS

Based on the similar success rates to the CHS in a minimally invasive setting without increased safety risks, the PCCP will be monitored for 12 months.

Written by Luis Zamora, ASERNIP-S

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Serial transverse enteroplasty

Short bowel syndrome (SBS) is a malabsorptive disorder caused by the surgical removal or dysfunction of a segment of the small intestine (1). Many patients experience diarrhoea, steatorrhoea, abdominal pain, fluid retention, weight loss, fatigue, anaemia, hyperkeratosis, muscle spasms, poor blood clotting, and bone pain (3). SBS is also associated with serious long-term complications such as liver and biliary complications, nutrient deficiencies, fluid and electrolyte disturbances, bacterial overgrowth, hyperoxaluria and D-lactic acidosis (1).

HOW IT WORKS

Surgical management of SBS consists of intestinal or combined liver-intestinal transplantation, and non-transplant operations. Intestinal or combined liver-intestinal transplantations are normally reserved for patients with serious, life threatening complications. Non-transplant operations include the creation of artificial enteric valves, stricturoplasty and intestinal tapering procedures. Procedures to lengthen the dilated bowel resulting from intestinal adaptation such as the Bianchi procedure (a procedure where the bowel is cut in half and one end is attached to the other) and serial transverse enteroplasty (STEP) are also included in this category (3).

The STEP procedure is performed to eliminate adaptive dilation by elongating the shortened bowel and preserving the mucosal surface area taking advantage of the natural adaptive dilation of the small intestine during SBS. The procedure is performed in patients who are dependent on parenteral nutrition and are experiencing SBS complications or as an alternative to tapering enteroplasty. During STEP, a surgical stapler is applied in a serial transverse manner to incompletely staple and divide the intestine. The stapler is applied from alternating sides of the small intestine, resulting in a new intestinal channel able to direct enteric contents through a longer and narrower lumen (4).

THE EVIDENCE

A retrospective review comparing the outcome of the STEP procedure and the Bianchi procedure was reported by Sudan et al. (2007). Of the 64 patients included, 43 patients underwent the Bianchi procedure and 21 underwent the STEP procedure. Six deaths were reported, with an overall patient survival of 91%. There was no significant difference between the Bianchi and STEP groups. Ten per cent of patients experienced early major postoperative complications. There was no significant difference between the two types of lengthening procedures. The baseline median length of remnant small bowel in patients who underwent the Bianchi and STEP procedures was 44cm and 45cm, respectively. Following the procedures, the median length of the small bowel increased in both the Bianchi and STEP recipients to 68cm and 65cm respectively (p = NS). When the percentage increase in length over the original length was compared between groups, it was revealed that the STEP procedure conferred a statistically significant greater increase (p = 0.01) than the Bianchi procedure (52% versus 48%).

At the time of surgery 62/64 patients were dependent on parenteral nutrition. The median percentage of calories from parenteral nutrition was similar between the Bianchi and STEP groups before surgery (79% & 90% respectively, p = 0.84). At 3-month follow-up, the median percentage of calories from parenteral nutrition had improved in both the Bianchi and STEP groups to 50% and 35%, respectively. Patients who had received the STEP procedures experienced a statistically significant greater improvement in median parenteral nutrition compared to patients who underwent the Bianchi procedure (p = 0.05). Whilst the improvement in parenteral nutrition continued at the six month follow-up to 30% and 7% in the Bianchi and STEP recipients respectively, there was no difference between the groups (p = 0.26).

Intestinal transplantation was required in nine patients at a median of 2.9 years after the lengthening procedures. Transplantation was significantly higher in patients who underwent the Bianchi procedure (18.6%) than patients who underwent STEP (5%) (p = 0.03).

Two other case series were assessed in this summary.

FUTURE STEPS

Based on the limited evidence regarding the STEP procedure suggesting its effectiveness and the small population of patients with SBS, this technique will be monitored for 24 months

Written by Luis Zamora, ASERNIP-S

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Autofluorescence imaging for colonoscopic adenoma detection

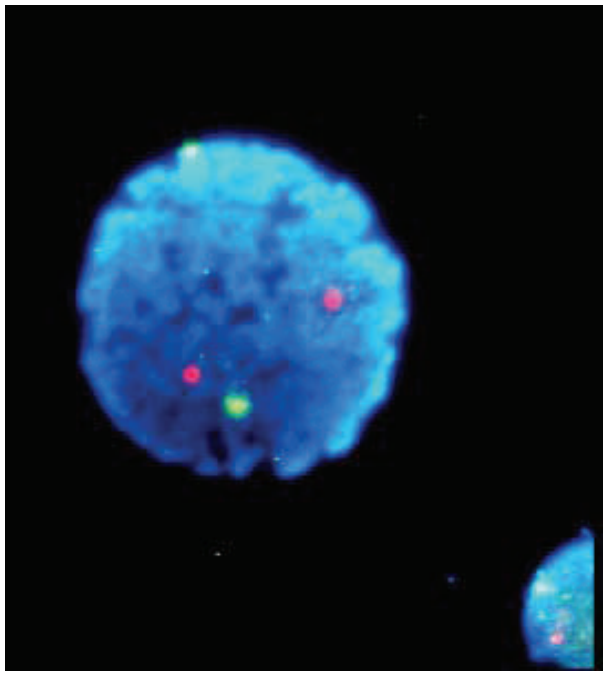
Colorectal cancer occurs when the growth of epithelial tissue in the inner lining of the colon (mucosa) accelerates, producing an abnormal growth or lesion known as a polyp. Polyps of glandular origin are called adenomas. Although polyps are benign tumours, they have the potential to become malignant. A malignant adenoma is called an adenocarcinoma. Since a pre-malignant lesion can quickly turn into a carcinoma, early detection of an adenoma is vital for preventing colorectal cancer in patients who are predisposed to the disease (1).

HOW IT WORKS

Autofluorescence (AF) colonoscopy, has been developed to detect adenomas typically missed by white light colonoscopy and works by exploiting the varying fluorescent characteristics of naturally occurring molecules found in tissues of the gastrointestinal tract. These molecules, known as fluorophores, include collagen, nicotinamide adenine dinucleotide, flavins and porphyrins. The concentration of endogenous fluorophores differs between tissues according to their thickness, micro-architecture, and haemoglobin concentration. Thus, the AF of normal mucosa is greater than that of diseased colonic tissue (2).

THE EVIDENCE

In the randomised crossover study carried out by Uedo et al (2007), patients underwent colonoscopic examination of the distal sigmoid colon and rectum for polyps. A total of 64 patients were randomly assigned to either AF or white light imaging groups. A single colonoscopic imaging device that could be switched from the white light to AF mode was used, and both patient groups received both types of imaging. The diagnostic ability of the techniques was verified by histological analysis of biopsy samples. Of the 64 patients, 57 polyps were detected by white light and 58 by AF; and of these 28 and 26, respectively, were neoplastic. The sensitivity and specificity of AF for detecting neoplastic polyps was 84 and 60% respectivley; and for white light colonoscopy it was 90 and 64%, respectively. The positive and negative likelihood ratios were 2.1 and 0.266, which indicate that AF provides minor but possibly important diagnostic evidence. The total number of overlooked polyps was 13 for white light (1 cancerous tumour, 2 adenoma and 10 hyperplastic polyps) and 12 for AF (5 adenoma and 7 hyperplastic polyps). Typically white light missed smaller (3.6 ± 1.9mm SD) lesions, both protruding and flat. AF missed larger (3.9 ± 2.2mm SD) protruding polyps, but did not fail to identify any cancerous tumours (3).



Flurosphore—the naturally occurring molecules found in tissues of the gastrointestinal tract

Two non-randomised cross-sectional analytic studies (1,4) comparing autofluorescence imaging with white light colonoscopy were also included for assessment in this summary.

FUTURE STEPS

Based on the very limited evidence base, autofluorescence imaging for colonoscopic adenoma detection will be monitored for 12 months.

Written by Deanne Leopardi, ASENIP-S

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Pulsed electron avalanche knife (PEAK-fc)

Intraocular microsurgery, in particular retinal and vitreous surgeries, is increasingly being used for the prevention and treatment of cataracts, retinal detachment and infection, which if left untreated may lead to severe vision loss or blindness. The majority of treatments are surgical and due to the delicate nature of the eye, it is important to use precise and safe surgical equipment and techniques to prevent further damage to eye tissue (1).

HOW IT WORKS

Conventional vitreoretinal surgery involves the removal of vitreoretinal membranes by mechanical segmentation and delamination using a significant amount of traction to the underlying retinal tissue. This methodology often results in damage to internal retinal layers, tears, and bleeding (1). The Pulsed Electron Avalanche Knife (PEAK-fc) is a new electric cutting device for intraocular microsurgery. This electrosurgical instrument uses 'cold' cutting and traction free dissection in a liquid medium to reduce damage to the eye (2). The improved second version of the PEAK-fc device incorporates a varied probe structure with greater cutting efficiency. This device uses lower voltages (300 to 600 V) and a shorter pulse length (approximately 100 µs) with each pulse consisting of a burst of several tens of biphasic 'minipulses' (1 - 2 µs duration). Cutting is established as the electrical pulse rapidly vaporises and ionises liquid and tissue in close proximity to the electrode. Because PEAK-fc uses short duration electrical pulses to cut through tissue there is little collateral damage caused from heat diffusion through the tissue from the incision site (maximum heat diffusion 7 µm). The advantages of PEAK-fc over conventional methods include sharply defined transection and incision of epiretinal membranes, fine coagulation of vascularised epiretinal tissue and traction free dissection (2).

THE EVIDENCE

Priglinger et al. (2007) recruited 20 consecutive patients (20 eyes, one per patient) for investigation of the PEAK-fc device. The preoperative diagnoses of the patients included congenital cataracts in five children, advanced senile cataracts (n = 2), mature cataracts (n = 6, including three with posterior iris synechia), posttraumatic cataracts with zonulolysis (n = 3), posttraumatic intumescent cataract (n = 1), anterior capsule opacification after cataract surgery (n = 2) and massive fibrosis covering the iris, pupil and most of the trabecular meshwork (n = 1). Three surgical manoeuvres were carried out using PEAK-fc, including anterior and posterior capsulotomy, synechiolysis and dissection of anterior capsule phimosis/scar tissue. Complete ophthalmologic examinations included visual acuity tests (Snellen), slit-lamp examination, intraocular pressure measurement and fundus biomicroscopy (2). The PEAK-fc cuts were reported to have sharp edges with very little visible whitening suggesting minimal collateral damage. This study reported no PEAK-fc related complications. However, several cases of minimal bleeding which resolved spontaneously were reported following treatment with the PEAK-fc device. There were no cases of postoperative cystoid macular oedema during the follow up period (2). Anterior capsulotomy was successfully performed in 15 patients (15 eyes), even in extremely complicated cases, for example when massive pigment desposition occurred after the removal of iris synechiae. In 2 cases surgeons failed to complete a continuous curvilinear capsulorhexis with capsulorhexis forceps as the incision margins showed extensive radial rip which would eventually result in damage to the posterior capsule. PEAK-fc was able to complete the procedure and avoid further damage. In 2 cases PEAK-fc successfully separated posterior iris synechiae (after unsuccessful attempts using conventional instrumentation). After synechiae removal capsulotomy was successfully performed with PEAK-fc in all cases. PEAK-fc also allowed for selective tissue dissection without affecting the surrounding eye structures. Postoperative examination data suggests that endothelial cell counts were similar to those of patients who had recently undergone conventional cataract surgery and visual acuity improved by a mean ± SD of 5.6 ± 3.3 Snellen lines (2).

Two other case series were included for assessment in this summary (3,4).

FUTURE STEPS

Based on the limited evidence available, the PEAK-fc will be monitored for 12 months.

Written by Deanne Leopardi, ASERNIP-S

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Other New and Emerging Technologies

The following additional technologies were considered by the Health Policy Advisory Committee on Technology (HealthPACT) in February 2008.

- Rapid breath test for assessing total body water in chronic fatigue patients.
- Spinal cord stimulation treatment for patients with cardiac syndrome X.
- Optical coherence tomography for MS patients.
- Home studies for the diagnosis of sleep disorders.
- Screening for Lung Cancer utilising computed tomography (CT).

The above technologies can be accessed on the following link:

http://www.horizonscanning.gov.au/internet/horizon/publishing.nsf/Content/prioritising-summaries-2007-2

- APACHE-AAA scoring system for patients undergoing adominal aortic aneurysm repair.
- Circumferential pulmonary vein ablation for the relief of symptoms in patients suffering atrial fibrillation.
- Computed tomography assessment for suspected large bowel obstruction.
- Microdebrider intracapsular tonsillectomy for patients suffering from tonsillitis or obstructive sleep disorders.
- Nerve stimulation in thyroid surgery to decrease recurrent laryngeal nerve damage in patients undergoing thyroidectomy.
- Pillcam ESO as an alternative diagnostic technique for patients with oesophageal disease.
- Totally endoscopic coronary artery bypass for patients suffering from coronary artery disease.
- Transvaginal pelvic reconstruction using mesh.

The above technologies can be accessed on the following link:

http://www.horizonscanning.gov.au/internet/horizon/publishing.nsf/Content/asernip-s-net-s-summaries-2

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