

A practical and innovative model for managing chest pains in rural/remote hospitals—a nursing perspective

Olivia Stapleton¹

¹Alpine Health

Picture yourself in a beautiful valley in northeast Victoria with snow on the surrounding mountains in winter and a beautiful array of colours from all the trees in the autumn, with rivers surrounding you, bush tracks, mountains to climb and cycling all year round. In the small towns of Bright, Myrtleford and Mt. Beauty, the population fluctuates with tourists leaving the city for a quiet country experience, overseas travellers, back packers, fruit pickers, experienced bicycle riders entering world class events and skiers. The three country towns of Bright, Myrtleford and Mt. Beauty, have also become popular areas to retire. Each town has a small hospital with up to ten beds in the acute ward and an unfunded Urgent Care. Two out of the three hospitals have a thirty bed nursing home and one hospital in Bright has a low level care facility in a nearby location but not on the same site as the hospital. The three towns (Centres) with their hospitals, nursing homes and low level care facility merged into one multi-complex service twenty years ago—creating one Health Service—Alpine Health.

To understand the complexity of these three Centres is to understand the geography of the area. Mt. Beauty is in the Kiewa valley—forty minutes of windy road from Bright in the Ovens Valley. Myrtleford is another hour away by vehicle from Mt. Beauty and thirty minutes from Bright. Sometimes snow and flood waters block the access between these Centres. The Centres have a regional hospital that take most of the complex presentations. The regional hospitals are well over sixty minutes away by road. Other patients are sent to tertiary facilities in Melbourne by air. This region is called the Hume Region and it is in North East Victoria, covering 40,000 square kilometres, with a population catchment of 400,000. The regional hospital in Wangaratta is called Northeast Health Wangaratta (NHW). The regional hospital for Mt. Beauty is Albury Wodonga Health (AWH). These two feeder hospitals have a limited capacity to take all the high acuity presentations from the catchment and at times must go on by-pass to other regional hospitals—Goulburn Valley Health in Shepparton.

During the busy tourist times, the three Centres have an influx of Urgent Care presentations. The three acute hospitals in these Centres are staffed after hours and on weekends by nurses with On-Call medical practitioners available by phone or Telemedicine. There are no General Practitioners (GP) at the hospitals but they run clinics Monday to Friday and Saturday mornings at their own Medical Centres. One GP remains On-Call Monday to Friday and Saturday mornings from their own Medical Centre and can be called in for an emergency at the local hospital Centre (at a different location from the Medical Centre). The GPs are rostered to be On-Call for all three sites, and access to the GP is via phone and/or telemedicine unless the GP On-Call is working from his/her Centre of residence. The On-Call GP covers the other two sites via the phone with the RN, giving phone orders, and advice and comes into the local hospital Centre when called by the RN for emergencies. This system relies heavily on the RN doing a thorough assessment at Triage and subsequently following through with treatment when a person presents with chest pain. There are no Triage nurses, no reception on the week-end and the RN is in charge of the Urgent Care Centre and also covers the acute ward, working with another nurse. However, this setting is not unusual in rural areas, and in remote areas—less access to GPs is far more common. The RN needs to be guided through assessment and prompt treatment with a patient that presents with Acute Coronary Syndrome (ACS).

The 'Hume Region Management of Chest Pains or Suspected Acute Coronary Syndromes' algorithm, (the 'Hume Algorithm') is essential to assisting nurses in rural and remote areas to be able to function when a GP is not available on site but contactable by phone and/or telemedicine. Presentations can occur on night shift with only a Registered Nurse (RN) and an Enrolled Nurse (EN) in attendance in the whole hospital.

If a person presents with chest pain suggesting Myocardial Infarction (with classical ST elevation greater than or equal to 1 mm in 2 or more contiguous limb leads and 2 mm in 2 or more contiguous anterior chest leads or has a new left bundle branch block or new ST depression in V1-V2 consistent with an acute posterior MI, the RN is prepared to follow the 'Hume Region Management of Chest Pains or Suspected Acute Coronary Syndromes' algorithm, (the 'Hume Algorithm'). The RN, with advice from the GP can assess and commence treatment for an impending ST Elevation Acute Coronary Syndrome (STEACS).

Firstly, there is recognition of ST elevation Acute Coronary Syndrome (STEACS) with the ECG and ISTAT troponins that can be done in a Centre. A General Practitioner (GP) On-Call is alerted via a phone. In the future, hospitals will have a digital ECG machine linked to regional hospitals to be read by specialist physicians in real time to provide guidance to the nurses. Following the High-Risk pathway (STEACS) on the algorithm, the nurses can be given approval for thrombolysis with Tenecteplase by the GP and/or the specialist physician on the phone, based on the ECG and clinical findings.

Secondly, treatment has already started with GTN, aspirin, betablockers and enoxaparin injections. Ongoing pain is also treated with morphine and antiemetics as required. Appropriately trained nurses in our Centres are able to administer analgesia for chest pain. Further treatment is discussed with the Emergency physicians in regional centres. Ambulance transfer to these centres or the nearest tertiary facility with PCI facilities is arranged when the patient is clinically safe for transfer.

If, however, a patient presents with atypical chest pain and there are no changes on the ECG, the RN can follow the Low Risk pathway (but no risk of myocardial infarction) of the algorithm. All chest pain is treated as cardiac until proven otherwise. It has been known that patients with a history of gastritis have presented with chest pain, treated for gastritis and a potential for an infarct has been overlooked. Thus, the 'Hume Algorithm' assists nurses to make a thorough assessment of any patient who presents with chest pain and follow through with the assistance of the GP via phone or telemedicine to make a clinically appropriate diagnoses.

Following the Low Risk Pathway, the RN can take bloods and use the ISTAT machine for a Troponin reading on the patient's arrival and repeat bloods for Troponin, six hours post arrival. The RN can treat the person with chest pain and do regular ECGs, consulting with the GP on the phone or by Telemedicine. The GP can discuss probable discharge six hours post repeat Troponin if the result remains in the normal range. The patient is given an appointment to see the GP for ongoing investigations e.g. Stress Test etc.

The patient that presents with signs and symptoms that fit the Moderate Risk Pathway (unstable angina or NSTEMI), usually causes the most uncertainty with assessment for the RN in charge. Hence having a digital ECG and a link to a specialist physician will assist with clarifying the assessment for diagnosis and treatment. Time is always of the essence with patients presenting with chest pains, especially if their ECG is non-diagnostic and the RN is unsure of other irregularities on

the ECG. Definitely having a digital ECG linked to a Regional Service will revolutionise treatment in rural and remote areas, and provide much needed support to the nursing staff in these Centres.

Not every presentation will fit the Pathways so neatly. A patient has been known to present with left lateral upper body pain, not specific to the chest region, radiating to left flank and groin, with a history of Coronary Artery By-Pass Grafts (CABGs) twelve years prior and a stent inserted within the last four months. The patient with a history of Type 11 Diabetes Mellitus adds further complications as chest pain is not always present. This was an atypical chest pain presentation marked by elevated Troponin. There was no ST elevation on the ECG and the patient was at Moderate Risk—the Non STEAC pathway on the algorithm. This patient was transferred for early angiography.

It is vitally important that the Hume Algorithm becomes a living document and education and development is on-going. This presentation for an infarct could have easily been missed. People with diabetes and particularly with previous CABGs may not have typical chest pain—“part of their autonomic neuropathy” (1). There are also conditions associated with serum troponin elevation without myocardial necrosis:

- arrhythmias
- aortic dissection
- hypo- and hypertension
- acute and chronic heart failure without significant coronary artery disease
- hypertrophic cardiomyopathy
- coronary vasculitis
- coronary spasm
- myocarditis
- takotsubo cardiomyopathy
- pulmonary embolus
- sepsis
- renal failure
- extreme exertion
- severe acute neurological conditions, e.g. subarachnoid haemorrhage. (2)

Regular case studies of atypical presentations and continual development of the Hume Algorithm will ensure that nurses in rural and remote areas are always updated and supported in their decision making when there isn't a doctor on the premises.

The Moderate Risk Pathway (unstable angina or NSTEMI) - patient with unstable angina or ECG changes—new ST depression or T depression or initial bedside Troponin positive was followed for the patient who presented with left flank pain. Several factors relating to history, may make the diagnosis difficult. However, if the Pathways are followed, then treatment has already begun to prevent misdiagnosis and potential life threatening injuries.

We have been so fortunate to have developed this protocol as it has revolutionised our assessment and treatment with patients who present with chest pain giving these patients successful outcomes. We have successfully achieved thrombolysis with patients in our Centres and have transferred patients to global centres or directly to Tertiary Hospitals for further treatment.

The Pathways were originally created by Dr Philip Tideman, Director, Integrated Cardiovascular Clinical Network Country Health South Australia, and then developed for our regions by Dr Leslie E Bolitho, (AM MBBS FRACP FACRRM FACP, FRCP MAICD) with assistance by Dr Jeffrey Robinson

(Medical Director Alpine Health), Mark Ashcroft (former Health Service Manager Alpine Health Bright) and Olivia Stapleton (Associate Nurse Unit Manager Alpine Health Bright).

We proudly stand by this protocol as it has proved to be successful with achieving good outcomes for patients who have presented to Alpine Health with chest pains.

Prior to the 'Hume Algorithm', an assessment of chest pain with a patient with a history of indigestion and reflux could have been easily overlooked and treated as such, especially if the patient was on a proton pump inhibitor. The potential for an infarct is always a possibility and with this patient, an acute myocardial infarct occurred. With the 'Hume Algorithm'—the nurse would not be able to discharge a patient prior to following the Low Risk, Moderate Risk or High Risk Pathways. To prevent the chance of missing the potential for ACS, critical analysis had to occur and better format for processing had to be created. Hence the creation of The 'Hume Algorithm'. It was developed to assist medical (general practitioners and trainees), nursing and healthcare staff in the assessment of people presenting to small rural hospitals and Urgent Care centres (the Centres) in Northeast Victoria with chest pains or suspected acute coronary syndrome (ACS). The 'Hume Algorithm' provides staff with a resource that enables patients to be classified into risk categories from high to low risk of an acute cardiovascular emergencies.

An evidence based literature review was undertaken and included key National Heart Foundation of Australia documents. Doctor Philip Tideman and Health South Australia had described a similar approach to risk assessment for cardiovascular emergencies that were introduced throughout rural South Australia. The 'Hume Algorithm' was developed utilising established evidence, to enhance assessment, risk stratification, supported decision making and early management of patients with chest pains to the Centres.

The 'Hume Algorithm' has received local support from regional practitioners and has been implemented in more than thirty-five Centres in the Hume region. There has been an early and consistent improvement in patient care, and timely referral of patients to regional and tertiary centres.

The introduction of the 'Hume Algorithm' provides evidence based guidelines for the early and appropriate management of patients with chest pains or suspected acute coronary syndromes. The 'Hume Algorithm' could be adapted for other rural centres.

References

1. Bolitho Leslie E. AM MBBS FRACRM FACP FRCP (Hon) MAICD Associate Professor University of Melbourne; Adjunct Associate Professor Monash University.
2. Bolitho Leslie E. AM FRACP adapted from Thygesen K, Alpert JS, Jaffe AS, et al. Third universal definition of myocardial infarction. Eur Heart J 2012;33:2551-67. With permission from Oxford University Press.
3. Bolitho Leslie E. AM FRACP; Robinson Jeffrey FRACGP, Stapleton Olivia ANUM; Ashcroft Mark HSM. 'The Hume Algorithm—for the management of patients with chest pains or suspected acute coronary syndromes in rural Victoria' Poster 2017
4. [http://www.heartlungcirc.org/article/S1443-9506\(11\)00104-1/abstract](http://www.heartlungcirc.org/article/S1443-9506(11)00104-1/abstract)
5. <https://www.mha.com.au/journal/2008/188/5/2007-addendum-national-heart-foundation-australiacardiac-society-australia>
6. <http://www.iccnestsaustralia.org.au/>

7. <https://www.mja.com.au/journal/2014/200/3/impact-regionalised-clinical-cardiac-support-network-mortality-among-rural>

Presenter

Olivia Stapleton has been a registered nurse since 1996. Before that she was a primary school teacher since 1981, where she taught all levels of primary school grades for 15 years, before deciding to do nursing. She has always had a passion for teaching and nursing and applied to do both after doing HSC. The first offer she received was for teaching, hence she took that path. Olivia's heroine is Vivian Bullwinkle, sole survivor of the massacre at Bangka Island during the war. She uses Vivian as her role model and hero. Vivian Bullwinkle had incredible strength of willpower to overcome adversaries during her entire life. She became heavily involved in establishing goals in nursing education. She helped to improve the salaries and working conditions for all nurses. Olivia works in a small hospital in the north-east of Victoria, in Alpine Health Bright. It is a wonderful place to work with a wonderful team but they mostly work with two nurses on during all shifts. The Urgent Care is busy as it is a tourist town all year round, plus it has an ageing population. Olivia has become involved in improving education in Urgent Care in the rural setting, mostly with doctors on call via telephone link or telehealth video, after hours and on weekends. This led to the creation of their Acute Coronary Syndrome protocol. The nurses want to get to the point of being able to thrombolise a patient without a doctor, as the nearest catheter laboratory is five hours away by road transport and over an hour away by air. Olivia is committed to educating the nurses and leading the team.