

2012

An update on stroke care in Australia: Interview with Ian Mosley Invited commentaries from Ian Patrick (Ambulance Victoria) and Christopher Levi, Stroke Research Program, Hunter Medical Research Institute, Australia

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Recommended Citation

Williams, B., & Mosley, I. (2008). An update on stroke care in Australia: Interview with Ian Mosley Invited commentaries from Ian Patrick (Ambulance Victoria) and Christopher Levi, Stroke Research Program, Hunter Medical Research Institute, Australia. *Australasian Journal of Paramedicine*, 6(4).

Retrieved from <http://ro.ecu.edu.au/jephc/vol6/iss4/10>

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CLINICAL PERSPECTIVE

Article 990331

An update on stroke care in Australia: Interview with Ian Mosley

*Invited commentaries from Ian Patrick (Ambulance Victoria) and
Christopher Levi (Stroke Research Program, Hunter Medical Research Institute, Australia)*

Interview by

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Brett: So, do you want to tell us a bit about yourself Ian?

Ian: Thanks Brett. My first qualification was in Nursing at the Royal Melbourne Hospital. Following that, I completed a business degree and found myself in health administration. I then completed a Masters in Management and have been working RMIT for the last 15 years. Over the last few years I've returned to my original area of interest, emergency care. Currently I hold a position as a Research Fellow and the research I've been undertaking investigates emergency and pre-hospital care of stroke patients.

Brett: Where are you currently working?

Ian: I'm at the National Stroke Research Institute based at the Austin Hospital and at the University of Melbourne.

Brett: Are there any specific portfolios you are currently examining?

Ian: My area of interest is in pre-hospital and emergency care of acute stroke patients. The research domain is an amalgam of health systems management, public health and clinical management.

Brett: Can you tell us a little bit about your latest research?

Ian: My research project is specifically involved in better understanding pre-hospital and emergency care of stroke patients. The research starts in the community and follows the patient in the ambulance and then into the ED. One of the problems we identified was that there was evidence that drugs were available to treat acute stroke patients (rt-PA), but unfortunately at the time only 2 to 3% of Australians were able to get that rt-PA, and the primary reasons for this was delays prior to their presentation to hospital.

My research is a descriptive study to investigate why people delay calling for an ambulance, and the process of care once the ambulance call is made. I investigated what goes on between the onset of symptoms and the call for ambulance assistance. I also looked at the call for ambulance assistance through to hospital arrival. For the first time in Australia we listened to the tapes of the calls for ambulance assistance, trying to better understand the factors that influence calling for the ambulance. I reviewed all the patient care records and then followed the process of care from hospital arrival to the first medical assessment in the ED. Of special interest was the impact of paramedic practice on ED care, and the time savings once the patient is in the ED.

Brett: Can you talk about the latest international evidence relating to stroke management?

Ian: The evidence currently available shows that administration of rt-PA, is both safe and effective for treating acute stroke patients. The drug is licensed in Australia but it has to be administered within three hours of symptom onset. A CT or MRI need to be done to exclude haemorrhage, which really means that there is about an hour of inpatient work involved prior to the administration of the rt-PA if the patient is eligible. There is also evidence that the sooner the drug is administered the more likely that patient will have a better outcome.¹

That evidence has been in place for a while and we have been delivering rt-PA in Australia for a number of years, but our administration rate is only around 4%. Two major studies have been published this year, the ECASS III trial,² and a trial from the SITS-MOST register,³ an international stroke register of rt-PA. Both these studies found that for acute stroke patients, rt-PA was both effective and safe out to four-and-a-half hours from symptom onset. The inclusion of these results into practice will have a major impact on stroke unit hospitals, EDs and ambulance services. A large number of patients that would previously have been excluded from this treatment will now be eligible. It also means that the way that we manage acute stroke care is going to be quite different. Patients from geographic areas that wouldn't have been able to get to an acute stroke centre in time now have the opportunity of receiving that treatment within 4.5 hours and they really should get that treatment.

Brett: That leads us nicely into your view or opinion on the stroke bypass system currently present in Melbourne?

Ian: In Australia, and especially in Victoria, we really don't have a system-wide approach to stroke care. The clinical practice guidelines for the ambulance service in Victoria clearly state there's a stroke assessment tool to help paramedics identify stroke, and that they should take patients identified as acute stroke to the nearest appropriate stroke facility. Unfortunately stroke care centres and sites that deliver rt-PA are not readily available and well known. The National Stroke Foundation in the recent past has published on their web site the hospitals that deliver rt-PA.

If we are now able to transport acute stroke patients with a four-and-a-half hour time window to treatment it will impact on paramedic practice. There may be longer transit times to hospital and there will be more situations that a paramedic will have to decide about transporting a patient past one facility to an appropriate comprehensive stroke service that delivers rt-PA to eligible acute stroke patients.

I would like to see greater involvement from the government in setting up system wide protocols so the hospitals work together, and also that there is a standardised practice so paramedics have a clear care pathway for acute stroke patients. Paramedics need to know what an appropriate acute stroke facility is, and that the facility will be ready to receive those acute stroke patients and respond to ambulance pre-notification.

Brett: How does the system in Melbourne compare with other states and territories in Australia?

Ian: The real bench mark at the moment is New South Wales, and especially the Hunter region of NSW. There's been a recently published paper from the John Hunter Hospital showing how a well organised, comprehensive stroke service can run.⁴ It really is at the sharp end of stroke care around the world and very comparable to centres like Houston in the United States. The study investigators were able to organise a whole range of disparate services. For example, they worked in with paramedics to assist them in education programs about what is the current evidence on stroke care. They designed a stroke assessment tool for the paramedics; they also worked designing pre-hospital protocols; they worked in with the regional hospitals to implement that protocol so the paramedics knew the hospitals that didn't have certain facilities and to by-pass those facilities. They worked in with the hospitals so that in-hospital protocols were in place to respond to the paramedics' assessment and pre-notification. They educated the staff at the hospitals, and they were able to integrate this program with the National Stroke Foundation to lead a community awareness program that was run at the same time. They integrated the involvement of community, government, ambulance and hospitals into the one process of care and the administration rate for rt-PA increased from 4% to 21%. If it can be done so well in Newcastle, the question needs to be asked: Why aren't we doing it here?

Brett: Are there any key messages or any elements from the evidence that you would like to see integrated into paramedic practice?

Ian: I think the key message is that paramedic practice is an integral part of acute stroke care and that stroke is a medical emergency. There is evidence out there that these treatments are safe and effective, and that eligible acute stroke patients should be given the opportunity of being treated with rt-PA.

From the paramedic's point of view: paramedics need to be informed of the current evidence and they need to be able to have a tool to uniformly recognise stroke symptoms. This is very important with neurological assessments as people in the ED tend to want to do re-do the assessment and to confirm the it for themselves. A validated assessment tool correctly applied overcomes this problem. The FAST test for example. When EDs get pre-notification from the paramedics that they have done the FAST test and this is the results then the chances are the hospitals will act on the paramedic assessment and instigate care protocols even before the patient arrives, decreasing the time to rt-PA. This was the result I found in my study. Acute stroke patients identified in the field and hospital pre-notification by paramedics was associated with reduced in-hospital delays. The reduction in in-hospital time was statistically significant.⁵

So some the issues that really come through is that stroke is a medical emergency, stroke patients can be treated with rt-PA and the paramedics can play a very important role in reducing time to treatment for stroke patients.

Brett: Are there any differences in stroke management between country and metropolitan Victoria?

Ian: Unfortunately, there are not very many centres where rt-PA is normally delivered in regional Victoria. What we need to do, from a government perspective, is to really support the stroke care protocol and roll it out across regional Victoria. It's not just a metropolitan thing. They may not have a neurologist on site at every regional hospital but there is support through telemedicine to assist. A virtual neurologist! Acute stroke treatment could be delivered in smaller centres, and I think it needs a big push from the government for this to happen.

Brett: This is a two-part question. Firstly, why do you think there have been historical barriers for paramedics in diagnosing stroke or TIA patients? And secondly, why hasn't the notion of 'brain attack' had the same impact as 'heart attack' in terms of paramedic management?

Ian: There is a legacy culture around. In the past there wasn't a lot you could do for stroke, and there are a lot of people that still think that, even though the evidence is out there. Now there is a lot that can be done for stroke patients. However, we're coming from a base that was: "we can't do much", and it's taken a lot to change that.

If you look at government funding for the purpose of the research and education; trauma and cardiac are much better funded than stroke care. This lack of funding does not assist in changing the culture. The second component is the actual event itself. Because stroke affects the person, their capacity to think, act and communicate may be reduced. There are difficulties recognising stroke as the common symptoms are not specific to stroke. The community have difficulties (including the patients and the people with them) recognising stroke symptoms and knowing what to do next.

The other component of stroke recognition is that stroke patients very rarely experience pain. Pain has a natural response of urgency as there is something wrong. With a traumatic injury or an AMI with pain, it becomes a natural reflex response that: "I have to respond, I have to act quickly". What we're finding with stroke patients, apart from the very severe patients that may end up unconscious, is that they engage in discussion with others about what is going on and what they should do. It becomes a dialogue rather than a response. Paramedics have to walk into that situation, try and make sense of it, and then act quickly. That's where a tool like the FAST test makes it easier to uniformly assess acute stroke patients.

So why isn't stroke the same as AMI? We've been seen as a poor relative to AMI. What's emerging at the moment is that AMI and stroke both need to get a shot in the arm to increase the responsiveness to symptoms. We are now looking at the trauma pathways and systems. The systems-based approach to trauma may be used as a template or model for acute stroke care and AMI.

A personal concern of mine is that in Australia we really don't have a community advocacy groups in the community to lobby the government to demand levels of care.

The Brain Attack Coalition in the United States and Canada are very vocal. Community members stand up in the media and say: “Hang on; we want these services in our region! We don’t have a stroke unit! We need a stroke unit!”. I haven’t seen here in Australia. At the last state election no one mentioned stroke units in the press, and I think there needs to be a lot more community advocacy. Stroke is the single largest cause of disability in Australia and the community should demand from government access to acute stroke services.

Brett: So you mentioned the stroke assessment. I was wondering if you had any comments on the stroke assessment tool currently used by Ambulance Victoria? Is the instrument valid and reliable and do you think it’s suitable for the Australian context? Would you make any modifications or suggestions to it?

Ian: The FAST test has been validated by investigators at Box Hill Hospital and they identified that paramedics in the field usually identify about 78% of stroke patients, without any additional education, without a stroke assessment tool.⁶ The research team at Box Hill Hospital implemented an education program and paramedics using the fast test were able to identify 94% of acute stroke patients which is about the same level as ED physician. That’s an excellent result.

The FAST test was not designed to identify every stroke patient. There are certain types of stroke that it doesn’t pick up but we know that. Currently in the community, stroke recognition from my research is about 44%, so the FAST test used in the community is much better than community awareness at the moment.

There’s been a criticism of the FAST test in that it doesn’t identify all strokes but from my point of view that was not its purpose. Its purpose was to increase stroke symptom awareness, to have a tool that’s easy to remember, easy to use, and easy to act on, and I think FAST does all those things.

There have been other stroke assessment tools... there’s a new one around by Nor et al called ROSIER – Recognition of Stroke In the Emergency Room⁷ – it’s specifically designed for the ED but there is no reason why that test can’t be applied... say for example, to the triage desk or in the pre-hospital setting, but I think at the moment, the FAST test is the first step in pre-hospital stroke assessment tools.

Another aspect of acute stroke care that paramedics have spoken to me about is TIA patients. If paramedics recognise a stroke patient and those symptoms are resolved, or resolving, what do they do? There is a validated assessment tool for TIA patients to identify those patients at high risk of imminent stroke.⁸ It’s called the ABCD² test, and one of the things that I’d like to see is paramedics assessing stroke patients in the field with the ABCD². Paramedics are able to identify stroke in the first instance using the FAST test. Then if the symptoms are resolved or resolving they do an ABCD² test on those patients to identify those at risk of imminent stroke and ensure the high risk patients are sent to facilities that have rapid TIA assessment protocols in place so they are investigated and treated prior to them experiencing a stroke. These patients are at the highest risk of a stroke and should be investigated and treated urgently.

Brett: Are there any other gaps in the clinical practice?

Ian: The issue to me right across the board is the application of existing evidence into practice. The evidence is there, hospitals at the moment aren't applying it uniformly. This creates a dilemma for paramedics in the field, because not only do they need to know what facilities are available, but they need to know what time of the days it is as there are facilities in Melbourne, where evidence-based practice is implemented only 9-5 Monday to Friday. This creates this extra layer in the clinical decision making for paramedics. What I would like to see is a uniform strategy rolled out across Melbourne with designated stroke facilities that is transparent and well-known to everyone. Paramedics will know that if you go to those facilities the patient will get the level of care expected.

Brett: Any there any controversies that may or may not impact on clinical practice for paramedics?

Ian: My concern for paramedics with the longer time window for the administration of rt-PA is the distances that they may have to transport patients and I think that's a real concern for the paramedic in the field who may be driving past one facility to get to another. The other problem is the operation of the ambulance service with vehicles transporting patients outside the normal region they cover.

Brett: Now, a recent article published in *Prehospital Emergency Care* by Brice et al.⁹ discussed the dilemma in education training of stroke care. Do you have any views on integration of the clinical practice in theory into paramedic education?

Ian: In the pre-vocational model I think it's very important that paramedic education provides the theory that underpins their practice in the field. I also recognise that it's very difficult for people in a pre-vocational model to get extensive practice in the field. However, I think we should incorporate issues like: what is the current evidence in stroke care; how do I transfer that evidence into my practice; how do I reflect on my practice; and, how do I keep up-to-date even when I may not necessarily be in the field all the time?

One of the issues that we would like to be involved in is education programs for paramedics about what is the current evidence for stroke care and the application to clinical practice. We are doing it now for ED staff, doctors, nurses and allied health staff. One of the things that I would like to see is that acute stroke care is embedded in the pre-vocational curriculum of all these health care providers, including paramedics.

The other aspect is that acute stroke care as a process of care is non-discipline specific, and I think a good example of this is my own research. My co-authors are an epidemiologist, neurologists, an ED physician, a nurse and a paramedic. The development of acute stroke care needs a multi-disciplinary approach. At the university we could bring doctors, paramedics, and nurses together in an education environment to increase this multi-disciplinary approach to health care before they enter the workplace.

Brett: Ian, on behalf of JEPHC thanks for your time and contribution.

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Response to Interview with Ian Mosley

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I would like to congratulate Ian on his pioneering work examining in detail, for the first time in Australia, the processes involved in various aspects of pre-hospital acute stroke care. Given the only proven effective drug therapy we have for acute stroke is thrombolysis with intravenous tPA within an incredibly narrow 3 hour time window, his work is critical to a better understanding of how we can maximise access to this important therapy.

tPA in selected ischaemic stroke patients is one of the most powerful therapies in medicine and is highly cost effective. I fully agree with Ian that organised stroke care in the pre-hospital sector is a critical factor in providing good access to the delivery of tPA. We know only too well, however, that implementation of best evidence health care is never a simple matter that can be solved by addressing one part of the system. The delivery of tPA is no exception and in fact is a prime example of the abject failure of our system to deliver a highly beneficial and highly cost-effective treatment to people who desperately need it. The 2007 National Stroke Foundation national stroke care audit demonstrated that only 1% of stroke patients across Australia were receiving tPA. Best practice benchmarks are 15% and in some centres 20%. Like many interventions requiring organised and co-ordinated care across care interfaces,

Author(s): Brett Williams, Ian Mosley, Ian Patrick and Christopher Levi.

implementation barriers abound. These can be broadly classified as lying with either individual health care providers' and their knowledge, the peer group environment within which the individual operates and, the health care system itself. In the case of tPA, all three areas are pertinent and any large scale implementation plan will have to address barriers across the three areas. However, as Ian has indicated, high rates of tPA implementation can be achieved when the inpatient care system is re-organised and then, a re-designed pre-hospital system is brought into action.

In summary, this sequence involves – 1. Establishment of an acute stroke care unit; 2. establish the 24/7 rapid response acute stroke team – ideally integrated with the Emergency Department (in many hospitals, however, Emergency Physicians and the College for Emergency Medicine itself, do not endorse and are not involved in tPA implementation), and finally, when the “house is in order”, 3. Activate organized pre-hospital acute stroke care. As Ian has indicated, the key elements of organized pre-hospital care are – firstly, public knowledge of how to recognize stroke and what to do, secondly, the dispatch response to a possible stroke being prompt, thirdly, the paramedics performing an in the field stroke assessment incorporating elements predicting potential tPA eligibility, fourthly, a hospital by-pass protocol for non-tPA capable hospitals and finally, a pre-hospital notification system allowing the acute stroke team to be scrambled. In my view, this approach is relevant not only to the larger metropolitan hospitals, but also the larger rural referral hospitals. Although the narrow time window for tPA implementation will inevitably limit access to people living in rural and remote Australia, reform of our system will enable delivery of therapy to the majority of the Australian population. The challenge is before us and research such as the work Ian and colleagues have published, is showing us the way forward.

Response to interview with Ian Mosley

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The importance of a systems approach has been demonstrated by Ian as a critical aspect of acute stroke care to get patients thrombolysis within the relatively small time window. A treatment proven to lead to improved outcomes. It is astounding and unfortunate that a treatment regime like this is so seldom initiated within the required time.

While ambulance service are driven to a large extent by response times including stroke as a medical emergency is only one of the steps that assist improved outcomes and clearly there is still a lot to be done to educate, organise and co-ordinate well managed stroke systems.

It is interesting to read Ian's comments about developing protocols to ensure patients get to appropriate stroke facilities and the implications this has when you consider the system parts. He shows that we need to educate the public who only recognise the symptoms 44% of the time, health care providers who need to prepare for the arrival and initiate the treatment, the funders who need to support a system approach, as has been done in NSW.

Ian has shown that the paramedics can identify stroke 94% of presentations and if hospitals respond to pre arrival notification, outcomes can be improved. He has also made the point that

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rt-PA administration is only around 4% in Australia. The challenge now is the translation of this research to close the evidence gap.

The days of pushing stroke patients down the priority list are gone. Paramedics and Ambulance services must be part of an organised system of stroke care that includes public education and ends with thorough evaluation and monitoring.

Trauma care in Victoria is a great example of a system approach that is working well. However further distribution initiatives require the same level of evaluation to ensure that all parts work to deliver the outcomes expected. The impact on the organisations involved also needs to be understood for example, from an Ambulance perspective we need to understand any impact to availability caused by the bypass of facilities, this needs to be considered in planning and funding.

Ian's work is the first in Australia to considering the issues associated with acute stroke management from the pre-hospital environment. As there is not much pre-hospital research available to inform practice this is critical, and he is to be congratulated for identifying the necessary steps required to improve stroke outcomes.

Response from Ian Mosley to Chris Levi and Ian Patrick:

Thank you to Ian and Chris for their comments. Together they have clearly described the task ahead of us all in the development and delivery of acute stroke care to the Australian community. There is much to be done for acute stroke patients and paramedics are an integral part of acute stroke care. Ambulance paramedics are in an ideal position to lead the change in both metropolitan and regional communities.