

Contemporary Comments

Forensic Science in Australia: Where does Australia sit in relation to Trends and Issues in the International Context?

Abstract

In 2009, the National Academy of Science (NAS) in the United States released a controversial report on the forensic sciences that has stimulated a critical debate on the current status of the forensic sciences internationally. More recently, in the United Kingdom, the Home Office has published a review of research and development in forensic science conducted by Bernard Silverman, the Home Office Chief Scientific Adviser, with support from Andrew Rennison, the Forensic Science Regulator, and Iain Williams, the Head of the Home Office Science Secretariat. This comment will address some of the criticisms and concerns expressed in these reviews, and will suggest where and why some of these concerns are, and are not, relevant to the Australian context. It will provide an overview of the strengths and weaknesses of forensic science policies and practices in Australia with a view to strengthening the field in the future.

Introduction

The forensic sciences are multidisciplinary and can be loosely grouped into three categories, field sciences (eg crime scene investigation), laboratory sciences (eg DNA and toxicology) and medical sciences (eg pathology). Each is its own area of expertise, but there is an overarching requirement that, individually and collectively, there is a proper underpinning of science, knowledge and understanding and a system that builds quality into any inspection, examination or analytical outcome.

The National Academy of Science (NAS) report — *Strengthening Forensic Science in the United States: A Path Forward* — was critical of a number of aspects of the forensic sciences in the United States (US) (NAS 2009). While the Report itself has attracted criticism (Melson 2010), it cannot be ignored. The NAS Report was critical of the research effort and the lack of funding for research:

... the committee is most concerned about the knowledge base ... and there is no unified strategy for developing a forensic science research plan across federal agencies. (NAS 2009:S-11)

It was critical of the level, nationally, of developed standards and quality management programs:

Too often [forensic science facilities] have inadequate educational programs, and they typically lack mandatory and enforceable standards founded on rigorous research and testing, certification requirements and accreditation programs. (NAS 2009:S-10)

It was critical of the fragmented approach to the forensic sciences:

It is clear that any approach to overhauling the existing system needs to address and help minimise the community's current fragmentation and inconsistent practices. (NAS 2009:S-4)

It was critical of the lack of underpinning validation related to forensic science disciplines, particularly those related to pattern recognition (eg bite marks):

The simple reality is that the interpretation of forensic evidence is not always based on scientific studies to determine its validity. (NAS 2009:S-6)

And it was critical of the level of knowledge of the forensic sciences within the legal community:

The judicial system is encumbered by, among other things, judges and lawyers who generally lack the scientific expertise necessary to comprehend and evaluate forensic evidence in an informed manner. (NAS 2009:S-9)

The key recommendation of the NAS Report was the establishment of a National Institute of Forensic Science:

Congress should establish and appropriate funds for an independent federal entity, the National Institute of Forensic Science (NIFS). (NAS 2009:S-14)

The United Kingdom (UK) report on forensic science research — *Research and Development in Forensic Science: a Review* — found some deficiencies in their approach:

Overall the research landscape that has developed is varied and in some ways fragmented and improvement in the degree of linkage and communication would drive forward innovation most effectively. (Silverman 2011:2)

These reports provide an ideal opportunity for self-reflection by the forensic science community in Australian and New Zealand with respect to the status of the forensic sciences here, at least on these specific issues.

Overall, Australia is relatively well placed. We have had a National Institute of Forensic Science (NIFS) since 1992. We have a well-established senior managers group (Senior Managers of Australian and New Zealand Forensic Laboratories (SMANZFL)) and active Specialist Advisory Groups (SAGs), all of which work very closely together. There is a good working relationship with academia and through the Australia New Zealand Policing Advisory Agency (ANZPAA, of which NIFS is a Directorate) and good links into one of the key user groups, policing.

There is a relatively small forensic science community with a significant amount of good will in terms of support for the advancement of forensic science. This has provided for a number of achievements in terms of a national accreditation program, national education and training programs, a national standards program and appropriate levels of standardisation.

Forensic science research

Similar to the situation in the US, Australia does not have an active national forensic science research strategy and the approach, similar to that in the UK, is somewhat fragmented.

The ANZPAA NIFS, in conjunction with the forensic science, law and law enforcement communities is developing an innovation (R&D) strategy that will include a review of the

2001 strategy 'The Advancement of Science for Justice'. To inform the new strategy, ANZPAA NIFS has developed two background papers, one on the current status of forensic science research (Scott and Ross 2011) and the other focused on emerging knowledge and technology in allied sciences that may impact forensic science service delivery (Ross 2011).

The first paper (Scott and Ross 2011) reported that the key roadblocks to innovation are the lack of funding, limited time to undertake research and limited research expertise. It also indicated that there is no real research culture embedded within the forensic science service providers, a lack of a strategic approach to innovation, and difficulties with operationalising research outcomes.

The second paper (Ross 2011) highlighted advances in separation science, biometrics, at-scene analysis, nanotechnology, surface chemistry, 'computer forensics', closed circuit television (CCTV) and social media, all of which have the potential to influence and impact service delivery and with respect to the 'electronics', the commission of crime.

The terms of reference for the development of the innovation strategy include examining solutions to the identified roadblocks, consideration of structures and funding models, development of a prioritised innovation portfolio and the exploration of international partnership opportunities.

With respect to the latter, the UK Report stated that:

No single country has the overall lead on forensic science research and all can benefit from international collaboration. (Silverman 2011:8)

To that end, ANZPAA NIFS is collaborating with the Forensic Science Regulator in the UK with respect to the development of innovation strategies. In February 2012, ANZPAA NIFS signed a memorandum of understanding (MOU) with the National Institute of Justice (NIJ) in the US. The MOU includes provision for research collaboration.

It is important to ensure that any innovation strategy for the forensic sciences includes a 'social sciences' component and not just 'hard science' research. The forensic science community is already working with the University of Tasmania through the Tasmanian Institute of Law Enforcement Studies (TILES) on projects related to the efficiency and effectiveness of forensic science, and will collaborate with the University of Queensland on issues related to cognitive thinking and contextual bias. Such collaborations must continue.

The forensic science community in Australia and New Zealand has strong inter-agency ties and sound working relationships with academia. It is also a relatively small community and the potential to develop and deliver a trans-Tasman innovation strategy is significant. However, the major roadblock, lack of funding, as identified in the 'current status' survey is likely to remain problematic.

Standards and quality management

Accreditation

Australia has had a national forensic science laboratory accreditation program since 1994. At that time, the project was developed in conjunction with the National Association of Testing Authorities (NATA) and the American Society of Crime Laboratory Directors Laboratory Accreditation Board (ASCLD/LAB). When introduced, the Australian program was the only program in the world to include crime scene investigation as an integral part of forensic science.

Forensic laboratories in Australia have opted for accreditation by NATA alone as it was one of the first accreditation bodies to move to Standard ISO/IEC 17025, which is the internationally recognised standard for forensic science accreditation. The program is not mandatory. However, all but one of the major government forensic science service providers in Australia and New Zealand are accredited.

Accreditation does not guarantee a ‘mistake-free’ environment. However, it institutionalises work practices and relevant checks and balances as a risk minimisation strategy. It is a continuous improvement process that allows for innovation, and for the recognition and remediation of any identified shortcomings.

Standards

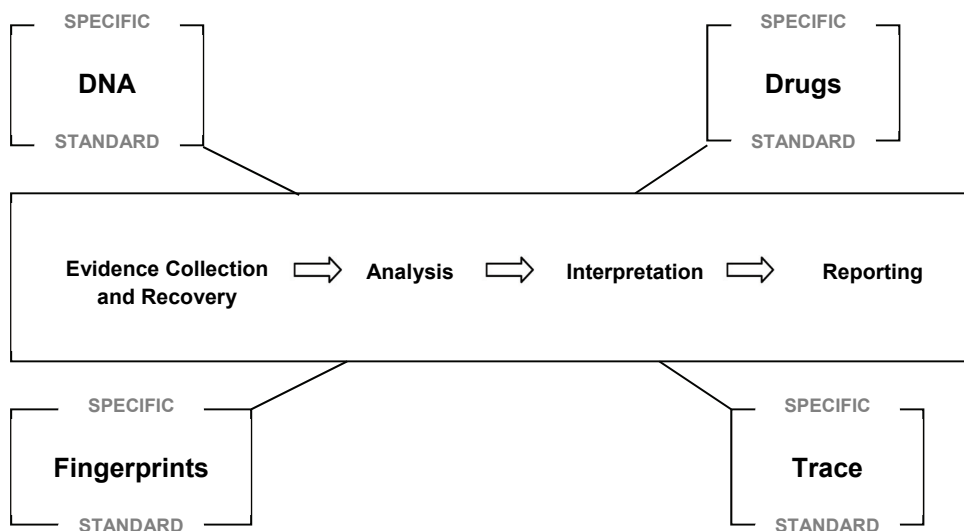
Standards that inform work practices are an integral part of the quality management structure. Through ANZPAA NIFS, the forensic science community is developing a set of standards specifically for forensic science. This is being done in conjunction with Standards Australia.

The first standards to be developed are a central, generic core that reflect the forensic process: collection, analysis, interpretation and reporting. These will be augmented by ‘bolt on’ discipline specific standards (eg DNA, drugs and fingerprints) — see Figure 1 below. The first two standards are written and out for public comment as per the Standards Australia process. The Interpretation Standard is in sixth draft form and the Reporting Standard is being drafted.

As with research, the development of standards is recognised as an international issue and one that lends itself to international collaboration to avoid duplication, to share resources and for peer review. ANZPAA NIFS is working closely with the UK’s Forensic Science Regulator to jointly develop a standards package.

The aim of the standards project is to introduce and maintain a more consistent and peer-recognised approach to forensic science service delivery. The benefit of the Standards Australia process and the public comment phase is that it encourages input from those outside of the forensic science community.

Figure 1: Discipline specific standards



Fragmented approach

Forensic science

The US has a very large number of police forces seeking forensic science services and a large number of service providers when compared to Australia and New Zealand. It also has a very distinct Federal system as well as state, county and city-based systems.

In the UK, the Government is closing down the Forensic Science Service, which has been the backbone of forensic science service provision and research for England and Wales for many years and this action has generated criticism on an international scale (Sample and Laville 2011). Service delivery will be undertaken by the private sector.

Almost without exception, Australian states/territories and New Zealand have recognised government service providers for the key forensic disciplines. These providers are not necessarily in the same government department. This varies between the states/territories and providers include police, health and justice departments, for example. Therefore, at least in some states, there is fragmentation and not a 'one-stop shop' for forensic services.

There is no Federal system in Australia, but ANZPAA NIFS and the SMANZFL work very closely with established SAG. There are eight SAGs, which between them cover the field, laboratory and medical sciences. The SAGs have representatives from each state and territory and from New Zealand. Individually, the SAGs meet annually and, from time to time, meet collectively. The collective meeting involves around 100 practitioners. The work of the SAGs over a number of years has led to a level of consistency in forensic science delivery and, nationally, has tempered the fragmentation. However, an interdiscipline siloed approach in forensic science still impacts what forensic science has to offer, for example in terms of triage and intelligence, and warrants further attention.

Forensic intelligence

The advent of databases for fingerprints and DNA through CrimTrac and the increasing potential of shoe impressions as an intelligence source, for example, should not be ignored. There should be systems in place that enable data mining and the bringing together of information from different disciplines of forensic science to build an 'intelligence picture'. However, with a mind-set based on the checks and balances governed by quality management, as it should be, forensic science does not at this time have a culture of 'best guess', which can be associated with the provision of intelligence. The provision of both science and intelligence has to be fit for purpose and there is a broad awareness and education process required with respect to intelligence.

The Centre of Excellence in Policing and Security (CEPS), the University of Technology Sydney (UTS) and ANZPAA NIFS are working in collaboration to develop a package that will address a number of issues relevant to forensic intelligence, including: a conceptual model; standards and interoperability; socio-legal issues; and organisational and cultural change. This is aimed at better informing the forensic science community about forensic intelligence and better articulating the role of the forensic scientist in the intelligence environment.

The justice system

The existence of a siloed or fragmented approach is not unique to forensic science. It also exists within the criminal justice system between science, medicine, law and law enforcement.

A clear example of the impact of this occurred recently in Melbourne, Victoria. A young male was convicted and jailed for rape. Subsequently, it became evident that he was innocent. There was no one who had a clear picture of the overall case. A report into the matter (Vincent 2010) noted one factor that led to the unjust outcome was the limited interactions and information flow between the medical, scientific and law enforcement practitioners involved throughout the entirety of the case.

ANZPAA NIFS, in conjunction with TILES, is now studying the interfaces between medicine, science, law and law enforcement practitioners, with particular reference to cases of homicide and sexual assaults. Researchers from TILES are interviewing either individually, or in focus groups, police, forensic scientists, lawyers, judges, coroners, pathologists and forensic physicians from five states across Australia. The aim of the project is to develop a framework for effective multidisciplinary and multi-organisational working relationships. Already the work has identified three different forms of multi-organisational interactions that appear to be effective in preventing justice, health, medicine, and science organisations from becoming siloed within the criminal justice framework (Kelty 2011). Focus on these interactions comes at a time when the issue of contextual bias in forensic science is also in the spotlight. A number of researchers are highlighting the risk of contextual bias in the forensic science context (Page, Taylor and Blenkin 2012; Helsloot and Groenendaal 2011; Byrd 2006). While it is a risk that has to be acknowledged and addressed, it will not be discussed further here, except to say that ANZPAA NIFS is partnering with the University of Queensland and other researchers to learn more about the risk of bias and how it might be mitigated. ANZPAA NIFS has also worked with the eight SAGs to generate an awareness of the risks.

The point of mentioning contextual bias is that there is a tension between it, forensic intelligence and encouraging effective multidisciplinary and multi-organisational interaction. Such interactions are designed to promote information flow, whereas risk mitigation strategies for contextual bias are arguing for a limit to the amount of information exchanged. A balance will have to be struck between the two, beginning with a widespread awareness of where and how contextual bias might be introduced. As stated in the NAS Report:

A body of research is required to establish the limits and measures of performance and to address the impact of sources of variability and potential bias. Such research is sorely needed. (NAS 2009:S-6)

Validation studies

When compared to disciplines referred to as the ‘pattern matching sciences’, DNA is the ‘new kid on the block’. DNA is also an extraordinarily powerful tool for both inculpation and exculpation in criminal investigations. As such, DNA analysis has undergone significant scrutiny resulting in broad-ranging studies related to validating the science and methodologies used.

The earlier ‘pattern matching sciences’ did not undergo the same level of scrutiny or validation when they were introduced — in the case of fingerprints, over 100 years ago. This issue is now coming in to focus through the NAS Report and numerous other challenges.

A broad validation program is both formidable and necessary, and fledgling activities are being undertaken on a number of fronts. The University of Queensland is working with the

fingerprint community undertaking validation studies (Tangen, Thompson and McCarthy 2011). Australia has led the way for a number of years in handwriting validation through the work of Found and Rogers from La Trobe University (Dewhurst, Found and Rogers 2007; Found and Rogers 2003). Now ANZPAA NIFS is working with the document SAG and UTS in validation studies for document examination and with the shoe impression working group within the Field and Identification Sciences SAG on validation studies for that discipline. The methodology is similar, involving a series of collaborative trials to validate current methods and, ultimately, the development of a national methodology that will involve international agencies and publication for peer review. Because of the size and scope of the project, ANZPAA NIFS is looking to partner with international agencies to share the workload.

Knowledge of the forensic sciences within the legal community

Ultimately, it is the trier of fact (eg the jury) who assesses and makes decisions about the meaning and value of any forensic science that is presented to them. It is the role of the forensic practitioner to couch their evidence in language that juries and the court can best understand, to offer any limitations and qualifications related to that evidence and to acknowledge or concede any viable options put to them.

During the trial, the trier of fact should be assisted by knowledgeable counsel who either lead the evidence (prosecution) or challenge the evidence presented (defence). Counsel can be assisted in this regard by taking time to discuss the evidence with the forensic practitioner pre-trial. This has benefits for the counsel and the forensic practitioner, but more importantly, it has benefits for the fair conduct of the trial itself. In Australia at least, it is rare that legal counsel make themselves available for such discussions.

In an article in *The Boston Globe* (Saltzman 2010) in March 2011 titled 'US judge urges scepticism on forensic evidence', Peter Neufeld described the judge's comments as a wake-up call to defence attorneys who do not mount serious challenges because they fail to do their homework.

It could well be argued then that often a trial involving complex forensic evidence suffers because of the lack of knowledge, even of the principles of the science, by counsel and the judiciary. It will be difficult for the jury to understand complex forensic science in the first place — due, in most cases, to an understandable lack of knowledge of forensic science. This difficulty will be exacerbated where there is a similar lack of knowledge by counsel and the judiciary.

It is vital that the forensic science and legal communities collaborate and cooperate to provide viable options for awareness and learning about forensic science. This may take various forms, but the e-learning environment is one form that should be targeted. As a result of the NAS Report, the National Forensic Science Technology Centre (NFSTC) in the US is preparing a series of primers. These primers will cover a range of forensic science disciplines, are designed for the legal profession and will be prepared for internet delivery. ANZPAA NIFS is working with the NFSTC, and will take responsibility for the development of a number of the primers. This is at least a start and other avenues for awareness and training will be explored.

Conclusion

The specific issues raised in the NAS Report (NAS 2009) and the UK Report (Silverman 2011) on research and development are not unique to those countries and, in fact, many are common throughout the world of forensic science.

Given the close working relationships in the forensic science community in Australia and New Zealand, particularly between service providers (ANZPAA NIFS, SMANZFL), the SAGs and academia, we are well positioned to assist and indeed, in some instances, to take a lead in their resolution. However, significant resources are required and national and international partnerships are vital as a means of sharing the load, expediting the process and securing global acceptance of the outcomes.

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