Providing assurance, driving improvement
Learning from mortality and harm reviews in NHS Wales

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1000 Lives Plus is the national improvement programme supporting organisations and individuals to deliver the highest quality and safest healthcare for the people of Wales.

www.1000livesplus.wales.nhs.uk
Executive summary
This white paper brings together the experiences of NHS Wales organisations to draw lessons on the use of mortality reviews and harm reviews to provide assurance and identify areas for quality improvement.

The primary purpose of mortality case-note reviews in NHS Wales has been to complement the use of mortality indices - providing assurance that patients have not died because of unrecognised sub-optimal care. However, in addition to this, mortality reviews can reveal underlying themes about care quality, for example, poor communication between clinical staff, specific diagnosis and therapeutic issues, or situations where dignity and respect have been compromised.

The mortality case-note review process has been developed and refined via a learning set collaborative that includes all health boards and two trusts. In parallel with mortality reviews, organisations have been using the Global Trigger Tool (GTT) to undertake harm reviews on a randomised selection of case-notes from closed clinical cases. Development and learning from the harm review process is also being informed by an ongoing research study being undertaken by Cardiff University.

Based on local experience, the learning set collaborative has identified six criteria which characterise a successful review process:
1. Clarify the purpose of the reviews.
2. Conduct reviews regularly.
3. Select cases systematically.
4. Seek system issues and common themes.
5. Share learning and feedback to clinical teams.
6. Feed learning into strategy.

Supporting organisations to develop and implement processes that meet these criteria is proving an effective way of accelerating progress and the forthcoming findings of the Cardiff University study will support this. Next steps will include identifying ways to extend the review process beyond hospital settings; encompassing all care groups; improving data quality; and ensuring staff are effectively trained in record keeping.

We already have enough learning to standardise some of the methods and processes that are being found to be effective and sustainable. This will support us in demonstrating assurance about the quality of NHS services for all citizens of Wales.
Introduction
Reducing levels of harm in NHS Wales has been a high national priority since the launch of the 1000 Lives Campaign in 2008 when all NHS organisations engaged in a co-ordinated programme of safety and quality improvement work.

This paper describes progress and learning on one component of that work - the use of case-note based mortality reviews and harm reviews as tools for quality assurance and improvement.

The development and implementation of mortality reviews has been locally led by NHS Wales organisations with active sharing of learning across the country. The work on harm reviews is also being supported via a research study by Cardiff University.

Using mortality indices
Statistics on deaths of residents of England and Wales are published by the Office of National Statistics (ONS) including age standardised mortality ratios (SMRs) and profiles of death by area and specified conditions. A statistical article was issued by Welsh Government in November 2012 summarising the range of published data sources in respect of population level mortality indices. A comprehensive technical review of mortality profiles has been undertaken by Welsh Government including a range of analysis drawn from ONS and NHS data.

At population level, mortality trends are heavily influenced by lifestyle factors, socioeconomic circumstances, advances in healthcare, and preventative public health action. However, trends relating to hospital mortality can contribute to the monitoring of healthcare quality and inform quality improvement action.

The monitoring of high level mortality indices is therefore an important component of quality assurance. A lack of attention to mortality indices was identified as one of the failings in the Mid Staffordshire NHS Trust and there is evidence that using mortality indices to identify quality issues could also have helped detect other major, high profile service failings, including child heart surgery at the Bristol Royal Infirmary and the criminal activity of GP, Harold Shipman.

Hospital mortality rates are currently monitored at national and organisation-level in Wales using a risk adjusted index (RAMI) - a measure of hospital mortality where the death rate is adjusted for risk, based on factors such as age, diagnosis and co-morbidity. The national profile of RAMI in Wales between 2008 and 2011 is shown in Figure 1, alongside the profile for a peer group comprised of mainly English acute hospital trusts.

There has been an observed reduction in RAMI over time. However, although improvements in safety and quality may be a contributory factor in RAMI reduction, the extent to which observed mortality rates result from failures in treatment and care remains contentious. Some international studies have claimed that up to one in three hundred patients will die.

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as a result of treatment deficiencies\(^3\), although a recent editorial in the British Medical Journal\(^4\) has argued that previous estimates have been over-stated.

**Figure 1: Hospital Risk Adjusted Mortality Index (RAMI 2011) by month, Wales and Wales peer, Jan 2008 - Dec 2011 (all ages and genders). Source: CHKS**

Observed differences between RAMI in Wales and its peer group, as seen in Figure 1, should also be treated with some caution. The sensitivity of the index to differences in the way cases are coded and the differences in data capture systems between Wales and other countries could be a contributory factor.

However, although the extent of avoidable harm may be contentious, its existence is not disputed and action is needed to reduce harm caused by sub-optimal care. This resulted in all relevant NHS Wales organisations being mandated in 2010 to supplement monitoring of mortality indices with systematic, case-note based mortality and harm reviews.

This paper focuses on action taken by NHS Wales in respect of understanding hospital related mortality and harm and not the broader aspect of population level mortality trends.


\(^4\) Shojania, K et al (2012) *Deaths due to medical error: jumbo jets or just small propeller planes?* BMJ Quality & Safety
Mortality case-note reviews
The primary purpose of mortality case-note reviews is governance and assurance, to ensure patients have not died because of unrecognised sub-optimal care. However, in addition to this high level assurance, mortality reviews can reveal underlying themes about care quality, for example, poor communication between clinical staff, specific diagnosis and therapeutic issues, or situations where dignity and respect have been compromised.

As a quality assurance mechanism, mortality reviews also complement other established sources of information - for instance the post hoc reporting of incidents and near misses, and the investigation of complaints and service user feedback. This triangulation of information from different sources is an important method of assurance in itself. It confirms the extent of robustness of general reporting and learning systems in the wider organisation.

The mortality case-note review process in Wales has been developed and refined via a learning set collaborative that includes representatives from health boards and trusts in NHS Wales. This approach acknowledges that implementing a sustainable review process that engages clinical staff and uses resources effectively is challenging and requires testing and development. The components of an effective process and shared learning about implementation are covered further later in this white paper.

Harm reviews
The implementation of harm reviews in Wales has been based on the use of the Global Trigger Tool (GTT) to review a randomised selection of closed clinical cases. Harm reviews have been seen as complementary to mortality reviews, acknowledging that patterns of harm detected in the case-notes patients who have died may not be representative of the wider patient population. It would be very rare for certain specialties to ever be represented at a mortality review.

The Global Trigger Tool (GTT) was originally developed by the Institute for Healthcare Improvement (IHI) as a way of assessing the wider prevalence of harm. It was used in pilot sites during both stages of the UK Safer Patients Initiative funded by the Health Foundation and was first widely used in Wales during the 1000 Lives Campaign (2008-2010).

The IHI recommend selecting 10 records every two weeks, based on the following criteria:

- Closed and completed record (discharge summary and all coding is complete).
- Length of stay at least 24 hours and formally admitted to the hospital.
  (This is a sampling strategy to avoid out-patient cases. Some hospitals include patients with a one-day stay; however, selected records for review should always be patients that have been classified as in-patient.)
• Patient age 18 years or older.
• Excluding in-patient psychiatric and rehabilitation patients.8

There is an extensive list of trigger events that could be an indicator of a lapse in the quality of care. IHI also advocate conducting a review from the patient’s point of view, including asking “Would you be happy if the event happened to you? If the answer is no, then likely there was harm.”9 NHS Wales has a robust guide outlining the criteria for identifying positive triggers, but teams have the option of using the IHI patient viewpoint approach.

Development of the harm review process is benefitting from local shared learning across Wales, but is being also being supported by learning from a Cardiff University research study funded by the NHS National Institute for Health Research (NIHR). This research programme began in April 2011 and will run over four years10.

The first phase of the study compares the GTT with an internationally recognised gold standard tool of harm measurement. The second phase aims to use a single tool to monitor harm in 5,000 in-patient episodes per annum across participating NHS Wales health boards and trusts.

The NIHR study will also identify service users most likely to experience a harm event during time spent in hospital, and examine harm events and make a judgment on their preventability, among other planned outcomes. Early findings will be published in 2013.

Since 2010 the GTT has been tested by some organisations in Wales as a screening tool within the mortality review process. However, it is important to recognise that using the tool in this way is not a substitute for using it on a randomised sample of case notes.

In the same way as specific stories can be a valuable way of sharing learning from mortality reviews, patient stories can complement information from the GTT and draw out learning points where sub-optimal care had been identified.

It is important that there should be openness with any review findings, and that patients be asked to contribute their reflections on the care that was delivered and to help shape required improvements. The inclusion of patients in the design of care pathways and services has already demonstrated how effective this approach can be11.

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10 More information is available at http://www.netscc.ac.uk/hsdr/projdetails.php?ref=09-2001-28
Building a common approach on sound processes
Six key criteria for effective reviews have been developed, based on learning across Wales. To date, these have been used mainly to guide progress on mortality review implementation, although the principles are also relevant to the implementation of wider harm reviews. The criteria can be seen as a six stage ‘virtuous circle’ (Figure 2). Learning and good practice examples relating to each of these stages are outlined in the following sections.

1 Clarify the purpose
It is important for organisations to be very clear about the terminology used when describing the purpose of reviews, for example what is meant by the terms, ‘preventable’, ‘amenable’ and ‘avoidable’ (see Appendix B). It is also important to clarify the definition of ‘error’ and ‘harm’.

Reviews are not about passive monitoring, but are about the active detection of systemic causes of harm to assist in setting improvement priorities. While some issues will be common between organisations and health systems, there are also likely to be differences. They should be used to help senior leaders understand what is going on at a local level - the ‘organisation finger-print’ for patterns of harm.

The priority given to mortality reviews gives an important cultural message about patient safety and this is a further important aspect of purpose. The creation of a ‘just culture’
that addresses error from a learning standpoint is essential for achieving safety and high reliability\textsuperscript{12,13}.

This must start with the board of an organisation, which needs to demonstrate how it is using the findings of reviews, not just as a source of assurance, but as a key driver of learning and improvement. Case studies indicate that when clinical staff understand reviews are used in this way positive culture change and improved engagement will follow (see Appendix A).

It is also essential to be clear that reviews are not intended to be used in isolation. Achieving the level of learning required must involve the integration and triangulation of information from different sources. This includes individual stories as well as quantitative data on incidents, near-misses, complaints and other feedback.

2 Carry out reviews regularly, involving the right people
Mortality reviews must be undertaken at a sustainable frequency. For large organisations providing acute services, weekly reviews are likely to be required to process the number of cases required. The Hywel Dda Health Board case study in Appendix A demonstrates that a weekly review process can be sustainable, even in a large multi-site health board.

However, review frequency can be adjusted, depending on the case-mix and the hospital services provided. For example, reviews which cover all relevant cases can be carried out less frequently in a health board with no acute hospitals, or a specialist cancer hospital.

A two-stage review process can be helpful in minimising the workload on individual clinicians and alternative ways of achieving this have been tested. In Velindre Cancer Centre reviews are carried out by nurse managers, who flag up concerns and pass the relevant notes to two consultants for further review. Aneurin Bevan Health Board uses a similar two-step process. In Hywel Dda Health Board a central team undertakes an initial review and hospital directors then write to individual consultants to clarify any issues where concerns are indicated.

It is essential that reviews are undertaken consistently and that staff are properly trained. Staff who do not fully understand the purpose, or are not convinced of the benefits of the review may not apply review tools rigorously. The NIHR harm review is providing valuable information here by highlighting the way in which the global trigger tool is being applied by different reviewers. The NIHR findings are likely to be equally relevant for the conduct of mortality reviews.

The involvement of clinical coding staff working alongside clinicians in the review process has been an important positive learning point. Clinical staff have developed a positive understanding of the value of coding expertise and the way in which high quality record-keeping underpins accurate coding. Meanwhile, coding staff have understood the way in which their work underpins the development of indices to provide organisational assurance.

\textsuperscript{12} Banfield, P. (2012) \textit{Achieving High Reliability in NHS Wales}, Cardiff: 1000 Lives Plus
Select and review cases systematically
Some research studies have used small samples of 30 to 50 consecutive deaths to identify quality issues\textsuperscript{14,15} and have extrapolated findings at a general level. The issue of whether investment in large scale mortality reviews is a worthwhile investment of resources remains topical\textsuperscript{16}.

The current position in Wales is that process and impact of large scale reviews is providing a rich source of learning and the two-stage process that selects a sub-set of cases which require more detailed review appears to be sustainable. However, the potential to refine the approach to select cases in a way that is appropriate to different clinical settings remains under review.

Some alternative approaches to case selection have been tested. In Cardiff and Vale University Health Board, the Risk Adjusted Mortality Index (RAMI) has been used to highlight cases with an assessed risk of death of lower than 25 per cent. Although this approach has not been found to be a sensitive way of selecting individual cases for further review, it has provided further evidence of the importance of timely, accurate clinical coding.

The completeness and accuracy of clinical case-notes is a primary quality issue in itself:

“Records of operational activities should be complete and accurate in order to allow employees and their successors to undertake appropriate actions in the context of their responsibilities, to facilitate an audit or examination of the organisation by anyone so authorised, to protect the legal and other rights of the organisation, its patients, staff and any other people affected by its actions, and provide authentication of the records so that the evidence derived from them is shown to be credible and authoritative.”\textsuperscript{17}

The highlighting of cases where clinical records have not met required standards has been an important component of reviews with implications for wider quality assurance processes, and some health boards have attributed improvements in note keeping to an awareness of the mortality review process in the organisation.

Although accurate clinical case-notes are an important pre-requisite for mortality reviews, the process also requires use of systematic screening tools to identify quality concerns. A range of tools have been tested, including the use of the Global Trigger Tool as part of the mortality review process.

The effectiveness of alternative tools is subject to ongoing review in individual organisations and it is hoped that the findings of the NIHR harm study will provide further evidence that will assist in identifying consistent tools for use across Wales.

\textsuperscript{15} Lau, H and Litman, K (2011)
\textsuperscript{16} Shojania, K et al (2012)
4 Look for system-level issues

One of the main reasons why screening tools are essential is to ensure a focus on system level issues. Unstructured review of case notes can be effective in identifying specific cases of harm (and such cases must be acted upon when they are found) but screening tools are a more effective way of identifying common themes and aggregate them in ways that can inform improvement priorities.

System-level issues that have been highlighted in Wales to date have included delays in treatment and patient transfers, slow responses to deteriorating patients, opportunities for more timely intervention in sepsis, incomplete record-keeping and missing information, and inadequate communication between staff and with patients. Importantly, mortality reviews have also focused attention on opportunities to make end of life care more patient-centred.

However, reviews have also highlighted the extent of positive practices, including appropriate use of end-of-life pathways and documentation of ‘Do Not Attempt Resuscitation’ decisions. Such findings are a useful source of assurance about implementation of existing policies as well as in supporting further improvements.

It is essential that arrangements are in place for rapid escalation of issues to board level when specific issues or general themes are highlighted that may represent significant risk to patients. The Hywel Dda Health Board case study (Appendix A) highlights good practice in this respect, with weekly reports of review findings to the chief executive.

5 Sharing learning from reviews

Review findings need to be fed back to clinical teams. Examples of approaches to this are included in the case studies. Feedback to frontline teams should make findings from particular cases relevant by linking them with organisational protocols and policies, to promote best practice. Senior management charged with ensuring quality will also need high level quantified information on aggregated review findings.

Triangulating learning from reviews alongside other sources of information – including incident and near-miss reporting, complaints and redress, is essential. Experience is highlighting that mortality reviews have potential to identify important issues that may remain ‘under the surface’ in other reporting systems and the Aneurin Bevan Health Board case study (Appendix A) shows an example of this.

Feedback is also an also important way of sharing and celebrating good practices. For example, cases where end of life care has allowed a patient to die with dignity and free from pain can be valuable to demonstrate the components of high quality care for both patients and those close to them.

A final important aspect of learning, relates to the future workforce: Sharing learning about the review process and findings has the potential to be valuable to clinical students,
as well as to existing staff. The direct involvement of students in the review process has been proposed and it is planned to test the approach during 2013.

6 Feed learning into strategy

The major driving force behind the strategic service changes now facing NHS Wales is the need to improve patient safety and the quality of services. Learning from mortality and harm reviews is one source of information which can directly inform priorities and highlight the case for change, as well as in providing assurance about the quality of existing services. Review findings also have the potential to inform local populations about the quality of their services and build a shared understanding.

Health boards have been tasked to “improve links across primary, community, acute care and social care”18 The extension of the scope of reviews beyond hospital services is currently at an early stage of development, but incorporating community settings has the potential to reinforce a commitment to system-wide improvement.

Conclusion and next steps

NHS Wales is building strong foundations for the sustainable implementation of systematic mortality and harm reviews.

Mortality reviews have an important role in complementing the monitoring of standardized mortality indices that will continue to be an important assurance measure at national and organisation level. However, the role of reviews in highlighting wider quality issues also needs to be emphasised. It is important that boards (including both executive and independent members) fully understand the purpose of reviews and use findings appropriately to inform priorities and areas for action.

The findings of the Cardiff University harm study will bring additional focus and learning to the harm review process in 2013. The GTT has already been adapted for use in specific clinical settings and the tool can be adapted for use in other specialist services.

The scope of integrated health boards needs to be reflected in review processes. The scope of reviews should be extended beyond patients in hospital, to encompass all care settings and all patient groups, including patients with chronic conditions receiving ongoing care.

In addition, data quality needs to improve. Staff at all levels need to understand why data quality is important and clinical staff should be trained to deliver high quality record-keeping and reporting. There is also scope for more integrated use of data sources and the use of metadata (data about the data) for assurance purposes. There is potential for further sharing of local learning between NHS Wales organisations on these issues.

Supporting organisations to develop and implement review processes locally has proved an effective way of accelerating progress and learning. We now have enough learning to standardise the methods that are being found to be effective and sustainable. This will support us in demonstrating assurance about the quality of NHS services for all citizens of Wales.
Appendix A - Case Studies

Hywel Dda Health Board - implementing a sustainable review process

Hywel Dda Health Board has been undertaking in-patient mortality review for the past three years and by November 2012 had reviewed over 4,600 cases. Reviews were originally set up in the light of concerns about the health board’s RAMI figures. A mortality meeting was set up involving:

- Five executive directors
- Eight senior doctors
- The Quality & Safety Team
- Clinical coders

All the deaths within one week are reviewed with a report generated by the Medical Director for the attention of the Chief Executive. In cases where initial review indicates potential concerns, hospital directors write to individual consultants to seek further information.

The approach was subsequently broadened from in-patient deaths to include deaths in the Emergency Unit and the review process was linked with the GTT harm review process. Independent board members are used to validate findings and grading of concerns and legal advice and support is sought where necessary.

<table>
<thead>
<tr>
<th>Level of concerns</th>
<th>2010-2011</th>
<th>2011-2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>No concerns</td>
<td>1834 (86%)</td>
<td>1717 (84%)</td>
</tr>
<tr>
<td>Mild</td>
<td>168 (7%)</td>
<td>234 (12%)</td>
</tr>
<tr>
<td>Moderate</td>
<td>59 (3%)</td>
<td>70 (3%)</td>
</tr>
<tr>
<td>Significant</td>
<td>41 (2%)</td>
<td>24 (1%)</td>
</tr>
<tr>
<td>Social</td>
<td>9 (1%)</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>19 (1%)</td>
<td>0</td>
</tr>
</tbody>
</table>

Evidence collected by the health board indicates improved data quality and a RAMI rate which has been lower than peer average for the past two years.

Although crude mortality rates have not changed, other benefits have included:

- Improved clinical engagement.
- A more open culture.
- Cross-site working.
- Improved multi-disciplinary team co-operation.
- Improved documentation and coding.
- Improved understanding of key quality issues.
Aneurin Bevan Health Board - identifying system level harm from mortality reviews

As a result of undertaking generic mortality reviews within one acute hospital, the core review team identified three key system-level quality concerns:

- Communication issues
- End-of-life care issues
- Identification of sepsis

It was recognised that work was already in progress to address each of these issues, but particular priority was given to investigating the issue of sepsis further for a number of reasons:

- Sepsis is often missed.
- Sepsis is responsible for significant mortality.
- Sepsis is often not well understood.
- Early recognition and treatment is vital to prevent deaths.
- Death can be avoided when sepsis is treated appropriately.
- Service efficiency (including length of stay) can be improved by treating sepsis well.

The team designed a template for mortality reviews that focused specifically on issues relating to sepsis and initial results from using the tool have highlighted the following:

- In 15 per cent of cases, sepsis appeared to be a ‘major’ contributor.
- In 22 per cent of cases, sepsis was present but was likely to have had a minor role.
- Staff have some awareness of sepsis, but understanding of the condition and the need to act swiftly (before blood results are returned if two triggers are met) needs to be improved.
- Staff awareness of the sepsis screening tool needs to improve.
- Skills in recognition of sepsis must be combined with reliable, timely deployment of the sepsis treatment bundle.

Further work is in process to establish root causes of why screening and treatment practices are not reliable, but the findings have reinforced the importance of the work already being supported nationally by 1000 Lives Plus on the rapid response to acute illness.
Velindre Cancer Centre - the mortality and harm Significant Clinical Incident Forum (SCIF)

The scale of services at the Velindre Cancer Centre is far smaller than in integrated health boards. However, the Velindre approach demonstrates the potential for integrating communication and feedback on information from different sources.

The mortality review process includes a review of all deaths in the Velindre Cancer Centre and reports of all patients who die within 30 days of chemotherapy or radiotherapy. The reviews are undertaken by a multi-disciplinary team of trained investigators.

The initial review is undertaken by a core team of non-medical reviewers, but a Consultant Oncologist team member is available to review any areas of concern from a medical perspective. The review team are notified of deaths on Monday of every week (average between one and two deaths per week) and the review team review the notes the following day.

The review team use the following ‘failure modes’ to categorise concerns:
- Failure to recognise
- Failure to plan
- Failure to communicate

Cases are also categorised based on whether they were admitted electively or as emergencies, and whether the admission was for symptom control or radical treatment.

The team standard for timeliness is to complete reviews within seven days of the patient death (last quarter achieved in 89 per cent of cases) and to feed back to Clinician within two days of the review (last quarter achieved in 74 per cent of cases). In cases where significant concerns are identify learning and communication is managed via the SCIF process, as outlined in Figure 3.

![Figure 3: The SCIF process (diagram created by Velindre Cancer Centre)](image-url)
Appendix B - Office of National Statistics Definitions

Amenable mortality
A death is amenable if, in the light of medical knowledge and technology at the time of death, all or most deaths from that cause (subject to age limits if appropriate) could be avoided through good quality healthcare.

Preventable mortality
A death is preventable if, in the light of understanding of the determinants of health at the time of death, all or most deaths from that cause (subject to age limits if appropriate) could be avoided by public health interventions in the broadest sense.

Avoidable mortality
Avoidable deaths are all those defined as preventable, amenable, or both, where each death is counted only once. Where a cause of death falls within both the preventable and amenable definition, all deaths from that cause are counted in both categories when they are presented separately.

Taken from: Mortality Analysis Team, Health and Life Events Division, Office for National Statistics (2012), Avoidable Mortality in England and Wales, 2010. Newport, Wales: ONS. 3-4
Further white papers available from 1000 Lives Plus include:

1. Accelerating best practice: Minimising waste, harm and variation
Addresses the questions: “If quality and patient safety are the priorities in an organisation, what would this look like?” and “How do we embed improvement in healthcare services?” Includes input from Professor Don Berwick, Sir Ian Carruthers and Gerry Marr.

2. 1000 Lives Plus and the NHS Agenda - Lessons from Systems Thinking
An introduction to Systems Thinking from Professor John Seddon, author of ‘Systems Thinking in the Public Sector’.

3. Are Bevan’s principles still applicable in the NHS?
A study of the NHS in Scotland, England and Wales looking at how well each service reflects the ideals of the founder of the NHS, Aneurin Bevan

4. Quality, Development and Leadership - Lessons to learn from Jönköping
An introduction to the approach of delivering health services by Jönköping County Council in Sweden, and what can be learnt and applied to Welsh healthcare.

5. Is healthcare getting safer?
What has been the result of over a decade of national and international work to improve safety in healthcare? Professor Charles Vincent attempts to answer this crucial question.

6. Attaining Peak Performance
Canadian and NASA astronaut Dr Dave Williams addresses issues of working safely and effectively in high-risk operational environments, including a look at achieving excellent team and personal performance.

7. Person Driven Care
A study of the Esther Network in Jönköping, Sweden, which is an acknowledged world-leader in focussing on the needs of patients and involving the public in planning healthcare services.

8. Improving Quality Reduces Costs - Quality as the Business Strategy
Examining the close relationship between high quality care and the efficient use of financial resources, and how genuine partnership working between clinicians and finance managers can enable transformational change, better patient experience and optimal clinical outcomes.

9. Achieving High Reliability in NHS Wales
Drawing on technical theory and practical work from the NHS and other industries subject to catastrophic consequences when things go wrong, this white paper explores applying the concepts of ‘high reliability’ to make NHS Wales a better and safer place to both work and be a patient in.

These papers are all available at www.1000livesplus.wales.nhs.uk/publications
About the author

Dr Grant Robinson is Medical Director of Aneurin Bevan Health Board, which covers a large section of south-east Wales. Grant also works as a Consultant in Clinical Haematology. He was previously the Chief of Staff for Pathology services, and remains a member of the National Pathology Programme Board for Wales.

Grant trained in medicine, surgery and haematology at Guy's Hospital Medical School in London before moving to Wales. He is committed to improving patient safety and quality of care, and has been heavily involved in implementing mortality reviews in Aneurin Bevan Health Board, to help focus improvement efforts and provide assurance about the quality of care.