

TAKE 2 – THINK, DO  
RESOURCE FOR IMPLEMENTATION

January 2016



CLINICAL  
EXCELLENCE  
COMMISSION

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# INTRODUCTION

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## Purpose

The purpose of this document is:

1. To outline a strategy for continuous improvement relating to clinical decision making during diagnosis in order to reduce the risks associated with diagnostic error.
2. To provide Local Health Districts with practical guidance on implementation of the *Take 2 – Think, Do* strategy in order to reduce diagnostic error associated risks.
3. To provide Local Health Districts with practical guidance on how the *Take 2 – Think, Do* program and diagnostic error strategies relate to clinical standards and other Clinical Excellence Commission programs and projects.

## Key Success Criteria

Successful implementation of the *Take 2 – Think, Do* strategy will be demonstrated by:

- Improved skills, knowledge and confidence of clinicians, managers and administrators in understanding clinical decision making principles and are able to recognise the risks to accurate decision making
- The ability to adapt appropriate components to meet the needs of different facility and unit structures and workflows in order to facilitate multidisciplinary participation across varied and complex environments
- Integrated evaluation to measure the effectiveness of the program to ensure that the objectives meet the needs of clinicians, patients and the system.
- Program support tools and materials are revised and updated in response to feedback and information obtained from evaluation

# BACKGROUND

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## Defining Diagnostic Error for NSW

Diagnostic error refers to a diagnosis that is missed, incorrect or delayed as detected by subsequent definitive information<sup>(1)</sup>.

To further define these:

- Missed diagnosis is one in which a diagnosis was never made
- Wrong diagnosis has occurred if an alternative diagnosis was made prior to the correct diagnosis being identified
- Delayed diagnosis is one in which a correct diagnosis was made however was not determined until significant time had elapsed despite definitive information being available earlier

The diagnostic process comprises several steps, often over a period of time, resulting in data gathering and synthesis of information to arrive at a diagnosis. A breakdown can occur at one or more steps in this process representing missed opportunities to arrive at an accurate and timely diagnosis.

Determining delay is perhaps the most difficult in retrospect. Diagnosis is typically determined over a period of time that could range from hours, days or years depending on the individual patient circumstances and presenting problems, so the question arises; 'What is an inappropriate delay?' Inappropriate delay is frequently only considered for the most obvious errors with unpalatable consequences. The possibility of a delayed diagnosis having occurred should be considered for all patients when an earlier arrival at the correct diagnosis was possible with the information that was available at the time, regardless of the outcome for the patient.

It is also important to remember that there will always be a small group of patients where an accurate diagnosis is difficult or impossible to determine, even when there is no breakdown in the diagnostic process. These are patients who present with rare conditions, atypical or non-specific symptoms<sup>(2)</sup>.

## Overview of Diagnostic Error

Diagnosis has been described in many different ways; like solving a puzzle, as ferreting out the answer to a mystery, and as putting a name on a complaint. Diagnosis is the process of trying to understand the nature of a patient's problems to clarify their prognosis and treatment options. It is quite possibly the most difficult cognitive challenge that exists in the clinical setting.

Every step of the diagnostic process poses challenges that reflect the complexity, variability and uncertainty that exists within medicine. Although there are thousands of diseases, the human body can respond in only a limited number of ways. A complaint of weakness or fever, for example, could be the presenting sign in literally thousands of diseases. Each new patient is a new puzzle with new complex problems to be solved<sup>(2)</sup>.

Cognitive and system related factors are the most cited contributing causes to diagnostic error. There are a multitude of system and cognitive factors described, often co-existing, that create an environment ripe for the potential for error to occur. Most commonly errors occur in the data synthesis and decision making steps of the diagnostic process as a result of the different systems of thinking based on experience and knowledge. The expert clinician will quickly recognise a problem and reach a conclusion while the novice will spend more time investigating and weighing up all the possibilities before reaching a conclusion<sup>(3)</sup>.

There are problems associated with both types of thinking and it is now widely accepted that strategies to reduce diagnostic error need to address both systems of thinking and create an environment where clinicians will switch backwards and forwards between the two systems as a means of cross-checking their decision making process. Strategies that develop an individual's cognitive processes, as well as target organisational systems impacting on diagnostic decision making, are required<sup>(4)</sup>.

At an individual level, doctors are generally overconfident about their diagnostic skills, and under-estimate the odds of diagnostic error<sup>(5)</sup>. One approach to improving diagnostic reliability is to develop a long-term plan for improving expertise through self-development and acquiring additional skills and experience. In the short term, the likelihood of cognitive error can be minimised through improved cognitive thinking that invokes System 2 to consciously monitor System 1<sup>(6)</sup>. This involves trying to be comprehensive in developing a differential diagnosis, keeping an open mind, debiasing judgments, and remaining ever vigilant as the diagnostic workup progresses and the patient's symptoms and signs evolve<sup>(7)</sup>. Getting help, from colleagues or decision support resources, is another valuable approach.

System level approaches to improving diagnostic error focus on assisting the cognitive processes and heighten individual awareness of biases in the decision making process. Tools such as 'diagnosis triggers' have been used to retrospectively look back at medical records to find and analyse diagnostic errors. The challenge is to develop these tools into a practical application that reduces error prospectively<sup>(8)</sup>.

Diagnosis has traditionally been the responsibility of the doctor, but the ultimate quality of the diagnostic process depends on many other members of the diagnostic team, including the patient<sup>(9)</sup>. Healthcare organisations can support diagnostic quality by focusing on diagnosis as a key component of quality. Nurses are the eyes and ears of the team and can play a major role in preventing and detecting diagnostic errors. Patients can help avoid diagnostic error by acting as a safety net. Being proactive, providing feedback about diagnosis, and becoming involved in healthcare policy discussions are all ways that patients can improve diagnostic quality.

## The Extent of Diagnostic Error

Diagnostic error is difficult to quantify for a range of reasons. These include difficulty in recognising that an error has occurred and an inherent desire by clinicians not to report either their own errors or those of their colleagues<sup>(10, 11)</sup>. International literature provides substantial evidence that approximately one in every 10 diagnoses is wrong and although the great majority of diagnostic errors are caught in time, or are inconsequential, roughly one in every 1000 diagnostic encounters will result in harm<sup>(3)</sup>. According to best estimates, diagnostic errors are one of the top ten causes of death in countries with modern healthcare systems, and also one of the top reasons for patients to file a claim of malpractice<sup>(3)</sup>.

The Institute of Medicine (IOM) report, *Improving Diagnosis in Health Care*<sup>(12)</sup>, describes diagnostic error as a serious problem that has been underappreciated for many years. The IOM report concludes that most people will experience at least one diagnostic error in their lifetime. While many of these errors will not lead to adverse outcomes, some will lead to serious harm and devastating consequences for patients.

In NSW Health the state-wide Incident Information Management System (IIMS) enables collation and analysis of significant issues, risks and trends for reported clinical incidents and near misses across this health system, and The Collaborating Hospitals' Audit of Surgical Mortality (CHASM) program provides a systematic peer-review audit of deaths of patients who were under the care of a surgeon at some time during their hospital stay in NSW. A detailed search of these databases and critical review of cases where a diagnostic error was identified to have occurred or contributed to an adverse outcome, yielded a rich source of information relating to diagnostic error in NSW.

The reported incidence of diagnostic error in NSW can be summarised as follows:

- Approximately 500 incidents reported in IIMS directly attributable to diagnostic error per year
- Average of 50 SAC 1 incidents with a diagnostic error contributing to serious adverse patient outcomes per year

- 13.2% (453) of audited surgical mortality cases over 3 years reported or identified a diagnostic error or delay

It is recognised that there is significant under reporting of diagnostic error and therefore the information presented represents cases that are more easily recognised and a higher frequency of cases with more severe outcomes for patients. Despite this, there is a substantial record of diagnostic error cases over the review period ranging from severe incidents with catastrophic consequences to minor errors with little or no impact to patients. IIMS information is summarised in Table 1.

**Table 1: IIMS Diagnostic Error cases by SAC score**

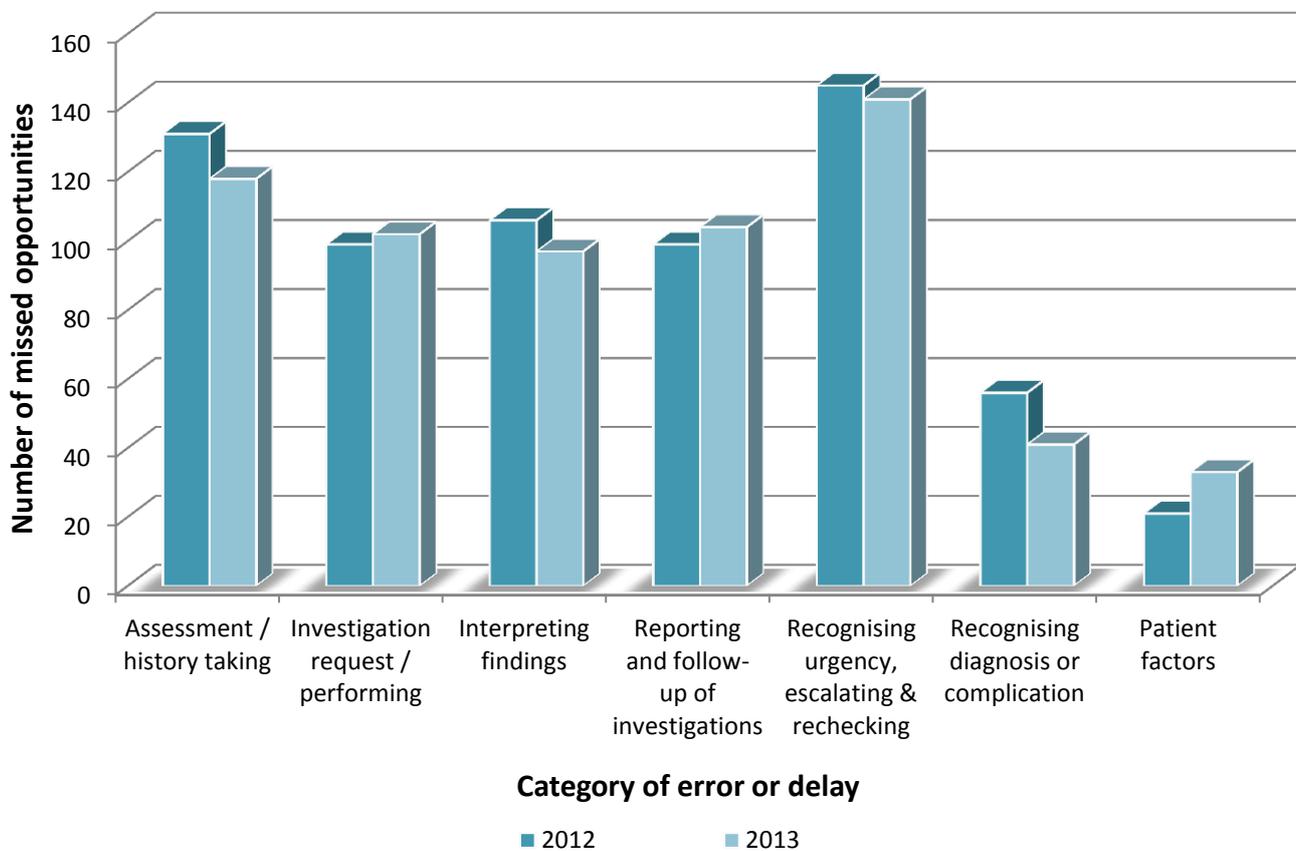
2012 (n=534)					2013 (n=500)			
SAC	1	2	3	4	1	2	3	4
Delayed	27	48	156	69	22	51	137	54
Missed	29	52	109	43	24	49	114	41
<b>Total</b>	<b>56</b>	<b>100</b>	<b>265</b>	<b>112</b>	<b>46</b>	<b>100</b>	<b>251</b>	<b>95</b>

Missed opportunities in diagnosis can be categorised on whether the problem relates to different aspects of the diagnostic process. For evaluation purposes, missed opportunities and errors were categorised as:

- Error or delay in assessment and history taking
- Error or delay in requesting or performing investigations
- Error in interpreting assessment, history or investigation findings
- Error or delay in reporting or following up investigation results
- Error or delay in recognising urgent clinical presentations, escalating complex or critical presentations or rechecking response to management
- Error or delay in recognising a diagnosis or complication
- Unavoidable patient related factors
- Undeterminable cause

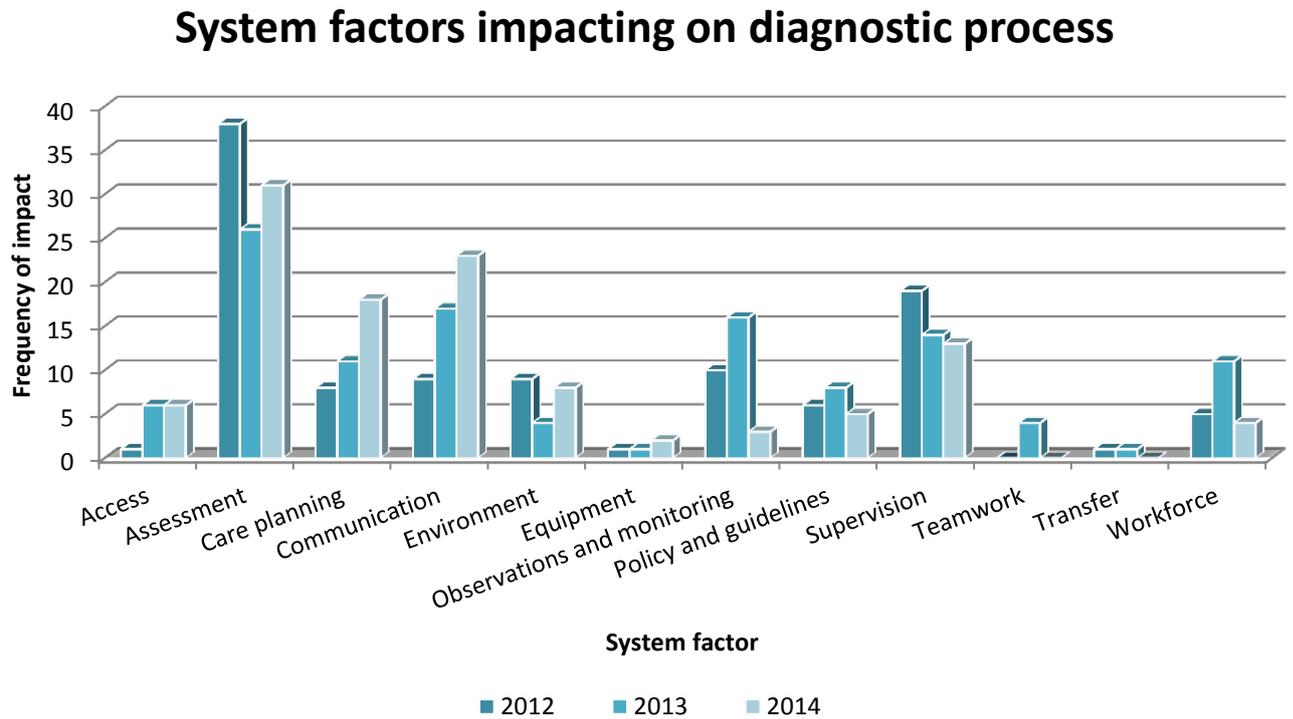
Graph 1: Categorisation of diagnostic errors

### Categorisation of missed opportunities to prevent diagnostic error

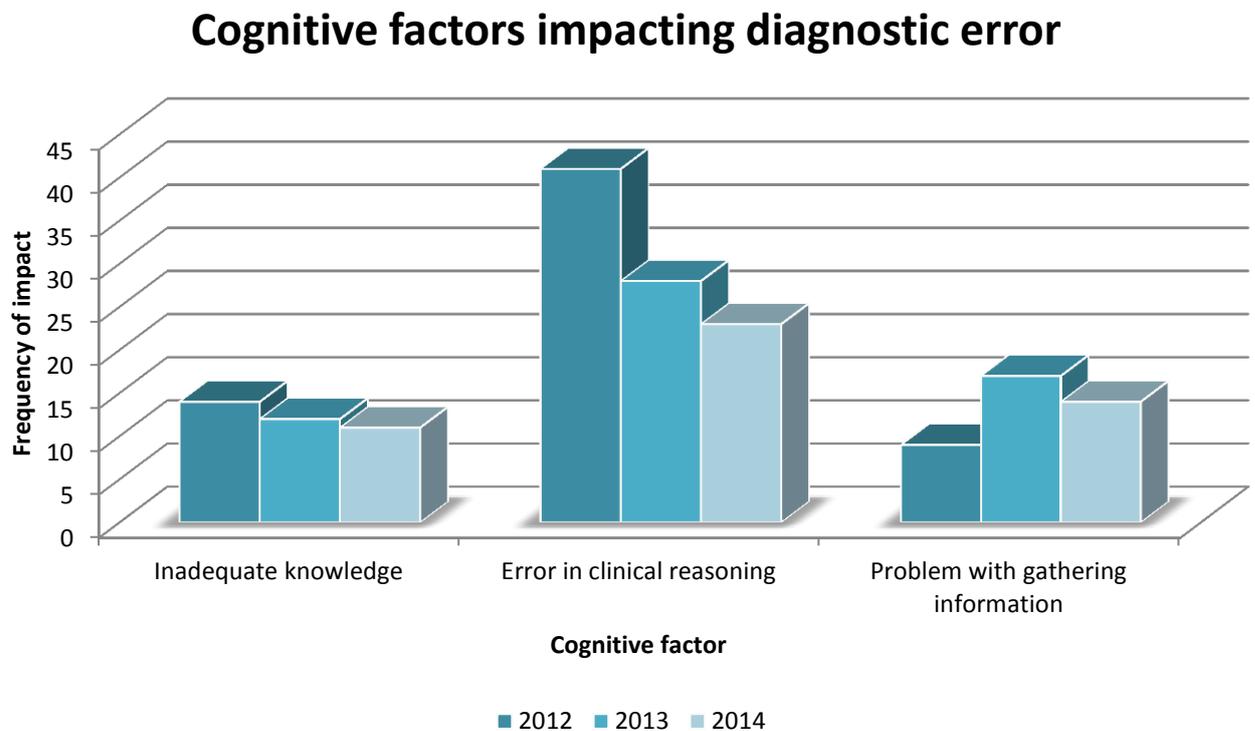


These diagnostic process errors can frequently be attributed to both system and cognitive factors that combine to impact on decision making and the diagnostic process. Cognitive errors can generally be grouped into the following 3 broad categories: Inadequate knowledge; faulty information gathering and inaccurate clinical reasoning / information synthesis. System factors include: access, assessment, care planning, communication, environment, equipment, observation and monitoring, policy and guidelines, supervision, teamwork, transfer and workforce. System and cognitive factors are identifiable in RCA reports. System factors impacting on diagnostic processes are shown in the following graph.

Graph 2: System factors identified through RCAs



Graph 3: Cognitive factors identified through RCAs

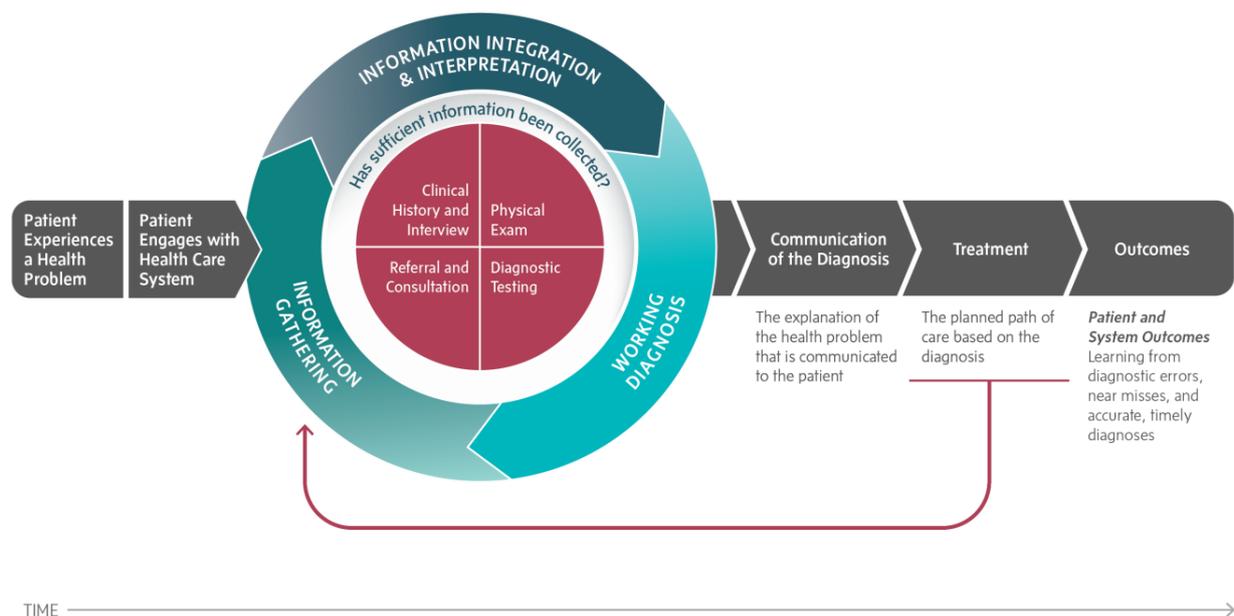


# THE DIAGNOSTIC PROCESS

## The IOM report

The Improving Diagnosis in Healthcare report<sup>(12)</sup> describes the diagnostic process in detail, and provides a conceptual model to illustrate the complexity of inputs to diagnosis, and the cyclical nature of information gathering and refining of hypothesis over time. The conceptual model is shown below in Diagram 1.

*Diagram 1: The Diagnostic Process*



SOURCE: National Academies of Sciences, Engineering, and Medicine. 2015. *Improving Diagnosis in Health Care*. Washington, DC: The National Academies Press.

The information gathering, integration and interpretation comprise the main cognitive aspects of decision making during diagnosis. The busy clinical environment creates a minefield of opportunity to generate a breakdown in any one of these important steps that will potentially lead to an important piece of information being missed and an error occurring.

Consider your own clinical practice: How often you are interrupted when taking a history, performing a physical examination or reviewing investigation results? How do these interruptions impact your thinking and thought processes when working through a patient's clinical problems. In many instances, straight forward cases are what they seem, and complex cases will prompt you to go back and think in more detail about all the aspects of the case. It is that occasional case that appears straight forward, but has a small detail that is different, doesn't fit or just isn't quite right that may get missed.

## Recommendations from IOM

The Institute of Medicine's report on improving diagnosis in health care described 8 goals to reduce diagnostic error and improve the diagnostic process. Those relating to funding, research and medical liability are beyond the scope of the Diagnostic Error project in NSW. *Take 2 – Think, Do* can have a direct influence towards achieving the first five of these goals. The goals outlined in the IOM report are:

1. Facilitate more effective teamwork in the diagnostic process among health care professionals, patients, and their families
2. Enhance health care professional education and training in the diagnostic process
3. Ensure that health information technologies support patients and health care professionals in the diagnostic process
4. Develop and deploy approaches to identify, learn from, and reduce diagnostic errors and near misses in clinical practice
5. Establish a work system and culture that supports the diagnostic process and improvements in diagnostic performance
6. Develop a reporting environment and medical liability system that facilitates improved diagnosis by learning from diagnostic errors and near misses
7. Design a payment and care delivery environment that supports the diagnostic process
8. Provide dedicated funding for research on the diagnostic process and diagnostic errors

## TAKE 2 – THINK, DO

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### Take 2 – Think, Do Framework

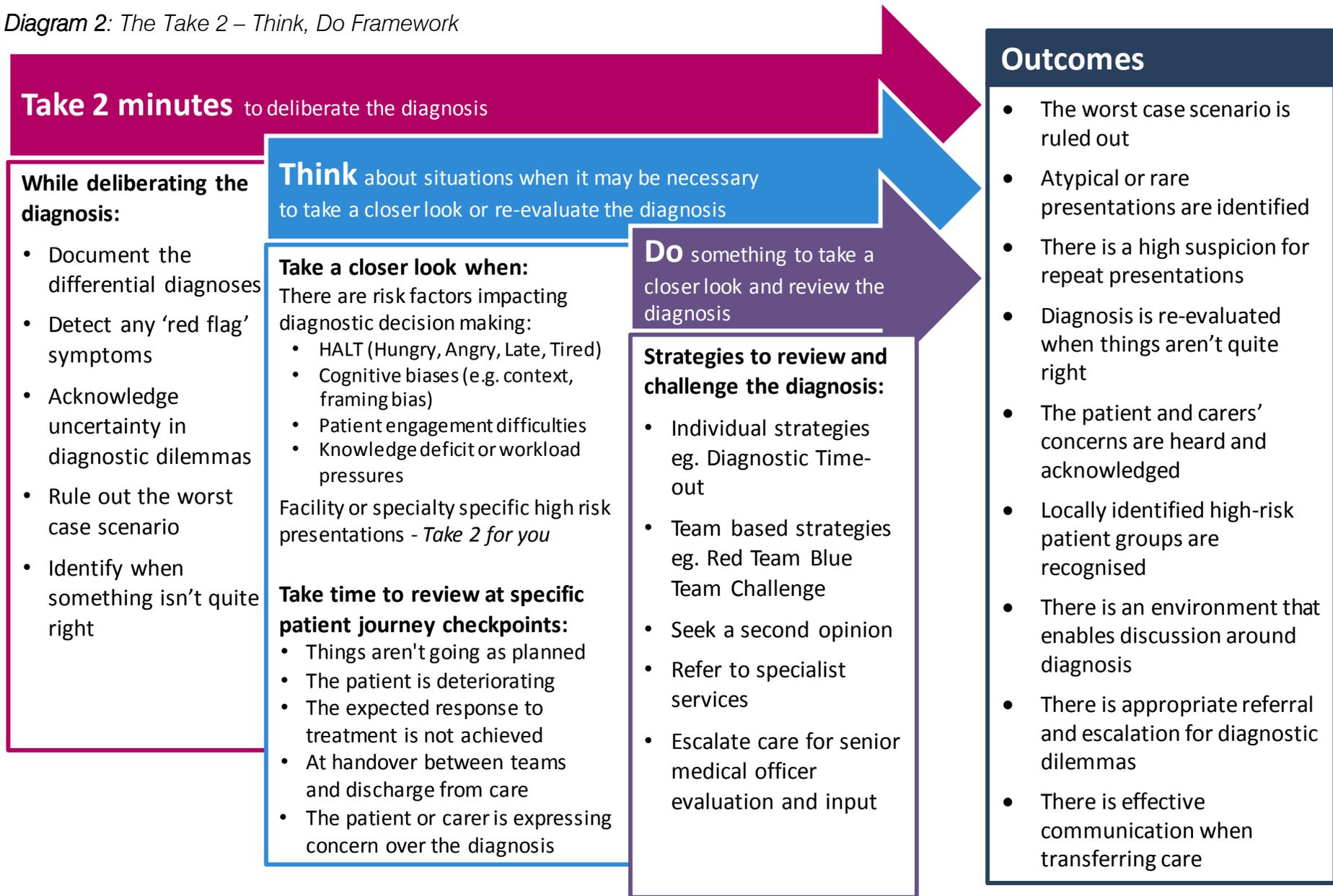
*Take 2 – Think, Do* is a framework to support accurate diagnostic decision making in complex clinical environments. It is designed to improve awareness and recognition of the potential for errors across a broad clinical arena, and reduce the morbidity and mortality associated with wrong, missed or delayed diagnosis in the NSW Healthcare system.

The program consists of the following components:

- **Take 2 minutes** to deliberate the diagnosis – promotes a quick reflection that ensures the critical elements of diagnosis have been captured for each clinical presentation.
- **Think** about when to take a closer look – provides clinicians with insight into high risk clinical situations in which it may be appropriate to take a closer look or re-evaluate the diagnosis.
- **Do** something in these high risk situations – supports clinicians with the strategies to take a closer look by outlining approaches that aid decision making. This includes individual and team based strategies to critically appraise the decision making process.

The Framework components are outlined in Diagram 2 on the following page.

Diagram 2: The Take 2 – Think, Do Framework



## Take 2 Think, Do Explained

This section further describes each component of the *Take 2 – Think, Do* Framework.

### Take 2 minutes to deliberate the diagnosis

This initial step encourages clinicians to take a quick reflection on the diagnostic decision making that has taken place and allows processes to quickly move on for straight forward cases while ensuring that the critical aspects have been considered.

This entails:

- **Considering and documenting a differential diagnosis.** This ensures that alternative possibilities for diagnosis are considered. They may be ruled out or considered unlikely in the clinical context through consideration of presenting symptoms that don't fit the clinical picture however, allows clinicians to come back to original possibilities if a working diagnosis is disproved on further examination or testing.

There may be a requirement to revisit the patient history, ask additional or clarifying questions regarding the presenting symptoms, or perform further physical examination to accurately and sufficiently consider all the items in the differential diagnosis. A Guide to undertaking a differential diagnosis and other diagnostic tools are included in Appendix 1.

- **Detecting any 'red flag' symptoms.** Red flags are the significant cues that indicate something may not be quite right. This may be a significant symptom associated with a serious problem, a patient who is not responding in the expected manner or a situation where the symptoms and investigation results do not quite match. These situations require a heightened level of thought and suspicion to ensure that those diagnoses that may have serious or fatal consequences, if missed, are identified early<sup>(13)</sup>.
- **Identifying potential atypical presentations** and elements of the presentations that are not quite right is an important aspect of considering possible differential diagnoses. There are some well documented, regularly occurring atypical presentations that should be considered 'red flags'. A typical example of a well-documented atypical presentation would be a 50 year old female presenting, complaining of back pain. In this scenario an atypical presentation of cardiac aetiology should be considered.
- **Ruling out the worst case scenario.** Ruling out worst case scenarios is a strategy that increases the likelihood that any critical diagnosis is considered for a particular set of presenting symptoms. Those that are frequently missed are also

those that are rarely seen and the strategy requires that the clinician has sufficient experience to recognise the potential worst case scenarios associated with the presenting symptoms.

For the most part this is a strategy of safety and errs on the side of caution. While it increases the likelihood of detection of diagnoses that must not be missed, similarly there may be a tendency for overdiagnosis and overutilisation of resources<sup>(14)</sup>. Awareness of the pattern matching and availability biases helps to ensure a thorough history and physical examination. This allows elimination or confirmation of possible diagnoses following careful consideration of serious conditions without overuse of diagnostic testing and is more likely to result in a greater degree of appropriate investigation for those 'don't miss' diagnoses<sup>(15)</sup>.

- **Acknowledging uncertainty in diagnostic dilemmas.** Diagnostic dilemmas appear frequently in clinical practice and represent those difficult cases where a combination of symptoms could represent different diagnoses with potentially diverse patient outcomes. Acknowledging uncertainty in the diagnostic decision making, particularly at handover, provides a prompt for clinicians to come back and revisit the diagnosis if required.

### Think about situations when it may be necessary to take a closer look or re-evaluate

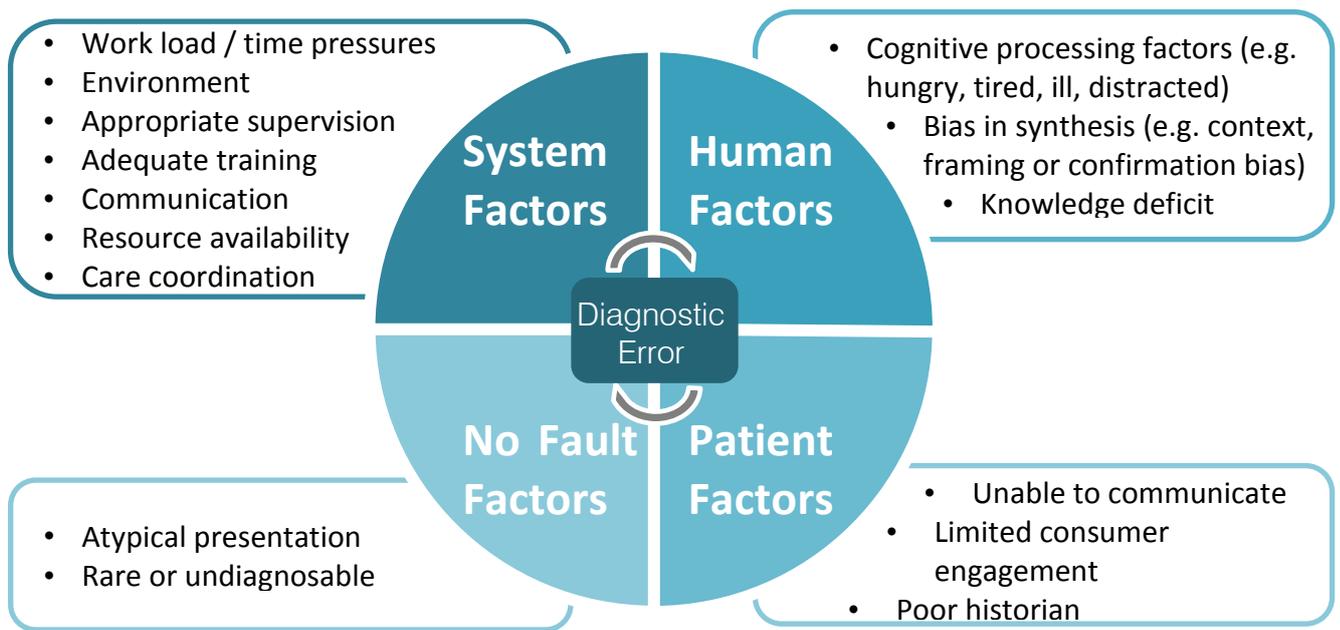
#### 1. Take a closer look when ...

This process provides clinicians with insight into clinical situations in which it may be appropriate to think twice and take a closer look;

- Creating a heightened awareness promoting greater identification of risk
- Enabling identification of cognitive, system and patient factors that have the potential to impact the decision making process
- Allows customisation at facility and specialty level for locally specific high risk presentations - *'Take 2 for you'*

The factors impacting diagnostic decision making are outlined in diagram 3 on the following page.

Diagram 3: Factors impacting diagnostic decision making <sup>(16, 17)</sup>



'Take 2 for you' is customisable to meet individual needs, allowing the identification of high risk scenarios or presentations at a unit or facility level. This promotes the development of customisable strategies that highlight locally identified diagnostic risks. This may be 2 or 3 frequently missed diagnoses or a common presentation that is usually indicative of a minor ailment, however on rare occasions could indicate a significant clinical concern.

## 2. Take time to review ...

Each patient journey, regardless of diagnosis, is varied and can often involve successes as well as setbacks during the course of an illness. This step represents an opportunity for reflection on the diagnosis at important stages in the patient's journey.

Taking time to review ensures there is:

- A high suspicion for repeated presentations
- Response to treatment is checked
- Re-evaluation of diagnosis in the deteriorating patient
- A quick check that nothing is missed prior to discharge
- Good communication of the clinical issues when transferring care between teams

## Do something to take a closer look in these high risk situations

### Take a closer look using ...

This step outlines the strategies that enable clinicians to take action when something is not quite right, things aren't going to plan or there is a difficult or ambiguous presentation that is not easily deciphered. Each strategy provides a different approach that promotes:

- Improved dialogue regarding diagnosis between team members and during the transfer of care
- Opportunities to reflect on the diagnosis as both an individual and in a team based approach
- Identification of escalation triggers

## Red Team / Blue team Challenge

### Background

Red Team / Blue Team exercises were developed by the military as a method of testing force readiness and are now well established in the corporate world as a simulation based means of testing strategy and security systems. During game-based simulation, the Blue Team hopes that security systems prove resilient to attacks, while the Red Team strives to find holes in the system that has been overlooked by designers.

In health, traditional hierarchical structures inhibit challenge among team members, and the holes can go undetected or the significance is not recognised. Diagnosis is being increasingly recognised as one of the most difficult cognitive challenges within medicine. The Red Team / Blue Team Challenge has been developed using the military exercises to provide a method of debating diagnostic decision making among team members in complex clinical environments.

The Red Team / Blue Team Challenge aims to test the hierarchical model and provides tools for team members to safely question and challenge the diagnostic decision making process within the team environment. This strategy enables the Blue Team to undertake history taking, clinical assessment and synthesis in the traditional manner, however, at a set point - usually during rounds - someone is allocated to the Red Team role.

The Red Team provides an independent review by thinking critically about the clinical scenario and identifying potential alternative diagnoses to those presented by the Blue Team. The Red Team member is rewarded for speaking up, thinking 'outside the box' and identifying potential alternative diagnoses to be refuted.

### Team roles

#### **Blue Team role**

The Blue Team is the person, or people who conducted the primary clinical assessment and collected a history for the patient. This team is responsible for synthesising the clinical information obtained, determining whether any further information is required and documenting the differential diagnosis.

#### **Red Team role**

The Red Team should be allocated to another member of the team. This person plays a 'devil's advocate' role that critically considers the clinical information presented. They will identify alternative possible diagnoses and clinical symptoms that don't fit the picture presented; ensure the worst case scenario is ruled out; and flag any possible atypical presentations that may not have been considered.

## Supervisor role

The supervisor is usually the senior MO responsible for the patient and may not always be present or available during the Red Team / Blue Team Challenge. Their role is to encourage and promote the Challenge at appropriate points in the patient's journey and provide rationalisation, expert knowledge and support during the decision making process.

## When to challenge

Opportunities for utilising the Red Team / Blue Team Challenge will vary depending on the clinical unit and specialty structures and processes. Some identified opportunities include:

- During ward rounds
- At initial presentation in ED
- During whiteboard rounds or team meetings
- At medical team handover
- During multidisciplinary team meetings and case conferences
- Prior to discharge

## Before commencing a Challenge

- 1. Establish who will act in which role**  
Roles are interchangeable and team members may switch roles from patient to patient or day to day.
- 2. Remember the ground rules**  
It is important to reinforce ground rules regularly and remind team members of these before commencing a Challenge.
- 3. Determine where the challenge will take place**  
This could be either at the patient's bedside or in a huddle away from the patient. There are advantages to both methods.
- 4. Identify how you will reach an agreed plan to proceed at the end of the challenge**  
Difficulty in reaching an agreed diagnosis or plan for proceeding may indicate that this is a complex patient or rare presentation that would benefit from escalation or a second opinion.

## So you're the Blue Team...

### Start the Challenge with:

The working diagnosis to be challenged is...

- Present the case for discussion as you normally would
- Give the Red Team an opportunity to ask questions and challenge the diagnosis

### Conclude the Challenge with:

The agreed working diagnosis is...

And the ongoing plan / or plan for review is...

- This will take into account planned and additional investigations, changes to the diagnosis, clinical management plan and a time frame for follow-up and review.

## So you're the Red Team...

### Things to consider

#### *Worst case scenario*

1. What is the worst case scenario?
2. Is this a time-critical problem requiring urgent action?
3. Have we ruled this out?

#### *Alternative diagnoses*

1. What else could this be?
2. Is this an atypical presentation of a common problem?
3. Are there any symptoms that don't fit?

#### *Investigations*

1. Do we have all the investigation results?
2. Will the proposed investigations rule out the differential diagnoses? (i.e. are they necessary?)
3. What other investigation/s will provide the right information to answer the questions being asked?

#### *Ask the patient*

1. What do you think this could be?
2. Is there anything that you think isn't right?

## Diagnostic Time out

A diagnostic timeout differs from a procedural timeout in that it is not a series of functional steps that are easily identified as having been performed in preparation for a procedure by team members, but rather a reflection on the factors that may have influenced the decision making process. This reflection provides some prompts in high risk situations to enable individuals to consider the presentation in more detail before deciding on a working diagnosis and subsequent plan for management.

The table below outlines the questions to consider when reflecting on a case presentation using a *diagnostic time-out*.

**Table 3:** Considerations when reflecting with a 'Diagnostic Time-Out'

Diagnostic Time-Out	Considerations <sup>(16, 17)</sup>
Was I comprehensive?	<ul style="list-style-type: none"> <li>Was my assessment thorough?</li> <li>Have I considered all the symptoms?</li> <li>Have I considered pre-existing conditions?</li> <li>Did I just accept the first diagnosis that came to me?</li> </ul>
Did I consider all the facts?	<ul style="list-style-type: none"> <li>Was this patient handed over to me?</li> <li>Did I receive all the information I need to know to make a decision?</li> <li>Do I need to ask any additional clarifying questions?</li> <li>Has this patient been seen recently for the same problem?</li> </ul>
Was my judgement affected by any other factors?	<ul style="list-style-type: none"> <li>Was I interrupted or distracted while evaluating this patient?</li> <li>Was my judgement affected by any bias?</li> <li>Do I have sufficient knowledge to make this diagnosis?</li> </ul>
Do I need to make the diagnosis now, or can it wait?	<ul style="list-style-type: none"> <li>Have I reviewed all the investigation results?</li> <li>Are results still pending and do I need these to make a decision?</li> <li>Will the outcome for the patient change if we 'watch and wait'?</li> </ul>
Are there any <b>red flag</b> symptoms I need to consider?	<ul style="list-style-type: none"> <li>What is the worst case scenario?</li> <li>What are the '<b>don't miss</b>' diagnoses associated with these symptoms?</li> </ul>

# EDUCATION

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## Tools and Resources

Resources have been developed that can be used by health care facilities to support widespread engagement with the program and develop clinician knowledge and skills. They can be adapted to meet health care facility needs and can be incorporated into existing education processes, such as BTF Tier Two education (DETECT training). It is highly recommended that local diagnostic error case studies and data are used.

The following education resources are under development and will be made available on the CEC diagnostic error website.

- Diagnostic Error Undergraduate Curriculum
- Diagnostic Error Clinical Vignettes
- Knowledge assessment test
- Red Team / Blue Team training video

# IMPLEMENTATION

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## Tools and Resources

This resource has been developed to be used by health care facilities to support widespread implementation of strategies to reduce diagnostic error and engage clinicians in the process.

Sample tools to support implementation are contained in Appendix 2. All tools within this resource can be adapted to meet health care facility needs.

The following implementation resources are available:

- Project aims and objectives
- Project scope and outline
- Risk assessment and communication strategy
- Implementation check list
- Implementation action log

# EVALUATION

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## Tools and Resources

Resources to support evaluation and measurement improvements in diagnostic processes have been developed. It is recommended that evaluation points are identified prior to commencing an improvement strategy and include:

- Baseline measure
- Implementation effectiveness
- Impact on patient care and outcomes

Sample tools to support evaluation are contained in Appendix 3. All tools within this resource can be adapted to meet health care facility needs.

## REFERENCES

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1. Graber M, Franklin N, Gordon R. Diagnostic Error in Internal Medicine. *Archives in Internal Medicine*. 2005;165:1493-9.
2. Graber MR, G, Franklin N. Reducing Diagnostic Errors in Medicine: Whats the Goal. *Academic Medicine*. 2002;77(10):981-92.
3. Graber M. The incidence of diagnostic error in medicine. *BMJ Qual Saf*. 2013;0:1-7.
4. Trowbridge RL, Dhaliwal G, Cosby KS. Educational agenda for diagnostic error reduction. *BMJ Quality & Safety*. 2013;22(Suppl 2):ii28-ii32.
5. Berner E, Graber M. Overconfidence as a Cause of Diagnostic Error in Medicine. *The American journal of Medicine*. 2008;121(5A):S2-S23.
6. Croskerry P. Context Is Everything or How Could I Have Been That Stupid? *Healthcare Quarterly*. 2009;12(Sp):e171-e6.
7. Croskerry P. A universal model of diagnostic reasoning. *Acad Med*. 2009;84(8):1022-8.
8. Schiff G. Diagnosis and diagnostic errors:time for a new paradigm. *BMJ Quality and Safety*. 2014;23:1-3.
9. Graber M, Trowbridge R, Myers J, Umsheid C, Strull W, Kanter M. The Next Organizational Challenge: Finding and Addressing Diagnostic Error. *The Joint Commission Journal on Quality and Patient Safety*. 2014;40(3):102110.
10. Singh H. Editorial: Helping Organizations with Defining Diagnostic Errors as Missed Opportunities in Diagnosis. *The Joint Commission Journal on Quality and Patient Safety*. 2014;40(3):99-101.
11. Norman GR, Eva KW. Diagnostic error and clinical reasoning. *Med Educ*. 2010;44(1):94-100.
12. Medicine Io. *Improving Diagnosis in Health Care*. Balogh EP, Miller BT, Ball JR, editors. Washington, DC: The National Academies Press; 2015. 450 p.
13. Schiff GD, Leape LL. Commentary: how can we make diagnosis safer?: *Acad Med*. 2012 Feb;87(2):135-8. doi: 10.1097/ACM.0b013e31823f711c.
14. Croskerry P. Achieving Quality in Clinical Decisions Making: Cognitive Strategies and Detection of Bias. *Academic Emergency Medicine*. 2002;9(11):11841204.
15. Trowbridge R. Twelve tips for teaching avoidance of diagnostic errors. *Medical Teacher*. 2008;30:496-500.
16. Croskerry P, Singhal G, Mamede S. Cognitive debiasing 1: origins of bias and theory of debiasing. *BMJ Quality and Safety*. 2013;0:1-7.
17. Graber M, Sorenson A, Biswas J, Modi V, Wackett A, Johnson S, et al. Developing checklists to prevent diagnostic error in Emergency Room settings. *Diagnosis*. 2014;1(3):223-31.
18. Schiff G. Finding and fixing diagnosis errors: can triggers help? *BMJ Quality and safety*. 2012;21(2):89-92.
19. Ely J, Graber M, Croskerry P. Checklists to Reduce Diagnostic Errors. *Academic Medicine*. 2011;86(3):307-13.

# APPENDIX 1

## DIAGNOSTIC TOOLS

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## Differential Diagnosis

### Benefit

A lack of consideration for the correct diagnosis is a common cause for error in diagnosis<sup>(18, 19)</sup>. Often, a diagnosis is either not considered at all or, equally, dismissed with insufficient consideration to it as a possibility. Thoroughly considering the differential diagnoses is one step in assisting to ensure that all potential diagnoses are considered with sufficient detail to exclude them with the confidence of knowing that it definitely does not fit the clinical picture.

### When

Evaluation of differential diagnoses should be carried out for every patient requiring a diagnosis and reviewed every time new information becomes available.

This process will happen very quickly for some patients and clinicians and will evolve over time for others depending on the presenting symptoms, the clinician's level of expertise and the clinical information that is needed and available to make a definitive diagnosis.

### The Process of Differential Diagnosis

Undertaking a differential diagnosis is the process of identifying all of the possible diagnoses that could be connected to the signs, symptoms and investigation findings, and then ruling out diagnoses as clinical information becomes available until a final determination can be made.

Questions to consider when differentiating between diagnoses:

- Are there any **Don't Miss** diagnoses associated with these symptoms?
- What is the worst case scenario?
- Is there anything that doesn't quite match up?
- What else could it be?
- Is this an atypical presentation or could it be something else?
- Do I need more expertise to make this diagnosis?

### Action

1. Undertake further assessment and history taking to confirm or refute each differential diagnosis
2. Use the differential diagnosis to guide the requesting and urgency of investigations
3. Ensure that investigations are followed up and results used to confirm or refute the diagnosis
4. Document each of the differential diagnoses considered

## Considerations for Diagnostic Decision Making

**High risk situations** include patient, environmental or individual factors that contribute to the risk of error. Frequently several factors will coexist to compound the risk. Each of these factors should be considered when reflecting on the diagnostic decision making process.

### Biases

The impact of bias in the decision making process is human nature. They are learned responses to particular situations that we are frequently unaware of and are often predictable, however insight and reflection on our thinking processes allows a reconfiguration of thinking to achieve a successful outcome <sup>(16; 17)</sup>. It is important therefore to be able to recognise both biases themselves, and the situations that lead to biases in order heighten awareness of vulnerabilities in each individual case. There are over 50 biases identified that have the potential to impact decisions. Common biases that have been identified as impacting on diagnostic decision making include; Anchoring, Premature Closure, Context Errors, Availability Bias, Confirmation Bias.

### Red Flags

Red flags are the significant cues that indicate something may not be quite right. This may be a significant symptom associated with a serious problem, a patient who is not responding in the expected manner or a situation where the symptoms and investigation results do not quite match. These situations require a heightened level of thought and suspicion to ensure that those diagnoses that may have serious or fatal consequences if missed are identified early <sup>(13)</sup>.

### Rule Out Worst Case Scenarios

Ruling out worst case scenarios is a strategy that increases the likelihood that any critical diagnosis is considered for a particular set of presenting symptoms. Those that are frequently missed are also those that are rarely seen and the strategy requires that the clinician has sufficient experience to recognise the potential worst case scenarios associated with the presenting symptoms.

For the most part this is a strategy of safety and errs on the side of caution. While it increases the likelihood of detection of diagnoses that must not be missed, similarly there may be a tendency for overdiagnosis and overutilisation of resources <sup>(18)</sup>. Awareness of pattern matching and availability biases help to generate a thorough history and physical examination that allows elimination or confirmation following careful consideration of serious conditions, without overuse of diagnostic testing, and is more likely to result in a greater degree of appropriate investigation for those 'don't miss' diagnoses <sup>(19)</sup>.

## Cognitive Autopsy

### Benefits

Performing a cognitive autopsy following the recognition of diagnostic error is a self-reflection exercise that provides meaningful and realistic feedback. The self-reflection process encourages reflective learning, the development of insight and a change in clinical cognition that reduces the likelihood of the error being repeated.

Sharing the information learned from a cognitive autopsy and generating discussion with team members in forums such as morbidity and mortality (M&M) meetings promotes a team approach to the key learning in order to improve recognition of the cognitive factors involved in the decision making process and encourage recognition and discussion of the system factors that may have contributed.

### When

A cognitive autopsy is an individual process that should be conducted as soon as possible after a diagnostic error has been realised.

### Cognitive Autopsy Guidelines <sup>(21)</sup>

1. Conduct as soon as possible after event
2. Avoid discussion with others
3. Be well-rested and have an adequate amount of sleep
4. Find a secluded place, free of interruptions with enough time to consider the events in detail
5. Start with the beginning of the day or shift and work through towards the event
6. Consider the event in detail keeping an open mind about events, thoughts and feelings
7. Pay close attention to ambient conditions
8. Write down everything, however trivial
9. Discuss with others and record their comments and observations
10. Consider the cognitive biases involved and their respective impacts

### Action

The opportunity to discuss the outcomes of a cognitive autopsy during M&M meetings is one that should not be missed. This is an important aspect of learning and developing as a team to prevent the same mistakes from recurring in the future. These meetings need to be structured in a way that enables and promotes discussion and analysis of the thinking processes in a non-judgemental manner for this to be an effective, open and honest discussion that leads to the identification of system solutions.

## Considerations during a Cognitive Autopsy

Cognitive Autopsy Steps	Considerations and Rationale <sup>(21; 16)</sup>
1. Conduct as soon as possible	<ul style="list-style-type: none"> <li>• The recall of information deteriorates rapidly over time</li> <li>• As it is important to reflect on every possible aspect of the situation, a detailed reflection as soon as possible allows the best opportunity for learning from the event.</li> </ul>
2. Avoid discussion with others initially	<ul style="list-style-type: none"> <li>• Discussing the situation with others before reflecting individually creates the potential to distort perceptions and recollections</li> </ul>
3. Work through the day from the beginning of the shift through to the event	<ul style="list-style-type: none"> <li>• Write down a detailed account of the shift providing as much objective detail as possible</li> <li>• Develop a timeline that outlines key points or events throughout the day that could have contributed to an error</li> <li>• Use the timeline to identify the critical decision points for the case under review</li> <li>• Reflect on the decision points to identify key cues and decision goals (Be aware of hindsight bias)</li> </ul>
4. Consider the event in detail keeping an open mind about events, thoughts and feelings	<p>While reflecting on the event consider the following stages of decision making:</p> <p><u>Plan</u></p> <ul style="list-style-type: none"> <li>• Do I feel comfortable with my judgement?</li> <li>• Was the patient comfortable with my judgement?</li> </ul> <p><u>Reflect</u></p> <ul style="list-style-type: none"> <li>• Does it make clinical sense?</li> <li>• Did I put enough effort into thinking about the case?</li> <li>• Did I have biases when thinking about the case?</li> </ul> <p><u>Manage</u></p> <ul style="list-style-type: none"> <li>• Do I need more information or skills to manage this case better?</li> </ul>
5. Consider the ambient conditions	<ul style="list-style-type: none"> <li>• Was it a busy shift, lots of pages, other clinical priorities to manage?</li> <li>• What else was going on around me such as new procedures, organisational changes, different environment or different colleagues?</li> <li>• Were there other things on my mind that day such as a conflict at home or an unwell family member?</li> </ul>
6. Consider the cognitive biases involved and their respective impacts on the decision making process in this case	<p>A summary of common biases related to diagnosis and clinical decision making is included in Appendix 1</p>

## APPENDIX 2

### IMPLEMENTATION PLAN

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## Project Aims and Objectives

Project Title:	Take 2 – Think, Do
Project Aim:	To improve knowledge and recognition of the potential for diagnostic error and reduce the morbidity and mortality associated with wrong, missed or delayed diagnosis.
Project Background:	<p>The Institute of Medicine (IOM) report, <i>Improving Diagnosis in Health Care</i><sup>(12)</sup>, describes diagnostic error as a serious problem that has been underappreciated for many years. The IOM report concludes that most people will experience at least one diagnostic error in their lifetime.</p> <p>There are approximately 500 reported incidents directly attributable to diagnostic error in NSW each year. Of these, there is an average of 50 SAC 1 incidents in which diagnostic error contributes to a serious adverse patient outcome for patients</p> <p><i>Add any local information to support the case for change</i></p>
Project Objectives:	<ol style="list-style-type: none"> <li>1. Educate staff to improve knowledge and recognition of the potential for diagnostic error within different clinical settings</li> <li>2. Implement Take 2 –Think, Do in a manner that is responsive and flexible to the facility needs</li> <li>3. Evaluate the impact of <i>Take 2 – Think, Do</i> on diagnostic processes</li> </ol> <p><i>Add any locally identified objectives relating to this project?</i></p>
Project Benefits:	<p>Implementation of <i>Take 2 – Think, Do</i> will result in:</p> <ul style="list-style-type: none"> <li>• enhanced clinician skills in recognising potential risks associated with diagnostic error</li> <li>• improved systems to support the decision making process during diagnosis</li> <li>• reduced morbidity and mortality associated with diagnostic error</li> <li>• enhanced communication between team members and with patients</li> </ul>

## Scope of the Project

	In Scope	Out of Scope
Project Scope	<i>Identify the clinical wards or units that will be included</i>	<i>Are there any specific groups that will not be included?</i>
Project Deliverables:	<p>At the end of the project implementation there will be:</p> <ul style="list-style-type: none"> <li>• A local oversight group to monitor implementation and address local challenges and barriers</li> <li>• Improved awareness of the risks associated with diagnostic error among clinicians</li> <li>• A culture of reporting identified missed and delayed diagnosis</li> <li>• <i>Take 2 – Think, Do Framework</i> adapted to suit the local environment</li> </ul> <p><i>Add any locally identified deliverables relating to this project?</i></p>	
Project Milestones:	<i>Identify key activities and dates (month/year) they will be completed</i>	
Evaluation:	<p>Evaluation criteria include:</p> <ul style="list-style-type: none"> <li>• % clinical staff who attend an education session on diagnostic error</li> <li>• No. of patients assessed using Red Team / Blue Team Challenge</li> <li>• % of patients* with differential diagnosis documented in clinical record</li> <li>• % of admitted patients* with discharge diagnosis identified in admitting differential diagnosis</li> <li>• <i>Add any locally identified evaluation points?</i></li> </ul> <p><i>*Based on random sample audit</i></p>	
Resources:	<i>Are there any resources required for implementation? Consider: people, space to meet and access to a computer and internet, etc.</i>	
Key Dependencies:	<i>Is there anything that needs to happen for the project to be successful?</i>	
Start Date:		

## Risk Assessment

Program Risks	Risk Rating	Mitigation Strategy
<i>What are the risks to successful completion of the program?</i>	<i>(high, medium, low)</i>	<i>List strategies to remove or minimise the risks</i>

## Project Team Roles

	Name and Designation	Role / Responsibility
Executive Sponsor		
Clinical Lead(s)		
Clinical Champion(s)		
Project Team Members		
Project Lead (CEC)		

## Communication Strategy

Stakeholder	Information Required	Mode <i>eg. Report, meeting</i>	When <i>Frequency or milestones / dates</i>
Executive sponsor			
Clinical lead(s)			
Team members			
Committees <i>(Identify relevant committees requiring reports)</i>			
Project lead (CEC)			

## Endorsement

Facility Executive Sponsor	Name:	Signature and Date:
Head of Department	Name:	Signature and Date:
Facility Clinical Lead	Name:	Signature and Date:

## Implementation Checklist

Governance	Executive Sponsor is identified	
	Diagnostic Error clinical lead and clinical champions are identified	
	Communication strategy for diagnostic error project is established	
	Roles and responsibilities are established	
	Diagnostic Error is an agenda item for Morbidity and Mortality Meetings	
Tools and resources	<i>Take 2 – think, Do</i> framework is reviewed to incorporate local requirements	
	<i>Take 2 – Think, Do</i> Framework is available for clinician reference	
	Information sheets are available for use	
	Red Team / Blue Team dialogue prompt cards are available for clinicians' reference	
Education	Training and education needs and methods of delivery are established	
	Training dates are established	
	Training is provided to all appropriate clinical staff	
	Pre and post knowledge assessment is conducted	
	Establish method for ongoing support and retraining needs	
Evaluation	Establish a method for recording patients undergoing Red team / Blue Team Challenge	
	Undertake random record audit of recommended audit points	
	Undertake clinical record audit of patients undergoing Red team / Blue Team Challenge	
	Results and outcomes are reported to the team and appropriate committees	
	Success stories and lessons learnt are communicated in relevant forums	

## Implementation Action Plan

Focus Area	Action	Responsible	Due	Status
1. <i>These may arise from identification of key dependencies and implementation checklist</i>				
2.				
3.				
4.				
5.				

## APPENDIX 3

### EVALUATION TOOLS

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## Red Team / Blue Team Evaluation

### Data set 1 – Clinical outcome measures

**Purpose:** To assess Take 2 – Think, Do impact on clinical outcomes

**Site / Unit:**

**Date range:**

#### 1. Unit Demographics

Average admissions / week	
Bed base	
Clinical Specialty	
Hospital peer group	

#### 2. Repeat presentations

Total discharges / week	
Number of patients represented to same hospital within 7 days / week	
% repeat presentations	

#### 3. Clinical Reviews and Rapid Response calls

Number of clinical reviews / week	
Number of rapid response calls / week	
Number patients with repeat calls	
<b>For patients with repeated calls</b> What is the average number of repeat calls /patient	
<b>For patients with repeated calls</b> What is the range for repeat calls / patient	

## Red Team / Blue Team Evaluation

### Data set 2 – Clinical practice measures

**Purpose:** To assess pilot impact on diagnostic process and documentation

**Site:**

**Patient identifier:**

1. Demographics			
Age		CALD	
Time of arrival		Day of week	
Admitting Specialty		Triage category (ED)	
What was the discharge diagnosis?			
Was the presentation typical for the diagnosis?			

2. Differential diagnosis	
Was there a differential diagnosis documented?	
<b>If yes:</b> What were the differential diagnoses?	
Was a provisional or working diagnosis identified at admission?	
Was the discharge diagnosis different to the admitting diagnosis?	
<b>If yes:</b> Was the discharge diagnosis identified in the differential diagnosis?	
Were there any changes to the diagnosis were there throughout the admission?	

3. Clinical reasoning	
Were the requested investigations adequate for the differential diagnoses?	
Is there appropriate investigation of the likely problem for this admission?	
Did the diagnostic process match the relevant guidelines / models of care?	
Is length of stay consistent with DRG?	
<b>If no:</b> Did comorbidities / treatment complications impact on length of stay?	

4. Red Team / Blue Team Challenge	
Did Red Team / Blue Team Challenge occur on this patient?	
<b>If no:</b> Was there any uncertainty in the diagnosis?	
<b>If yes:</b> Was this part of the original problem or a new problem?	
Did the working diagnosis change as a result of the Red Team / Blue Team Challenge?	
Were additional investigations requested as a result of the Red Team / Blue Team Challenge?	
<b>If yes:</b> Were the investigations appropriate to adequately investigate the diagnosis being questioned?	

## Red Team / Blue Team Challenge Log

	Date	Patient Identification	Working diagnosis	Outcomes / Changes
1				
2				
3				
4				
5				
6				
7				

## Issues Log

**Purpose:** To identify risks and barriers to implementation of the Red Team / Blue Team pilot

**Action:** Record all concerns and issues experienced

Issues logged may include: difficulty with decision making, challenges with communication and teamwork and any staff or patient concerns

Date	Problem identified	Reported by	Actions /Resolution	Status