Intelligent Systems

CLINICAL PRACTICE GUIDELINES - INTRODUCTION

Intelligent Systems Lab

Universidade do Minho

Tiago Oliveira, José Neves, Paulo Novais

Summary

- **Clinical Practice Guidelines**
  - Definition
  - Clinical Specialty and Category
  - Types of Clinical Practice Guidelines
  - Development Process
  - Important organisations
  - Benefits
  - Shortcomings
  - The role of Artificial Intelligence in guideline application

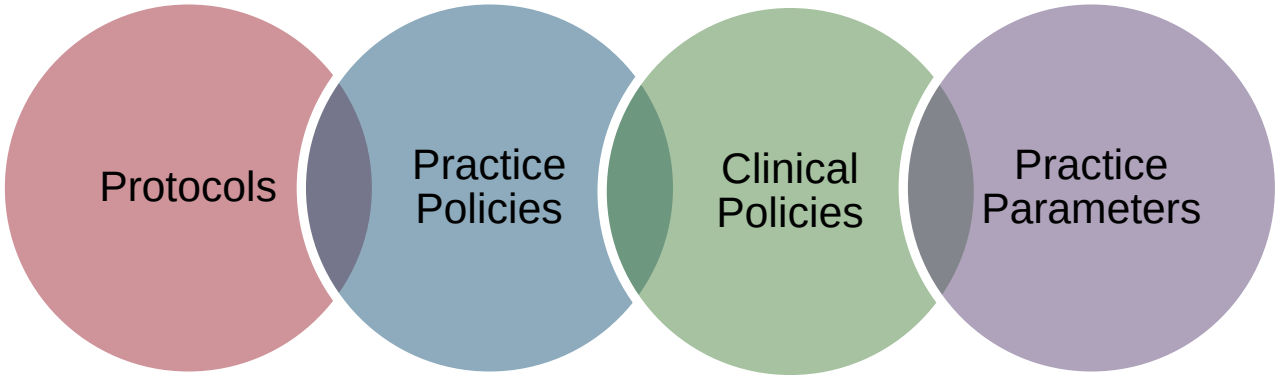
Objectives

- Understand the function and scope of Clinical Practice Guidelines (CPGs);
- Identify the key phases in the development process of CPGs;
- Identify important organisations in the creation and standardisation of CPGs;
- Identify benefits and shortcomings of these documents;
- Determine which aspects *Artificial Intelligence* may help to improve.

Definition

CPGs are systematically developed statements containing **medical recommendations** to assist healthcare professionals and patients about appropriate healthcare in specific clinical circumstances (Miller and Kearney 2004).

Other designations include:



Clinical Specialty and Category

Medical fields touched by the CPG

Clinical Specialty

- Family practice
- Pediatrics
- Cardiology
- Surgery
- …

Determined by the types of recommendations provided

Category

- Diagnosis
- Evaluation
- Treatment
- Management
- Prognosis
- …

Types of Clinical Practice Guidelines

- According to the **type of information** CPGs are built upon, there are two types of documents:
  - Consensus-based guidelines
  - Evidence-based guidelines

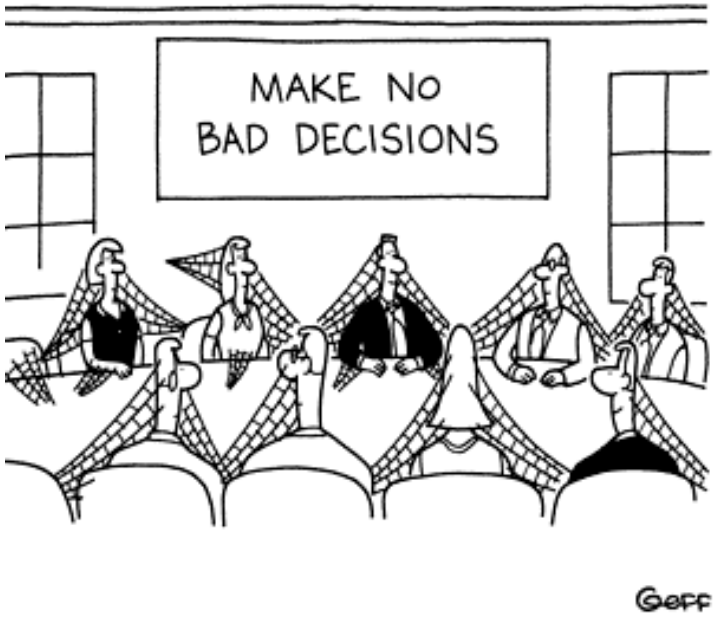
Which one is more appropriate

Types of Clinical Practice Guidelines

- Consensus-based Guidelines

A common form of guidelines resulting **from the consensus of expert opinions**. A process that seeks the agreement of all parts.

The opinions of the **minority** must be considered.



Types of Clinical Practice Guidelines

- Consensus-based Guidelines

Nominal Group

- Team members write down their ideas of the problem;
- Each idea is summarized so that all members can see them. No ideas are discussed until all are presented and recorded;
- An open discussion of ideas follows to clarify ideas that members do not understand. No attack or defence is allowed;
- Next, members vote (in secret) on the top ideas in order of priority. The eventual decision of the nominal group is the vote outcome.

Delphi Technique

- It utilizes a series of questionnaires administered by a central individual of experts who never meet together;
- As the respondents reply, their questionnaires are summarized;
- A new questionnaire based on their responses to the first, is developed;
- This repeating process continues until a team consensus on the problem is reached.

Types of Clinical Practice Guidelines

- Evidence-based Guidelines
  - Guidelines developed after the extraction and revision of scientific information from bibliography, clearly distinguishing what is proof from what is opinion;
  - Besides advising which treatment is better, the document quantifies in absolute terms the benefits and costs of adopting this or other procedure.

Types of Clinical Practice Guidelines

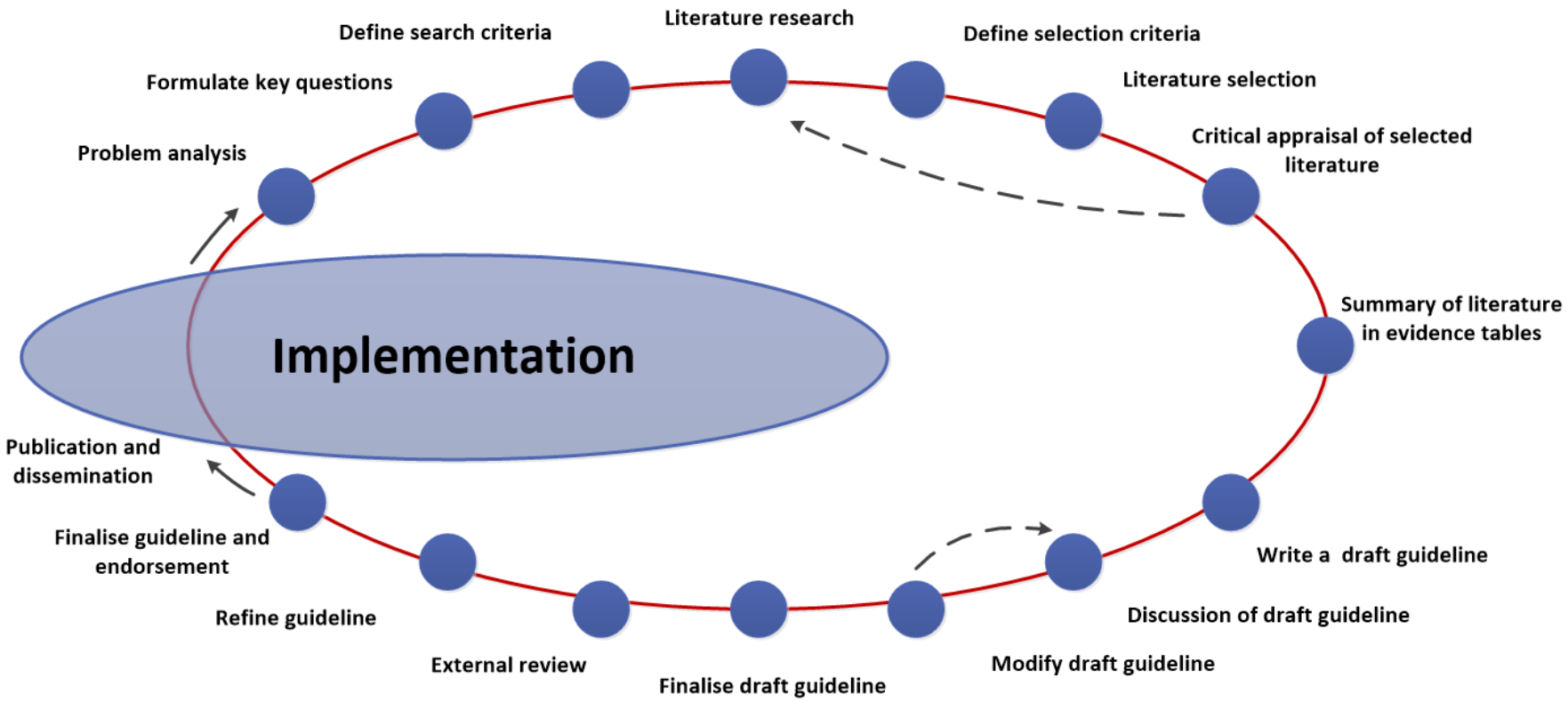
- Evidence-based Guidelines

Features of evidence-based guidelines in the COGS (Conference on Guideline Standardisation) checklist (2003)

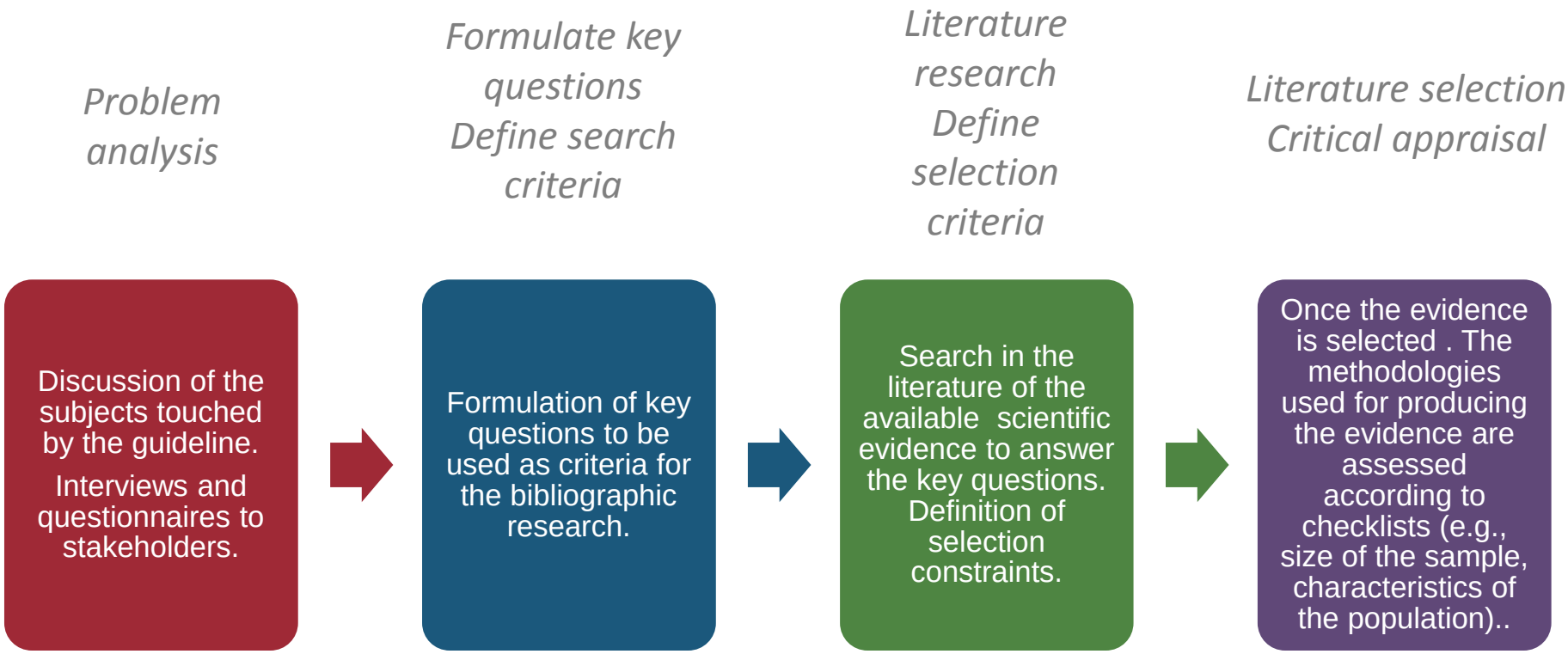
Clear definition of the scope and objectives	Involvement of all the stakeholders	Rigor in the development process
Clarity in the presentation	Applicability	Editorial independency

Development Process

- There is no standard development process for CPGs. However organisations follow a set of similar phases.



Development Process



Development Process

Summary of literature in evidence tables

Production of evidence tables with scores for the evidence.

More on evidence grading later.

Production of a draft for the guideline

Based on the evidence, produce the document containing: key-questions, evidence tables, recommendations, implementation costs and references

Discussion, modification and finalisation of the draft guideline

An iterative process in which the development group evaluates the draft guideline and proposes changes until the final version of the document is reached.

External Review Refinement

The development group submits the guideline for external revision by an independent organisation.

Development Process

Finalise guideline and endorsement

Using the suggestions obtained in the external review, the development group produces the final version of the guideline. The guideline is approved by the responsible organisations.

Publication and dissemination

The guideline is published in online repositories and disseminated through newsletters and conferences.

Development Process

- Evidence Grading
  - Each organisation implements its *ad-hoc* grading system;
  - However, efforts haven made towards a unified grading system:

Grading of Recommendations Assessment, Development and Evaluation (GRADE)

4 levels of evidence grading

High
Moderate
Low
Very Low

Features

Study limitations
Inconsistency of results
Lack of precision
Bias

Important Organisations

- National Institute of Health (NHI)

http://www.nih.gov/

- Dutch Institute for Healthcare Improvement CBO

http://www.cbo.nl/en/

- Scottish Intercollegiate Guidelines Network (SIGN)

http://www.sign.ac.uk/

- New Zealand Guidelines Group (NZGG)

http://www.health.govt.nz/about-ministry/ministry-health-websites/new-zealand-guidelines-group

Important Organisations

In Portugal:

- Direção Geral de Saúde

http://www.dgs.pt/

For the standardisation of CPGs:

- Guidelines International Network(G-I-N)
  - Comprises 92 organisations and 127 individual members representing 48 countries from all continents.

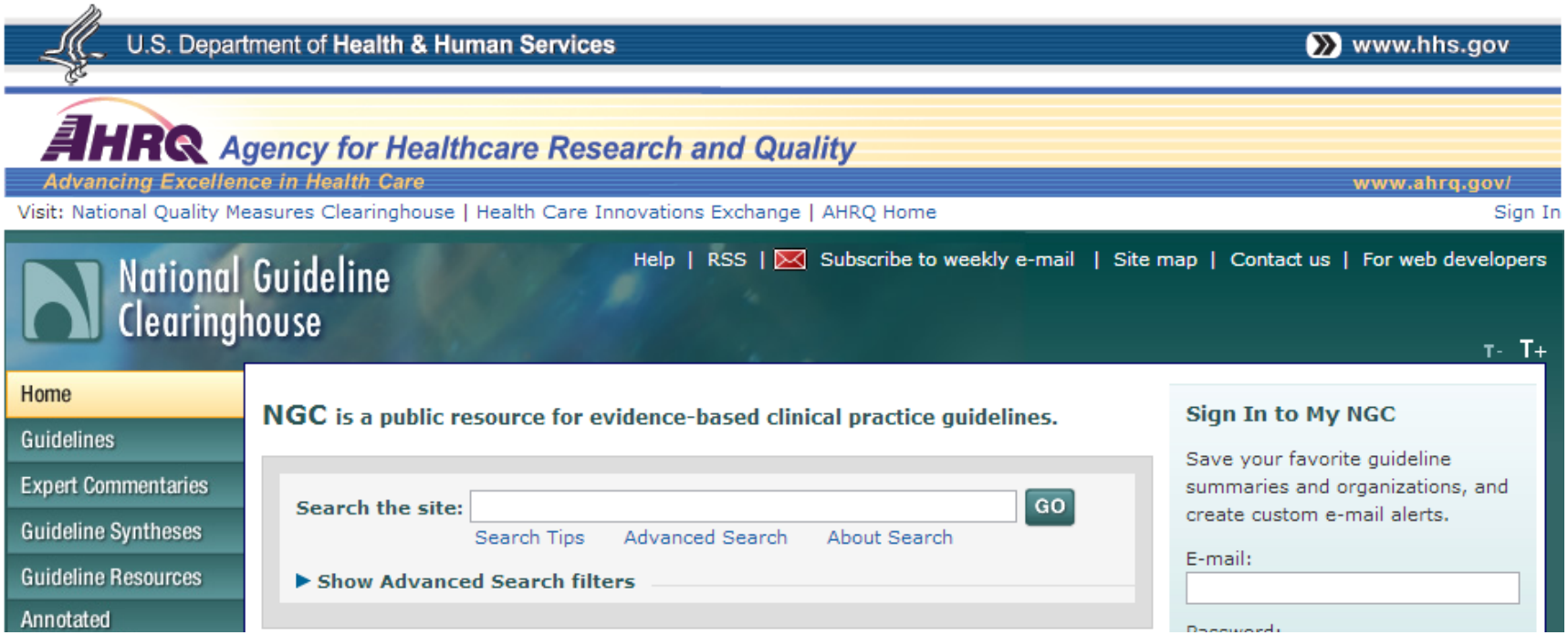
http://www.g-i-n.net/

Important Organisations

Centralised guideline repository:

- National Guideline Clearinghouse (NGC)

http://guideline.gov/



Benefits

- Reduce Medical Error

A medical error is defined as a mistake or error committed by a healthcare professional, which results in harm to the patient. It includes errors of execution and errors of planning. It usually results in an adverse event.

Kalra (2004)

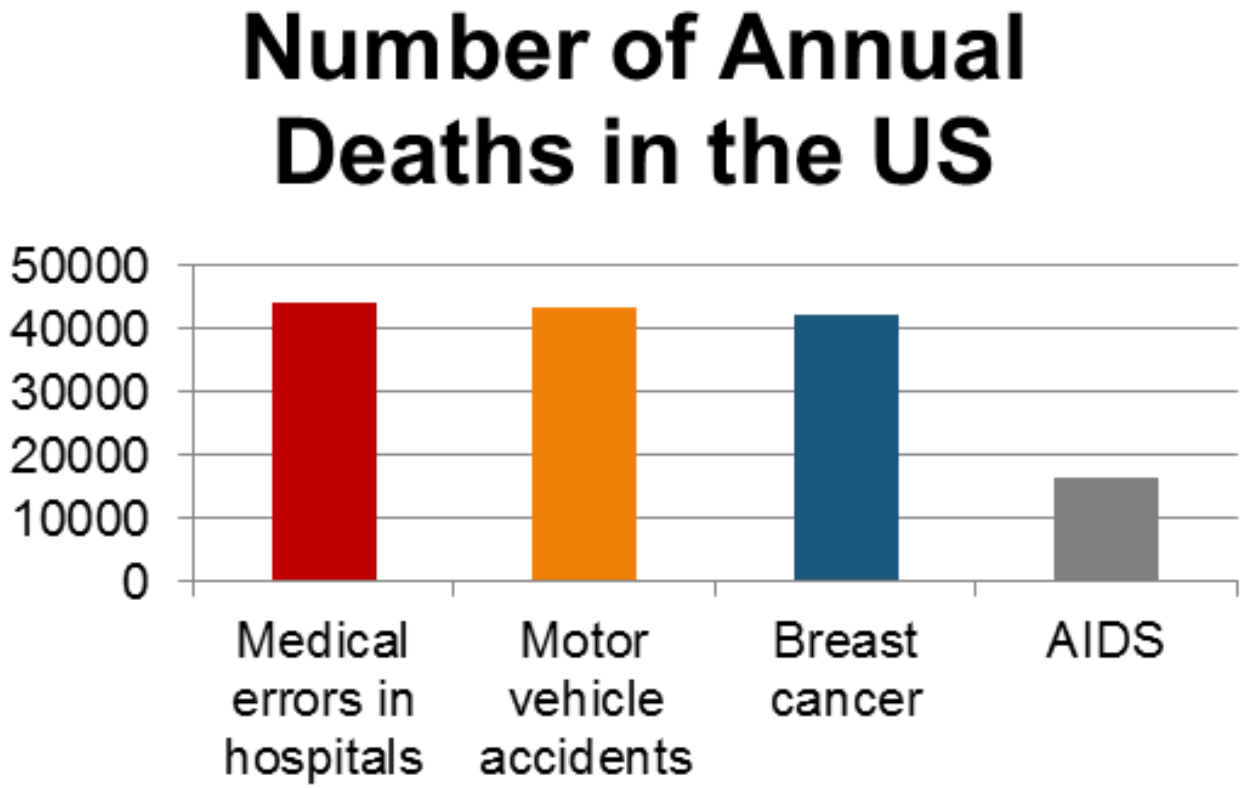
5-80 times per **100 000** consultations
11% of all prescriptions
Sanders and Esmail (2003)

39% of adverse event incidence with **18%** preventability
Nicolleta et al. (2003)

108 errors in **64** patients
Proctor et al. (2003)

Benefits

- Reduce Medical Error



Institute of Medicine (2000)

Benefits

- Reduce Defensive Medicine

Ordering of treatments, tests and procedures for the purpose of protecting the physician from criticism rather than diagnosing or treating the patient.

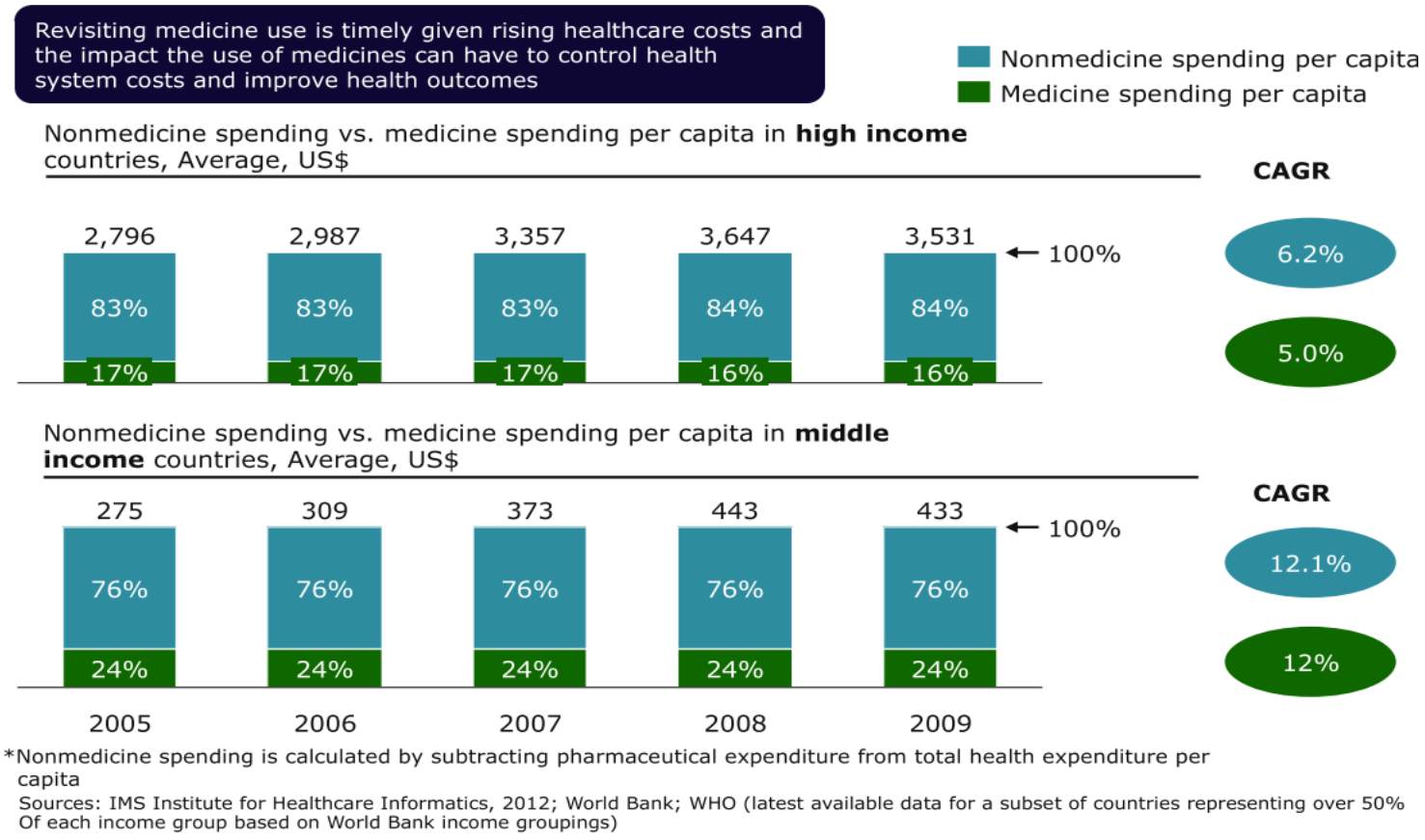
Chawla et al. (2008)

8% of all diagnostic testing in the US is defensive
$2 trillion attributable to defensive medicine
50% of women who will undergo mammography testing will receive a false positive
Chawla et al. (2008)

93 % physicians reported practicing defensive medicine
Studdert et al. (2005)

Benefits

- Reduce Defensive Medicine



World Health Organization (2012)

Shortcomings

- **Long textual** documents that are difficult to consult at the moment of care;
- Difficult maintenance: **updating** and **modifying**;
- Healthcare professionals argue that they **stifle change** and innovation. Moreover, they consider that CPGs are **strict rules** that do not take into account the social, economical and cultural contexts where the medical practice is developed.

Shortcomings

- Sometimes the documents show some form of **ambiguity**

Syntactic

- Syntactic ambiguity occurs when the structure of a statement is not clear, thus impeding its correct interpretation.
- Misplaced (or lack of) punctuation and wrongfully applied Boolean connectors are some of the causes of syntactic ambiguity.

Semantic

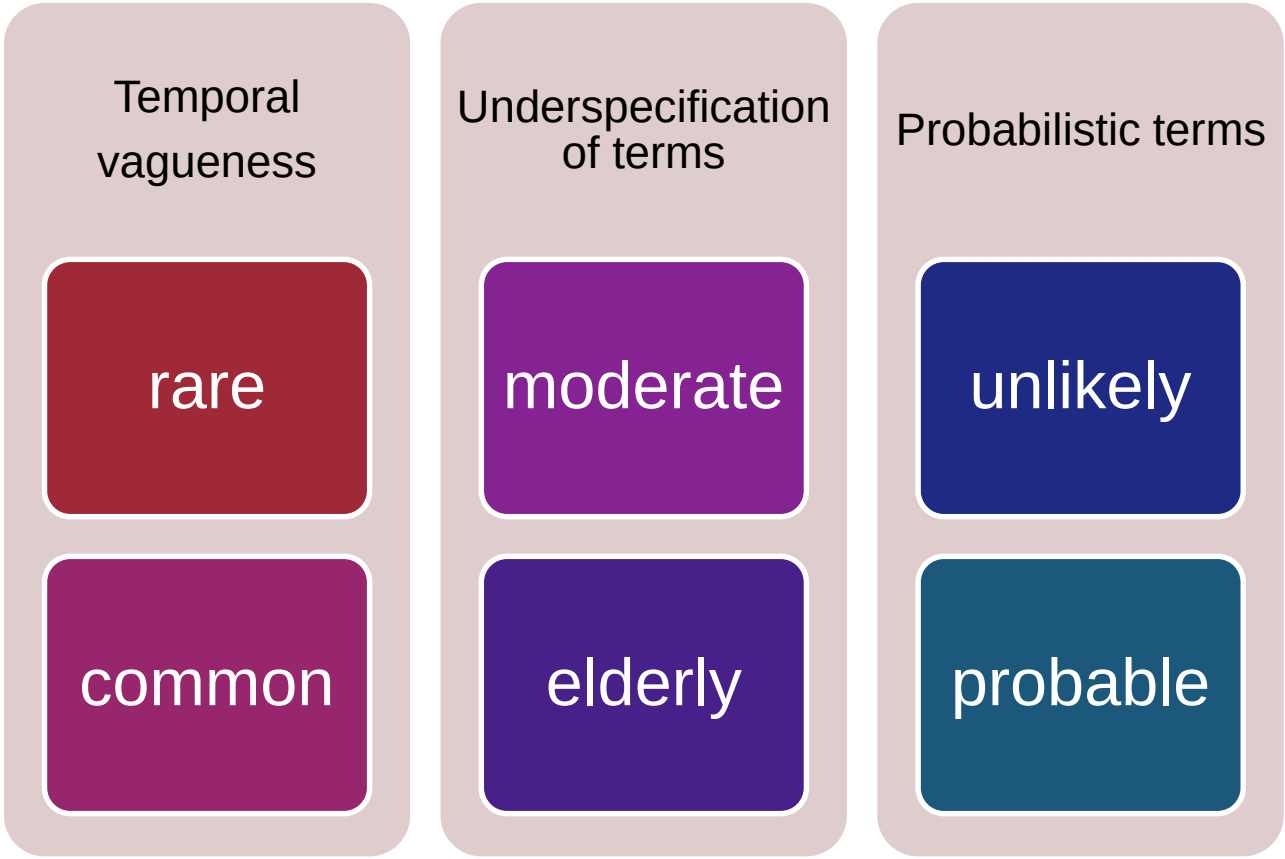
- Characterized by situations where terms can be interpreted in more than one way.
- Misuse of abbreviations, such as the case of the word “cold”, which in the context of a guideline can mean “common cold”, “cold sensation” or “Chronic Obstructive Lung Disease”.

Pragmatic

- It happens when the recommendations of CPGs are not consistent or are conflicting with each other.

Shortcomings

- The vocabulary used may also denote **vagueness**



The role of AI in guideline application

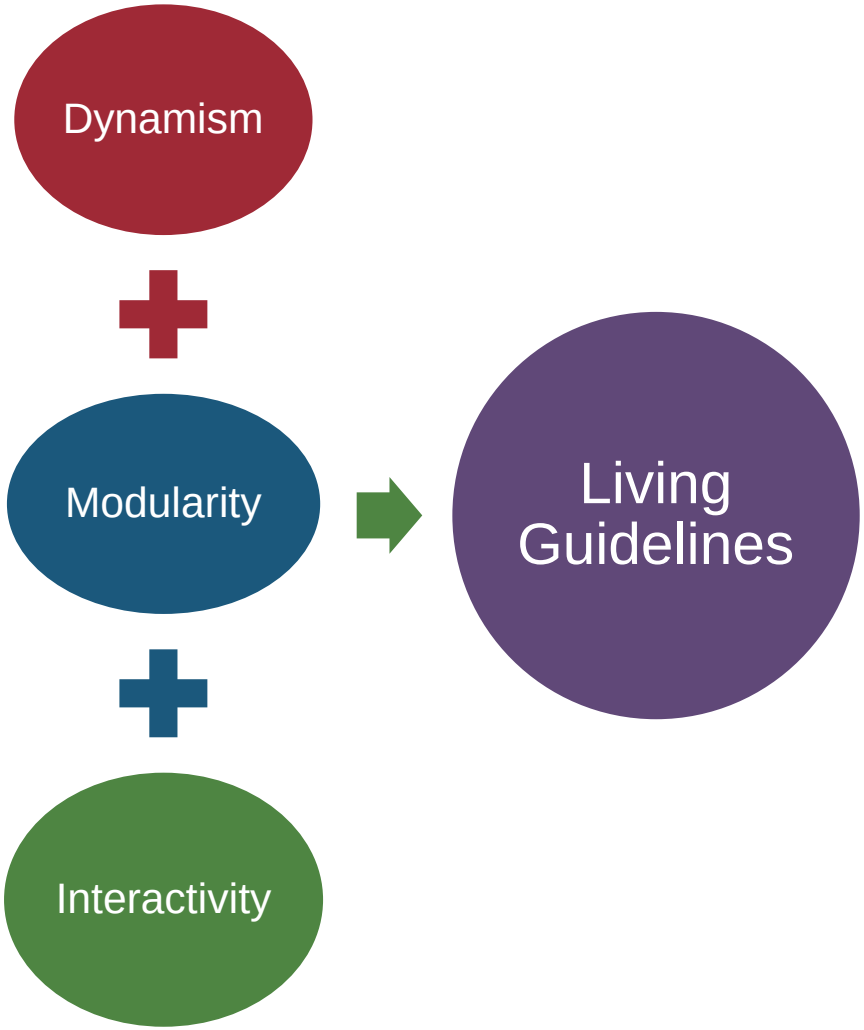
- AI is a field of study that aims to explain and **emulate intelligent behaviour** in computational processes. It is the branch of computer science that is concerned with the automation of intelligence;

- **AI in Medicine** is more focused on giving support to healthcare workers rather than trying to replace them.

- Using knowledge representation formalisms, it is possible to create **structured representations** of CPGs for Clinical Decision Support Systems.

- This way, guidelines acquire a set of desirable features, namely…

The role of AI in guideline application



CPGs in **constant change**, that are easy to update and modify.

These guidelines are modeled as **modules of knowledge**, easily reusable inside other guidelines.

By being integrated in Clinical Decision Support Systems, they provide an **interactive clinical process**. They are fed with the information provided by healthcare professionals and give real-time recommendations.

In the next session…

- Clinical Decision Support Systems
- Computer-Interpretable Guidelines

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