

# CAPITA

## Pathways, algorithms, and CDS: now and the future

Dr Charles Young, Chief Medical Officer  
Capita Healthcare Decisions



Healthcare Decisions



# Clinical Decision Support



Clinical Decision Support is a process for enhancing health-related decisions and actions with pertinent, organized clinical knowledge and patient information to improve health and healthcare delivery. Information recipients can include patients, clinicians and others involved in patient care delivery; information delivered can include general clinical knowledge and guidance, intelligently processed patient data, or a mixture of both; and information delivery formats can be drawn from a rich palette of options that includes data and order entry facilitators, filtered data displays, reference information, alerts, and others.

*Improving outcomes with clinical decision support: an implementer's guide. Second Edition. HIMSS. 2011 (in press).*  
<http://www.himss.org/library/clinical-decision-support>



# Clinical Decision Support



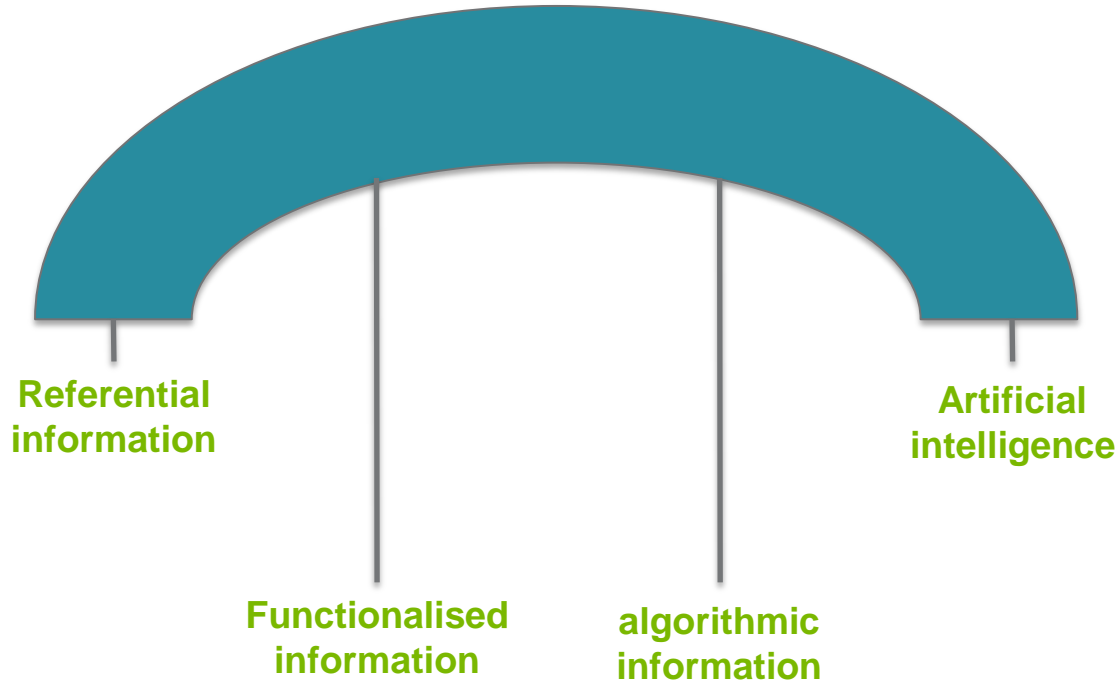
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pertinent, organized clinical knowledge and patient information

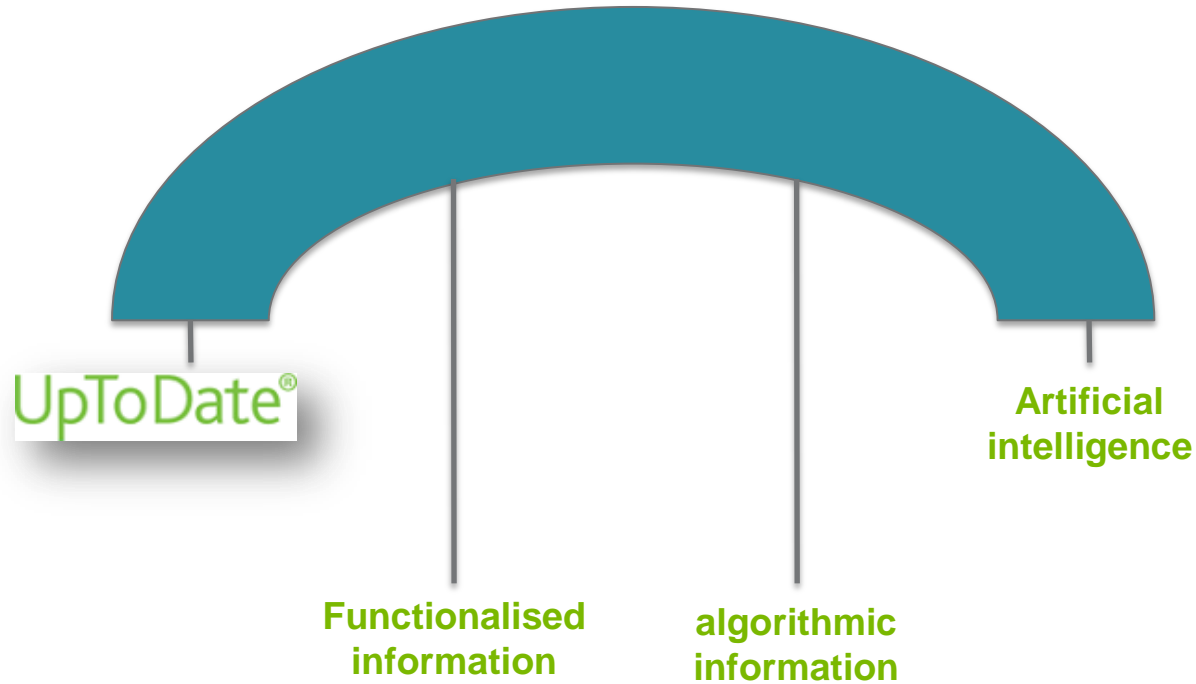
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# CDS Spectrum



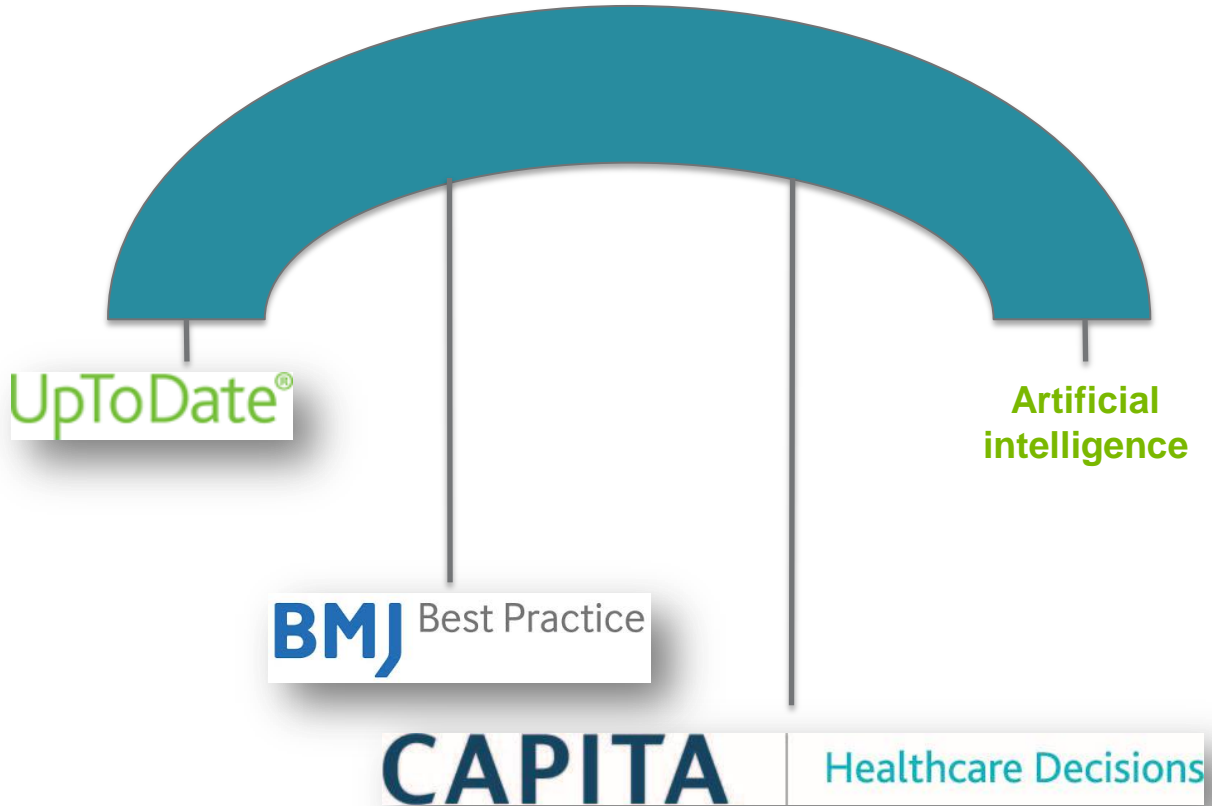
# CDS Spectrum



# CDS Spectrum



# CDS Spectrum



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# CDS Spectrum



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# UpToDate - referential

The screenshot displays the UpToDate website interface. At the top, the search bar contains the text 'AIDS-related cryptococcal meningoe' and 'All Topics'. Below the search bar, there are navigation links for 'New Search', 'Patient Info', 'What's New', 'Calculators', 'CME 26.0', and 'My Account'. The main content area is titled 'Treatment of cryptococcal meningitis in HIV-infected patients'. On the left side, there is a 'TOPIC OUTLINE' with a 'SUMMARY & RECOMMENDATIONS' button highlighted. The main text area includes sections for 'Authors' (Gary M Cox, MD, John R Perfect, MD), 'Section Editor' (John G Bartlett, MD), and 'Deputy Editor' (Jennifer Mitty, MD, MPH). It also features 'Disclosures', an 'INTRODUCTION' paragraph, and an 'ANTIFUNGAL AGENTS' section. A vertical 'Topic Feedback' button is visible on the right side of the article content.

<http://www.uptodate.com/home>

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# BMJ Best Practice - functionalised

The screenshot shows the BMJ Best Practice mobile app interface. The top navigation bar is blue with the text 'Type 2 diabetes in children' and the 'BMJ Best Practice' logo. Below the navigation bar is a sidebar menu with categories: Prevention, Diagnosis, History & exam, Diagnostic tests (highlighted in teal), Differential, Step-by-step, Criteria, Guidelines, Case history, Treatment, Follow-up, and Resources. The main content area is titled 'Diagnosis: Tests' and shows '12 of 27' tests. Under the '1st tests to order' section, there is a table with two columns: 'Test' and 'Result'. The tests listed are:
 

- urine dipstick: glycosuria
- random plasma glucose: 11.1 mmol/L or greater (200 mg/dL or greater) in the presence of symptoms of polyuria and/or polydipsia. A note below states: 'Non-fasting test and less accurate than fasting plasma glucose. One of 4 tests can be used to confirm the diagnosis: fasting plasma glucose, random plasma glucose, 2-hour post-load glucose, or HbA1c. The chosen test should be repeated to substantiate the diagnosis.'
- fasting plasma glucose: 7 mmol/L or greater (126 mg/dL or greater)
- HbA1c: 48 mmol/mol (6.5%) or greater
- autoantibodies to insulin, islet cell, glutamic acid decarboxylase, and ZnT8: typically negative; positive in 15% to 30% of clinical T2DM

 Below this is the 'Tests to consider' section, which includes:
 

- oral glucose tolerance test: plasma glucose 11.1 mmol/L or greater (200 mg/dL or greater) 2 hours post-glucose load
- C-peptide: elevated

 The bottom of the screen shows standard Android navigation icons.

<http://bestpractice.bmj.com/best-practice/welcome.html>

**BMJ** Best Practice

# IBM Watson – artificial intelligence

THE UNIVERSITY OF TEXAS  
MD Anderson Cancer Center Oncology Expert Advisor, powered by IBM Watson JSAllen ? IBM.

Home Patients Cohorts Therapy

Patient List > Raymond Svenson Patient: Raymond Svenson

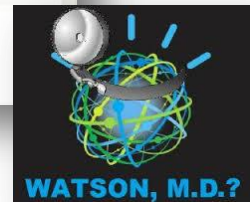
Azacitidine+PKC412 2010-0374 salvage-1 08/27/2013 Date Not Available

OEA Suggestions Approved Therapies Genomic Based Rx Clinical Trials

| Therapy  | Confidence | Audit | Rating         |
|--|------------|-------|----------------|
| Salvage fludarabine + cytarabine + GCSF +/- idarubicin                                   | Very High  | Audit | ( 0 comments ) |
| Salvage clofarabine + cytarabine + GCSF  | Medium     | Audit | ( 0 comments ) |
| Subcutaneous Cytarabine, 5-azacytidine, Decitabine                                       | Medium     | Audit | ( 0 comments ) |
| Salvage cladribine + cytarabine + GCSF +/- mitoxantrone or idarubicin                    | Medium     | Audit | ( 0 comments ) |
| Salvage HiDAC +/- anthracycline  | Medium     | Audit | ( 0 comments ) |
| Intermediate-intensity therapy (clofarabine)   | Medium     | Audit | ( 0 comments ) |
| Standard-dose Cytarabine 100-200, Idarubicin 12 or Daunorubicin 45-90 or Mitoxantrone 12 | Medium     | Audit | ( 0 comments ) |

Summary  
Timeline  
Current Labs  
Past Labs  
Prognosis  
Latest Therapy  
Therapy History  
Suggested Therapies  
Patient Similarities

<http://www.mdanderson.org/newsroom/news-releases/2013/ibm-watson-to-power-moon-shots-.html>





# Algorithmic

Mapping linear clinical pathway – triage:

- Structure
- Transparency
- Provenance

Ensuring consistency in clinical approach

Clinical consistency driving:

- Clinical outcome improvement
- Clinical resource conservation



# Clinical pathways

## ORIGINAL RESEARCH

### 911 Emergency Communication Nurse Triage Reduces EMS Patient Costs and Directs Patients to High-Satisfaction Alternative Point of Care

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#### Keywords:

Emergency Communications Nurse System, Emergency nurse triage, Low acuity calls, Patient satisfaction, Patient care, Cost Avoidance, Emergency Dispatch

#### Citation:

Gardett I, PhD et al. Ann Emerg Disp Resp 2015; 3(1):8-13

#### ABSTRACT

**Introduction:** Recent estimates indicate that more than half of all Emergency Department (ED) visits could be avoided, reducing patient costs and increasing satisfaction with care. Since 911 is increasingly the first point of contact for many patients entering the health care system—even those with non-emergency conditions—one potential approach to decreasing emergency costs and ED overcrowding is to reinvent the 911 dispatch center as a clearinghouse for directing patients to alternative care providers. This study presents a cost avoidance analysis of two 911 dispatch centers that implemented such a service, the Emergency Communication Nurse System (ECNS). **Objectives:** The primary objectives were to determine the amount of cost avoidance realized by payers using the ECNS to send patients to alternative final points of care, and to identify the amount saved by transporting patients by alternative means an ambulance. The secondary objective was to quantify patients' satisfaction with the service through analysis of patient follow-up survey data.

**Methods:** This was a retrospective cohort study involving two agencies employing the ECNS program in the USA. Fort Worth, Texas (MedStar) provided 9 months of 911 call data, and Louisville, Kentucky (LMEMS) contributed 34 months of 911 data. Both agencies are designated by the International Academies of Emergency Dispatch (IAED) as Emergency Medical Dispatch (EMD) accredited "Centers of Excellence". Certain areas affecting the study were also evaluated, including patient dispatch information, cost of care, and patient satisfaction.

**Results:** Patient records from 3,976 cases were analyzed (n=304 for MedStar, and n=3,672 for LMEMS). Collectively, nearly \$1.2 million (USD) in payments were avoided as a result of directing patients away from the ED to alternative provider points of care. Additionally, MedStar avoided 284 emergency ambulance transports, and LMEMS avoided 3,672 emergency ambulance transports resulting in a combined savings of nearly \$450,000 (USD) in costs (Table 2). Overall, 91.2% of the patients were satisfied with the ECNS service.

**Conclusion:** The study findings suggest that a 911-based service such as the ECNS is a feasible solution for reducing patient costs, using resources more efficiently, and maintaining high levels of patient satisfaction.

*“A 911 nurse triage service such as the ECNS can change the way EMS responds to patients' calls help, simultaneously reducing costs, using resources more efficiently, and maintaining high levels of patient care and satisfaction.”*

[http://www.aedrjournal.org/wp-content/uploads/2015/03/Cost-Avoidance-Using-911-Nurse-Triage-System\\_Gardett-I-PhD-et-al.-Ann-Emerg-Disp-Resp-2015\\_3.1\\_8-13.pdf](http://www.aedrjournal.org/wp-content/uploads/2015/03/Cost-Avoidance-Using-911-Nurse-Triage-System_Gardett-I-PhD-et-al.-Ann-Emerg-Disp-Resp-2015_3.1_8-13.pdf)



# Clinical questions

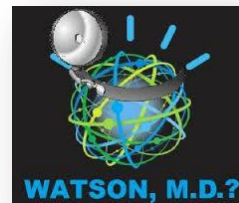


- Question 1
- Question 2
- Question 3
- Question 4

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# Clinical questions

▪ Question 1 →



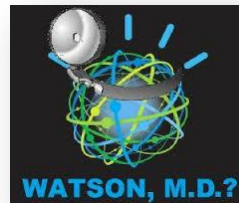
▪ Question 2 →



▪ Question 3 →



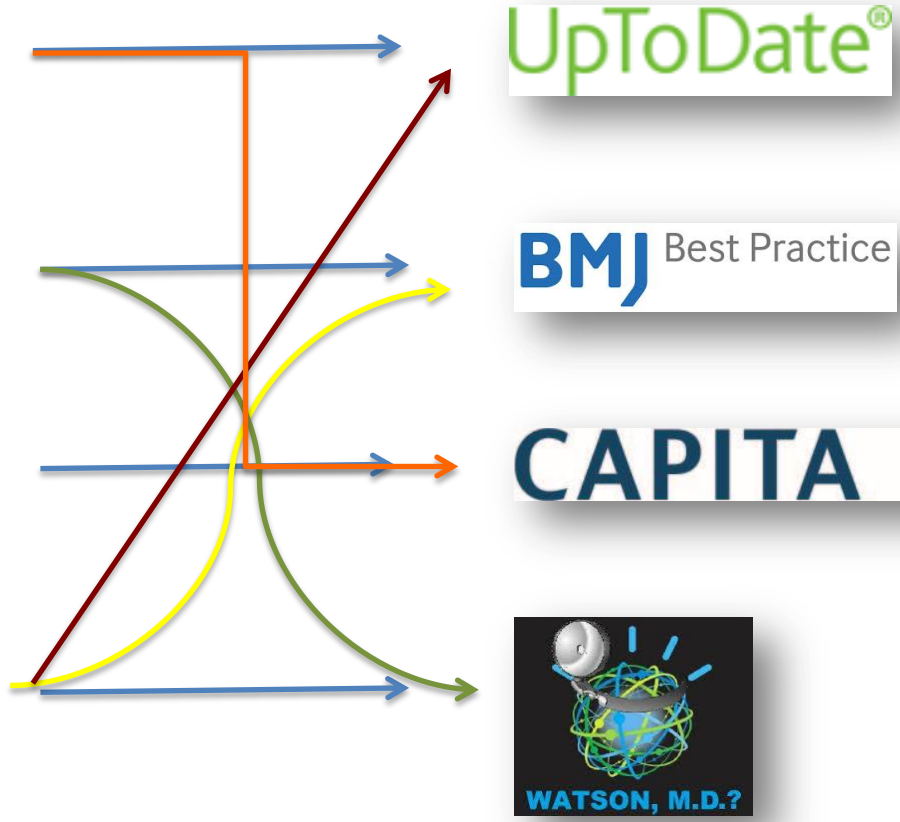
▪ Question 4 →





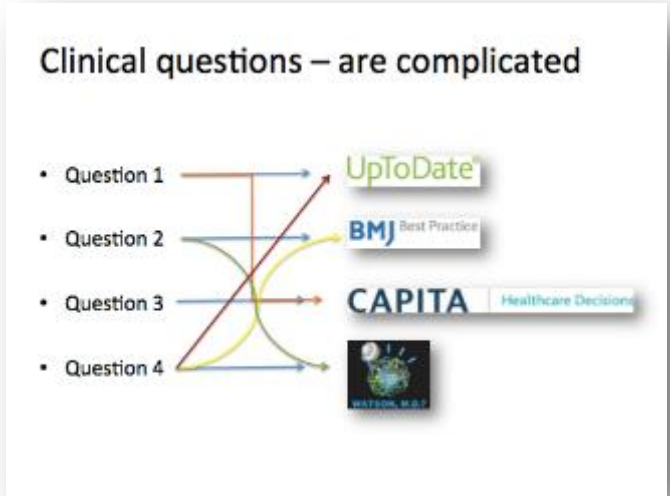
# Clinical questions

- Question 1
- Question 2
- Question 3
- Question 4

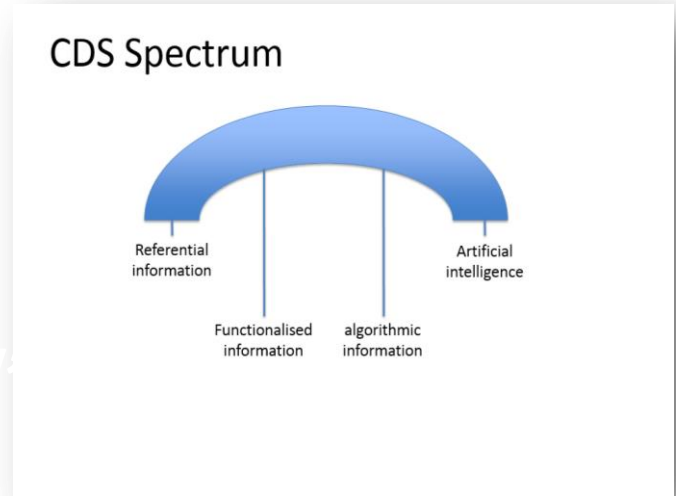


# Future – interactive

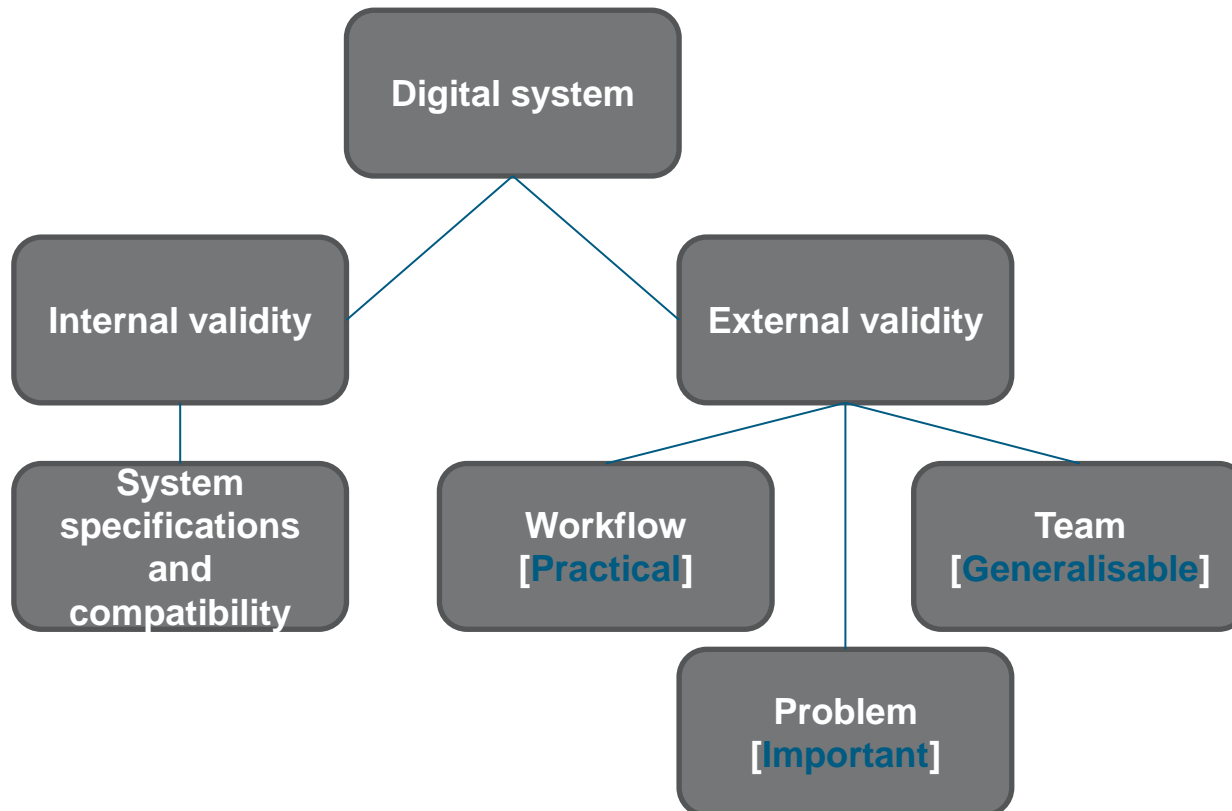
- No single perfect resource to deal with all clinical requirements
- Resource compatibility
- Resource interaction



***“Choice is crucial”***



# How do you appraise a digital solution?



# Future – patient data



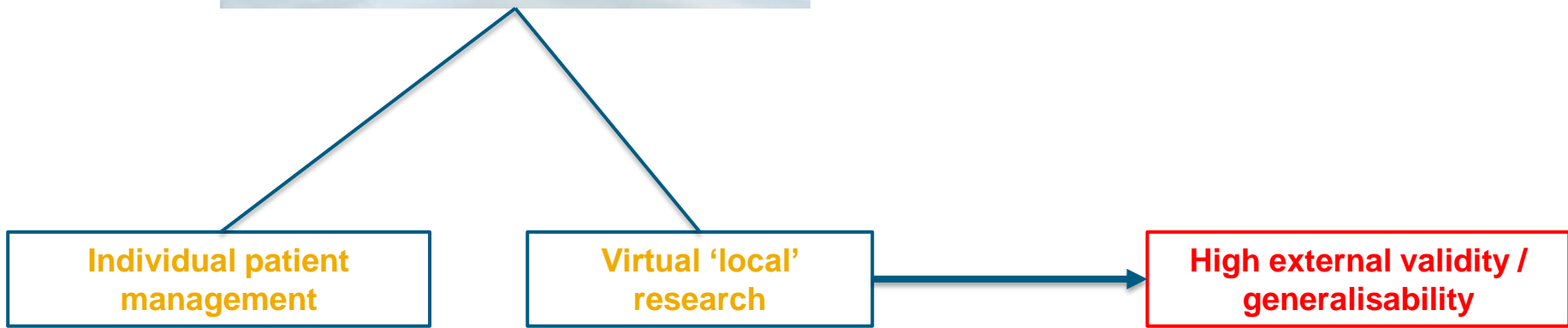
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# Conclusion



- Broad spectrum of CDS types
- Digitally mapping clinical pathways drives outcome improvement and resource conservation
- Future CDS solution-solution and solution-patient-data interaction crucial