CODEBOOK- Format

Attribute: Components

Concept	CODEBOOK DEFINITION	OPERATIONALIZATION – *"How-to"*	CONTEXT	RELATIONSHIP WITH UPTAKE
Components	Specific information content included in PG: PG may contain discharge criteria, immediate treatment flow, mild/moderate severity treatment, panic thresholds, strategies to minimize readmissions, severity scoring system, references, etc. (1, 2). Shaneyfelt et al's (2008) recommendations for guidelines - specify purpose, rationale, participants in development process, targeted health problem, targeted patient population, intended audience, etc.	**How-to:** • References, while important, are not necessary at the time of patient treatment (1). • Shortcuts in CPGs (and assessment of them) that do not highlight health conditions and interventions, patients and practitioners, and benefits and harms will leave the clinician open to misapplication of guidelines in clinical practice (3). • Overview material (structured abstract that includes the guideline's release date and print and electronic sources), name and institutional affiliation of adaptation panel; Introduction and background; Scope and purpose; Target audience of the guideline; Target population; Health questions; Recommendations (risks and benefits associated with the recommendations, specific circumstances under which to perform recommendations, strength of recommendations based on stated recommendation grading criteria if used); Supporting evidence and information for the recommendations (panel rationale behind the recommendations, presentation of additional evidence and/or the results of the updating process, how and why existing recommendations were modified; External Review and Consultation process (who was asked to review it, what process was followed, discussion of feedback and what was incorporated into the final document); Plan for scheduled review and update; Algorithm or summary document; Implementation considerations; Glossary; References; Acknowledgement of source developers; List of panel members and their credentials, declaration of conflicts of interest; List of funding sources; Appendix describing adaptation process (2). **Examples:** • We found that physicians find strategies to minimize readmits/encourage self-management and immediate treatment flows to be the most useful information content included in PG (1). • PG accompanied by a general introductory section that explains the need for the proposed guidelines and the process by which they were developed. This section informs those who review the document about the rationale for creating the proposed guidelines and the steps taken in their development (4).	**Medicine** (1-3) **Medicine/Psychology** (4)	• None.

Include Logo	Strategy to ensure recognizeability of guidelines include an abbreviated formats and consumer information, logo clearly displayed (5).	**Examples:** • Visual recognition of guideline documents within New Zealand appeared to be low with confusion.	**Medicine** (5)	• Confusion between evidence based guidelines and quasi guideline or other information produced and disseminated (5).
Abstract	To mean short precise with guideline information (i.e. "brief summaries") (6).	**How-to:** • Brief summaries or algorithms with links to more extensive explications of guidelines could present the most pertinent information concisely, while not compromising comprehensiveness (6).	**Medicine** (6)	• None.
Short summary of principal recommendations	Can be consulted in clinical practice, underpinned by detailed documentation about the process of guideline development and the scientific basis (7). There must also be a summary of the PG that can be easily read (8).	**Examples:** • Many detailed best practice guidelines will be pages long. In order for practitioners to follow the recommendations without difficulty, there must also be a summary that can be easily read (8).	**Medicine** (7) **Paediatrics** (8)	• Recommended summarizations help to create more clarity for patients (9).
Recommendation sets	Collections of decisions that are to be applied to specific situations or as processes that specify activities that take place over time. Recommendation sets are organized according to a computable formalism (10).	**Examples:** • Authors discuss recommendation sets as either consisting of "activity graphs" that represent guideline-directed processes or "decision maps" that represent a temporal recommendations or recommendations involving decisions made at one time point (10).	**Medicine** (10)	• None.
Key features	Recommendations that are essential to the whole guideline and to the ultimate goals (11). It is a central element in the guideline (12) and include those that have the most significance in the care of patients (13).	**How-to:** • Differentiating major recommendations from other recommendations (14).	**Medicine** (11-14)	• None.
Definitions	A definition of terms should be included, particularly when terms are not commonly used or when common usage varies or is imprecise. Definitions may be provided in the text or in a glossary of terms (4).	• None.	**Medicine/Psychology** (4)	• None.

CODEBOOK - Format

Attribute: Presentation

Concept	CODEBOOK DEFINITION	OPERATIONALIZATION – *"How-to"*	CONTEXT	RELATIONSHIP WITH UPTAKE
Presentation	**Presentation:** Clinical practice guidelines should be presented in a user-friendly format (14, 15), be clearly understandable (16, 17), provide summaries (18) and be able to convert to many formats such as paper or computerized-based (19).	**How-to:** • Using bullet points, heading, and boxes with key points to improve clarity (20-22). • Writing of summaries is mentioned in 4/6 handbooks. Algorithms are also useful tools that can improve guideline utilization (23). **Examples:** • Example: The BTS guideline's innovative stepped approach simplified classification and treatment of asthma. Thus, instead of a complicated disease with several treatment options (difficult), there were a few sub-diagnoses ('steps') with few treatment options (simple) (24). • Checklist for WHO treatment guidelines - presentation, clarity section (16). • Visual perspective: Refers to how a given visual representation changes the relationship between visual information and the decision maker. How to: It is determined by task variables, such as whether a representation can be manipulated by the user (i.e., its interactivity) and the extent to which a representation allows the user to see contextual and/or detail information (i.e., the depth of field). Task variables are general characteristics of information environments, including how much information is presented and how the decision maker can interact and respond to information. • The structure and format of the full guideline are at the discretion of the NCC, but core elements should be as follows: • a summary section containing: − all the recommendations, highlighting the recommendations that are key priorities for implementation and the reasons for selecting them. − the algorithm(s). • an introduction, containing information on: − funding. − GDG membership. − epidemiological data. − aim and scope of the guideline.	**Medicine** (14-20, 22, 24, 26)	• Computerization of CPG can improve their level of use and their impact on clinical practice (19).

			− scheduled review of the guideline. • a methods section, containing information on: − the literature search strategy. − how the evidence was reviewed and synthesized, including economic analysis. − any consensus techniques used that involved people outside the GDG − interpretation of the evidence and development of the recommendations. − other work relevant to the guideline (for example, related NICE guidance that has been published or is in preparation; related NHS documents). • chapters dealing with the review questions and the evidence that led to the recommendations, each with the following content: − review question(s) (PICO [patient, intervention, comparison and outcome] format). − evidence profile (modified GRADE profile, including summary of economic studies). − evidence statement (short text summary of the evidence on clinical and cost effectiveness). − 'evidence to recommendations' (structured summary of GDG discussions on the trade-off between benefits and harms, and consideration of economic evidence, in relation to policy, making clear the justification for the recommendation). − recommendation(s). − recommendations for research (if applicable). • references. • appendices, which should include: − declarations of interest. − review protocols. − details of search strategies. − evidence tables. − prioritization of research recommendations (25).		

Elements of Document Layout: Visual elements; Length

Concept	CODEBOOK DEFINITION	OPERATIONALIZATION – *"How-to"*	CONTEXT	RELATIONSHIP WITH UPTAKE
Ease of finding information	**Ease of finding information:** Once the information is at hand, how easy it is to find the knowledge needed in the resources is also important (27). **Visual priming:** • **Visual Priming**: Priming refers to changes in a person's ability to identify an object as a result of a specific prior encounter with the object. Visual priming refers to changes in a person's ability to identify an object as a result of a specific prior encounter with the visual displays associated with the object (i.e., visual priming enhances a person's awareness of an object by making the object more noticeable visually). Changes in a person's ability to identify an object as a result of a specific prior encounter with the visual displays associated with the object (28). o Categorical priming: **Categorical Priming**: Priming refers to changes in a person's ability to identify an object as a result of a specific prior encounter with the object. Categorical priming is one of different types of visual priming, which shares the same underlying mechanism as visual priming. Exposure to these types of visual priming increases the awareness of a primed object. Categorical priming focuses on categorical selections of information that prime awareness of this information (28). o Visual imagery: **Visual Imagery**: Pictures are extremely vivid stimuli compared to words *(29).* **Accessibility:** • Due to the short time frame and sheer volume of decisions (30), guidelines that are acceptable to clinicians must be easily accessible at precisely the right time (31).	**How-to:** • Road testing guidelines before publication can help identify impractical recommendations (5). • Visual priming enhances a person's awareness of an object by making the object more noticeable visually. Visual priming can influence how a person understands the information primed visually because awareness can activate previously learned knowledge about similar disclosure information thereby influencing the understanding of the information (28). • Use of numbered chapters and corresponding numbered headings helps readers to navigate the document. A maximum of four levels of numbered heading (for example, 2, 2.1, 2.1.4, 2.1.4.2) should be used in the full guideline. For unnumbered headings, use the same style (such as bold or italic) to denote the same level or type of heading in each section or chapter (25). **Examples:** • Research has also found that people often used a shortcut strategy, processing information based on the pieces of information most easily retrieved from previous knowledge (32). • Relevant content was often dispersed among different subsections throughout the report. Topics related to inhaled corticosteroids (ICSs) are treated in at least five separate sections, spanning more than 120 pages (33). • The PG does not have an index, so it is not possible to search the printed document by subject. The Table of Contents is highly detailed, but topics are listed in order of appearance, rather than alphabetically. For example, it is not possible to use the Table of Contents to locate a discussion about one of the most important concerns the site physicians had, which was how to determine the patient's current treatment step. The report is lengthy; because there is no index, it is difficult to locate the exact place where detailed information on a particular topic is discussed (33). • For quick reference, it is necessary to allow doctors to find essential information easily through quick scanning when they are meeting a patient and want to confirm something (34).	**Cognitive Ergonomics** (31) **Finance** (28) **Health Policy** (30) **Marketing** (35) **Medicine** (5, 27, 33, 36) **Psychology** (29)	• Format elements of implementability are those that influence accessibility and ease of use, which may overcome attitudinal barriers of guideline adoption, and appear to be important to all stakeholders (36). • When the information is primed visually, the information becomes more accessible and more likely to play a role in the subsequent understanding of the information (28). • Pictures are quicker and easier for consumers to process in a low involvement situation, and may attract consumer attention and set expectations for content (35).

Visual elements	Recall is better for verbal stimuli when the copy is on the right-hand side and better for non-verbal stimuli when it is on the left, which imply that to maximize consumers' recall, pictorial elements such as product photography should be positioned on the left-hand side of the package, and text on the right (35). The recall of package elements is likely to be influenced by their lateral position on the package as well as font size, and colour (35).	• None.	**Marketing** (35)	• None.
Length	**Viewing information: one screen** • Healthcare knowledge workers are used to dealing with large volumes of data. In general, these users prefer viewing more information on a screen over scrolling or paging for more information (37). **Concise:** • **Concise**: PG were designed, piloted and presented in a clear and concise format to improve readability (38). **Length:** • **Length**: Guidelines need to be short, succinct (6, 39) and not too long (40) with too much information due to time constraints on physicians (41-43). **Spacious layout:** • Attractively designed, user-friendly formats are advocated with spacious layout where possible (44).	**How-to:** • The majority of physicians preferred a guideline format that was short, concise, and easy to use, rather than a full text document (preferred by only 16% of physicians) (6). • The desire for short, succinct guidelines is of particular note because many published guidelines are presented as lengthy monographs (6). **Examples:** • Example: The modal response for the maximum text length of a guideline to which physicians would refer was **two pages.** Forty-nine percent stated that guidelines would ideally be available from a published compendium similar to Physician's Desk Reference. 43% of respondents reported that it would be useful if clinical guidelines were a component of an EMR (6).	**Medicine** (6, 38-41, 45) **Medical Computing** (37)	• Presentation of data in a way that facilitates assimilation and interpretation of the data is necessary and desirable (37). • PG were designed, piloted and presented in a clear and concise format to improve readability (38). • The volume of data may overwhelm the ability of the user to glean relevant and significant information (37).

Sub-attribute: Structure

Concept	CODEBOOK DEFINITION	OPERATIONALIZATION – *"How-to"*	CONTEXT	RELATIONSHIP WITH UPTAKE
Structure	**Structure**: High-level categorization of the components of a recommendation and how recommendations relate to each other (10).	**Examples:** • Information sheets: It should be easy to identify the topic of the sheet. The main topic of the sheet is conspicuously set at the top of the front page, and on the outer edge of the front and back of the sheet, referenced out in a white against the color used for the particular sheet (34). • In terms of the structure of the information, some participants mentioned the value of the color coding the summary, the stratification of the information, and the wealth of information (42).	**Design** (34, 42) **Medicine** (10)	• None.

Elements of Structure: Match the system to the real world; Ordering/Bundling

Concept	CODEBOOK DEFINITION	OPERATIONALIZATION – *"How-to"*	CONTEXT	RELATIONSHIP WITH UPTAKE
Match the system to the real world	**Match the system to the real world: i**t is best to use real-world conventions or natural mappings (46). **Approach to presenting info:** • **Approach to Presenting Recommendations**: Beginning with the presenting complaint is the best approach for clinical practice guidelines. This is because: (1) patients do not typically walk into offices with their diagnosis in hand; (2) misdiagnoses are unfortunately common; (3) focusing on procedures can be useful if the guideline is to detail how to do the procedure effectively (47). **Semantic presentation:** • **Semantic Presentation:** The presentation reflects the meaning of the data (37). Clear semantics for the representation constructs (10). • Requirement for a standardized way of representing the overall flow of recommendations (10). **Format for economic evaluations:** • The model should be structured so that the inputs, outputs, costs and consequences are relevant to the decision-making perspective (48) • **Formatting:** • Recommendations formatted in step-wise fashion to highlight how and when to deliver care (36).	**How-to:** • Using a "rewind" function on a computer to navigate backwards, as it replicates that which people are used to using for TV and stereo (46). • Guidelines most useful for the care of common occupational-related complaints focus on conservative care after excluding "red-flag" signs and symptoms. - In the context of occupational medicine (47). • This approach will yield benefits significantly exceeding the costs, both financial and in terms of risk to patient health. Medicine has sought to exclude serious disease first and then attempt to deal with whatever is left. These worse-case scenarios are relatively rare. The majority of presenting complaints are minor or self-limiting. Useful guidelines seek clues for serious disease through a careful focused history and physical examination. Testing is indicated only to confirm these findings not as a screening procedure (47). • Many authors believe that the societal perspective should be used in decision-analytic modeling studies. However, a narrower perspective such as of the relevant decision-maker can also be used as long as it is presented alongside the broader societal perspective (48). • Guidelines intended for immediate clinical use should present recommendations for all aspects of the clinical interaction, case and disability management, and functional recovery. This level of guideline should provide a brief but clear road map over time, from the initial visit to return to function, on the basis of the review for the evidence and professional consensus (47). **Examples:** • Guidelines that are found to be the most evidence-based and objective are hundreds of pages in length and would be extremely burdensome for the average family physician to use (49).	**Biomedical Informatics** (46) **Medicine** (10, 36, 37, 48) **Occupational Medicine** (47)	• None.
Differentiating formats	Dividing patients into specific subclasses (7).	**How-to:** • Rigorously evaluated guidelines have achieved success with a wide range of styles and formats (7).	**Medicine** (7)	• None.
Stepwise recommendation	Recommendations formatted in step-wise fashion to highlight how and when to deliver care (36).	• None.	**Medicine** (36)	• None.

Ordering/Bundling	**Sequential arrangement**: Due to a relevant limit in the span of immediate memory, a series of three series of three items, if grouped meaningfully, is easier to process than a single series of nine items (50).	**How-to: Encapsulation:** Knowledge encapsulation is a learning mechanism that can be defined as the subsuming or 'packaging' of lower-level, detailed concepts and their inter-relations, under a smaller number of higher-level concepts with the same explanatory power. Experts have many encapsulating concepts available, describing syndromes (i.e. groups of symptoms that collectively indicate or characterize a disease) or simplified causal mechanisms. This knowledge is often called clinical knowledge (as opposed to biomedical knowledge) and experts tend to use this kind of knowledge preferentially. Encapsulated knowledge is more readily assessed by doctors than biomedical knowledge. The recall protocols of experts contain more encapsulations than those of sub-experts [20]. The integration of biomedical and clinical science should not be left to the students but the encapsulation process should be supported by integrated teaching (51). **Examples:** • Bundling: Some car manufacturers "bundle" car maintenance into intervals for consumers and mechanics to make the servicing of the over 18,000 parts more manageable, and also to beat procrastination. Honda created a maintenance schedule that lumped all servicing into three "engineering intervals". This list was displayed on the wall of the reception room in the service department. It was simple to follow, but it was also a procrastination buster because it instructed customers to get their service done at specific times (external controls help people manage procrastination). "The lesson to learn from this experience is that bundling our medical tests (and procedures) so that people remember to do them is far smarter than adhering to an erratic series of health commands that people are unwilling to follow.." (52).	**Psychology** (50, 52)	• None.

Sub-attribute 3: Information Visualization

Concept	CODEBOOK DEFINITION	OPERATIONALIZATION – *"How-to"*	CONTEXT	RELATIONSHIP WITH UPTAKE
Information visualization	The presentation of information in visual form. It offers a way to shift cognitive load to the human perceptual system through graphics and animation. Involves the selection, transformation, and presentation of data (including spatial, abstract, physical, or textual) in a visual form that facilitates exploration and understanding. It can enlarge problem-solving capabilities by enabling the processing of more data without overloading the decision maker (53).	**How-to:** • How to: Visualization tools that use visualization techniques that include using color, size, shape, texture, orientation, and brightness to portray some dimensions; distortion approaches to highlight some data while providing context; graphic portrayals of hierarchical and network relationships; and interactivity. • What it does: May make it easier to see patterns and outliers, make certain information more salient and other information less salient, and show detailed information on specific alternatives or provide a context for evaluating focal information. This may improve decision quality. • Why it works: humans have evolved great visual and spatial skills, including the ability to detect edges and discontinuities, things that stand out, variations in color and shape, and motion; to recognize patterns; and to retrieve information using visual cues (54). This suggests that a solution to information overload could be to present information in ways that engage the use of the associative system, in which meaning is ascribed through gestalt and automatic processes, such as visual recognition. Information visualization leads to better, faster, and more confident decisions. • How to: Because consumers are likely to use the vividness and evaluability of attributes in a visualization to infer importance and are less likely to be able or motivated to change visual representations, default visualizations should be selected with care. This is particularly true when the intent is to aid consumer decision making (e.g., in choosing nutritious foods or a health care plan that meets people's specific needs). If determining a default representation is problematic (e.g., because consumers vary in their preferences), it may be preferable to build visual representations on the fly on the basis of questions that elicit preferences.	**Design** (53, 54)	• None.

Elements of Information Visualization: Information Display; Information Context

Concept	CODEBOOK DEFINITION	OPERATIONALIZATION – *"How-to"*	CONTEXT	RELATIONSHIP WITH UPTAKE
Information display	**Information Display:** Concerns how information is displayed to the decision maker, and can affect decision behavior (55). **Incomplete information**: another issue concerned with the display of information is the problem of partially described options (55). **Tables:** • Presentation of guideline information in table format (6). **Algorithm** A graphical description of evidence based narrative guidelines (17, 56) that put patient care into a sequence of binary (yes/no) decisions (57) that allow the problem solver to proceed with an efficient search of the problem at hand (58). An algorithm is a rule of procedure or set of instructions for solving a problem or accomplishing an objective (59). An algorithm is a flow chart of the clinical decision pathway described in the guideline in which decision points are represented by boxes linked by arrows (25). ○ <u>User friendly:</u> Good guidelines are clinically excellent guidelines that are readable (60) (61) by various users and not burdensome to use (44, 62, 63)Rosser, 2001 #377}(64). Guidelines should be presented in language and formats that can be read and understood by nonphysician reviewers, practitioners, and patients/consumers (65). ○ <u>Synchronous and asynchronous recommendation:</u> A sub-recommendation can be executed synchronously or asynchronously. A synchronous sub-recommendation means that the execution of the parent node is not completed until execution of the sub-recommendation is completed; Asynchronous sub-recommendation means that the parent node does not wait for the sub-recommendation to complete its execution, instead, management of is forked off as an independent process (10). **Pictures:** Pictures, other visual aids, and case scenarios may address different learning needs. "From an education stand point, you could easily look at a picture	**How-to (Tables):** • Flowcharts are good for communicating comparative data (the outcomes of one treatment over the other). Patients find that tables have the highest clarity, as compared to other communication formats. The risk of having a false positive is higher with a table than any other format (70). • Tables should be easy to understand and have clear, informative titles. Footnotes should be included only if they are essential for readers to understand the table. Comparisons within the table should compare like with like. Tables should be numbered sequentially and should be cited in the text, but information in a table should not be repeated in the text. Figures should also be numbered sequentially. Tables or figures from another source may only be reproduced only if written permission has been obtained, usually from the publisher. It must be stated in the full guideline that such permission has been received. A recommendation may include a small table to improve clarity; for example, to present information that should be shared with patients, or if the information is most easily understood when tabulated (25). **How-to (Algorithm):** • Use when: Algorithms are most useful when the decision logic of a guideline is complex and the temporal sequence of activities is unclear (56). • Example: algorithm was seen as a reminder tool for experts, whereas it was more useful for the GPs as a means to fill in gaps in knowledge and that as an aid in organizing their knowledge. Thus, GPs may require a guideline with a greater amount of detail than would experts (58). • How to: Brief summaries or algorithms with links to more extensive explications of guidelines could present the most pertinent information concisely, while not compromising comprehensiveness (6). • Clinical algorithms are intended to guide both physicians and their extenders (nurse practitioners and physician assistants) in the proper treatment of individuals with common medical disorders (17). • Algorithms are built on condition-based (branching) logic, in which the condition encountered at a decision node, or point of branching, determines the next step of	**Biomedical Informatics** (58, 67) **Management/ Psychology** (55) **Marketing** (35) **Medicine** (1, 10, 17, 45, 49, 57, 60, 62-65, 68) **Occupational Therapy** (61) **Psychology** (69)	Physicians consistently indicated that the most user-friendly PG formats are flowcharts/flow diagrams and algorithms (1). Tradeoffs: Because of the condensed nature of algorithms, they are often rigid and cannot provide the all the information present in text-based guidelines, which may be needed by non-expert physicians. Also, they may be seen as ambiguous because there is no room for explanation of counter-intuitive advice (58)(this problem could be solved by using links (see "how to" in the operationalization section). Attention to format is one of the most important aspects of guideline development, in that it may directly affect the extent to which the guidelines are read, remembered and used in practice (44). Graphics and Colour: Highly noticeable factors such as graphics and color becomes more important in choice of a low involvement product (72), but the behaviour of consumers towards high involvement products is influenced less by image issues (35). Algorithm flowcharts have been shown to be considerably clearer than algorithms in words only for communicating the conditional statements that constitute the underlying logic of most clinical algorithms and have become the recommended format for representing clinical algorithms clearly and succinctly.

and understand how subglottic drainage would prevent pooling of secretions in the back of the throat… I need to picture in my head to understand the concepts." (RT Educator) (66).

Graphical display

Graphical Displays: Graphical displays are a very short summary of the guideline text (67) that enhance further interpretation and clarity of the recommendations (68) in an intuitive way (69). Some graphics include bar graphs, pictographs and pie charts (69).

- Scrambled vs. ordered presentation:

  Based on Fuzzy Trace Theory, scrambled v ordered presentation of meaningful inputs has been predicted and shown to affect the readiness with which people extract the gist of those inputs (69). The theoretical principle applies that people easily and automatically estimate relative magnitudes perceptually, whether comparing relative heights of bar graphs, differently colored areas in a pie chart, or differently colored icons in a pictographs; (note: this was originally in "operationalization") (69).

- Good continuity of lines: The principle of good continuality can be applied to the problem of drawing diagrams consisting of networks of nodes and the links between them. It should be easier to identify the sources and destinations of connecting lines if they are smooth and continuous.

- Graphic aids: **Graphics and colour:** Graphics includes image layout, color combinations, typography, and product photography and the total presentation that communicates an image (35).

- Area Estimation: Rapid and accurate processing of area estimation. Fast area estimation can be done on the basis of either the color or the orientation of the graphical elements filling in a spatial region (53).

- Euler Diagrams: Euler diagrams (Venn diagrams are a sub-category of Euler Diagrams) are a powerful device for displaying the interrelationships among sets of data. A Venn diagram is a more restricted form of Euler diagram containing all possible regions of overlap (53).

the pathway. Algorithms can be represented in words only or in a flowchart format (59).

- Algorithms or care pathways, checklists, and patient information material are desirable. How a document is formatted may modify the way a message is conveyed. The adapted guideline needs to be formatted for its intended group (2).
- Conditions: Conditions are temporal patterns, sampled at a specified frequency, that need to hold at particular plan steps to induce a particular state transition of the plan instance. They are used for actual execution (application) of the plan. We do not directly determine conditions that should hold during execution; we specify conditions that active the change of a particular plan state (71).
- Flowcharts are good for communicating comparative data (the outcomes of one treatment over the other) (70).
- Algorithm flowcharts enhance the usefulness of the algorithm in a number of ways: (1) a flowchart provides a visual display of the branching logic of the algorithms, (2) working through the logic of the branching at the decision nodes reveals inconsistencies or omissions that may be obscured in an algorithm written in words only, (3) all the pathways in the algorithm logic can be traced to determine the appropriateness of the end points (59).
- Flowcharts are good for communicating comparative data (the outcomes of one treatment over the other). Patients find that tables have the highest clarity, as compared to other communication formats. The risk of having a false positive is higher with a table than any other format (70).

Attractively designed, user-friendly formats are advocated with spacious layout and use of graphic aids where possible (44).

How-to (Graphical Display):

- How to: *Stacked bar graphs* are better at conveying absolute risk (69).
- *How to: Simple bar graphs* are better at conveying relative risk (69).
- *How to: Line graphs* are typically the best choice when illustrating the effectiveness of a drug over time or other trends over time (e.g., survival and mortality curves) (69).
- Example: A good graphic should provide the means to read such additional information, for example clicking on a graphical element, the guideline text related to the element context should be displayed

	○ Words vs Images: Words should provide the general framework for the narrative of an extended communication. They can also be used for the detailed structure. Words are better for representing procedural information, logical conditions, and abstract concepts. Images are better for spatial structures, location and detail. Images and words in combination are often more effective than either in isolation.	(67). - How to: Visual displays that emphasize only the numerator (i.e., showing only adversely affected individuals) tend to increase risk-avoidant behaviors, whereas those that highlight both the numerator and denominator tend to decrease risk-avoidant behavior (69). - Background: The theoretical principle applies that people easily and automatically estimate relative magnitudes perceptually, whether comparing relative heights of bar graphs, differently colored areas in a pie chart, or differently colored icons in a pictographs (69). - The bar chart format was highly rated fro clarity by study participants and the most consistently interpreted data format but was not as successful as several others in accurately conveying outcome information (70). - Multimedia learning has been defined as learning or building mental representations, from both words and pictures and multimedia instruction as "presenting words and pictures that are intended to foster learning". Studies have consistently shown that students perform significantly better on problem-solving transfer tests with the use of both words and pictures than words alone, which is referred to as the multimedia principle and is the rationale for studying the use of multimedia as a basis for learning [157]. One important challenge when designing multimedia instruction is limiting the amount of cognitive load that is required to complete the task to develop meaningful learning, as there is always the possibility of cognitive overload because an individual's capacity for cognitive processing is limited. Based on the theory of multimedia learning, in order to minimize unnecessary cognitive load when designing and learning and instructional environments, the way in which individuals think and perform tasks in an environment needs to be taken into account (58). - There is a low risk of having a false positive when using a risk scale. Although the risk scale was ranked higher than bar charts and icon arrays in terms of clarity, it was the most inaccurately and inconsistently interpreted format (70). - Monotonic display variables naturally express relations such as greater than or less than if they have a direction that we associate with increasing value. For representing simple quantity, a mapping to any of the following attributes will be effective: size, lightness (on a dark background), darkness (on a light background), vividness of color, or vertical height above a ground plane. For each of		

these, an inverse mapping will lead to confusion (53).

- (Words vs. images)Information that specifies conditions under which something should or should not be done is better provided using text or spoken language. Visual information is generally remembered better than verbal information, but not for abstract images. Simple line drawings may be most effective for quick exposures. Frequent and explicit links between text and images can lead to better comprehension.

Examples:

- Example (for incomplete information), what happens when a subject is asked to evaluate alternatives on a set of dimensions but is not given complete information about the values for each alternative on various subsets of the dimension - subjects may infer the missing values, or avoid uncertainty by discounting partially described alternatives, of they will weigh common dimensions more heavily than unique dimensions because of cognitive ease of comparison or the contrary idea that dimensions that are occasionally unique may draw more attention (55).
- Example (algorithms) Data condensed into a more readable format and algorithms - In the context of occupational medicine (61).
- Example (scrambled vs. ordered presentation): Pictographs that display icons in a random rather than systematic fashion make it harder to "get the gist" that is, to judge relative magnitude (69).
- Example (scrambled vs. ordered presentation): This interfering effect on gist extraction of scrambling inputs rather than ordering them systematically has been replicated in a variety of tasks: in probability judgments, linear inferences, and false-memory tasks that involve getting the gist of a semantically related work list or set of sentences. Scrambling the inputs disrupts the representational momentum associated with encoding meaningfully related items (the tendency to see a meaningful pattern in related inputs increases with experience) (69).
- (Algorithm)The full and NICE versions of the guideline should contain an algorithm unless this is inappropriate for the topic (for example, most mental health topics). The algorithm may form the basis of the quick reference guide, and should be discussed by the lead editor and the NCC (and GDG members if appropriate) during the development of the guideline.
- Example of algorithm -Skeletal plans: Skeletal plans are plan schemata at various levels of detail that

		capture the essence of a procedure, but leave room for execution-time flexibility in the achievement of particular goals. Skeletal plans are reusable in different contexts. CGs can be viewed as reusable skeletal plans that need to be refined by a reactive planner over significant time periods when applied to a particular patient (71).		
Information context	**Vividness:** • Information that is likely to attract and hold our attention and to excite the imagination to the extent that is emotionally interesting, concrete and imagery provoking, and proximate in a sensory, temporal or spatial way (73). Preattentive processing determines what visual objects are offered up to our attention. ○ <u>Appropriate use of color:</u> • *For coding:* Red, green yellow and blue are the most valuable in coding data (53). • *Easy to remember*: Basic colours (green, red, yellow, blue) are easier to remember than non-basic colour (53). • *Fast to identify:* Colour contrast helps people quickly identify colours (53). • *Colour consistency:* A small set of standardized colors (also called colour pallet) (53). • *Colour Contrast:* For ease of comprehension, colors of objects should have strong contrast with the background (53). • *For the colour blind*: Yellow and blue are the best for coding for people who are colour blind. • *Number of colours* Between 5 and 10 (53). • *Colour sequence:* When difference in colours represents a sequence in order. (53). • *Field size:* The larger the area that is color-coded, the more easily colors can be distinguished (53).	**How-to:** • Vividness of information doesn't persuade unless elaborated upon. Instructions to elaborate may not be necessary when pictures are used to encourage elaboration (75). • (vividness-preattentive processing)Color, orientation, size, basic shape, convexity, concavity, and an added box around an object are all preattentively processed. Two factors important in determining whether something stands out preattentively: degree of difference of the target from the nontargets, and the degree of difference of the nontargets from each other. For example, yellow highlighting of text works well if yellow is the only color in the display besides black and white, but if there are many colors the highlighting will be less effective. **Examples:** • *Appropriate use of colour for coding:* This phenomenon is cross-cultural. The following 12 colours can be used: red, green, yellow, blue, black, white, pink, cyan, gray, orange, brown, purple (use the first six before any of the last six) (53). • *Easy to remember:* Orange, lime, green and other non-basic colours are not as easy to remember (53). • *Fast to Identify:* Subjects were asked to identify the presence or absence of a chip of a particular colour. The subjects took much longer if the chip was surrounded by distracting elements that were of a different color but belonged to the same color category than if the chip was surrounded by distracting elements that were a different colour (53). • *Colour consistency:* A color palette allows for consistency in color style across a number of visualization displays. Typically in design, you determine which limited number of colours you will use (53). • *(example of appropriate use of color)Different degrees of severity:* It should be easy to identify different degrees of severity where they exist.	**Marketing** (75) **Design** (53, 74)	• Vividness may influence persuasion only under conditions where vivid information is attended to more than non-vivid information (76).

	• *Text contrast:* The luminance difference between text and its background (53). • *Gray scales:* Colours that vary only based on the amount of white in them. Grey scales are colour palettes that use the following colours: white, black, and all shades of gray (53). • *Numerosity:* Numerosity is preattentively processed when the number of objects is 4 or less (53). • *Spatial proximity*: Spatial proximity is a powerful perceptual organizing principle and one of the most useful in design (53). • *Highlighting*: Adding marks to highlight something is generally better than taking them away. As a rule of thumb, to highlight an object, use whatever graphical dimension (color, texture, shape, etc.) is least used otherwise in the design (53). • Text size: Font should be easy to read (34). • Orientation steps: You can vary the orientation of objects to show difference or change (53). • Size steps: You can vary the size of objects to show difference or change (53). • Font: The selection and use of fonts, and the choices of sizes, styles, and tonal values, responds to the need to clearly distinguish levels of importance and units of meaning. **Framing** • How a given representation changes the reference point or scale against which information is evaluated (74). **Evaluability** • Refers to the ease with which information	Color coding: a scale caution/warning/danger (yellow/orange/red) associated with the notions of severity of the disease, and based on ISO standards for color coding for safety signs, id used to activate the visual aspect of the sheets and to call attention to levels of severity in a consistent way (34). • Each topic for an academic detailing sheet will have a distinct color. This color will be based on the color assigned to the corresponding disease in the Alberta Medical Association Guidelines, but a high perceptual performance expectation might require review of existing standards. • *Colour contrast:* It is advisable to have only a small set of color codes. A method for improving contrast is to place a thin white or black border around the color-coded object. For contrast, there should be both a significant hue and luminance difference (53). • *Field size:* Very small colour coded areas should not be used, to avoid small-field color blindness (53). • *Text Contrast:* For ease of reading, it is essential that text have a reasonable luminance difference from its background. The luminance ratio of text and background should be a minimum of 3, but 10 is recommended. The finer the detail, the greater the contrast required (53). • *Gray scales:* Gray scales are very unreliable as a method of conveying quantitative information (53). • *Colour sequence:* Color sequence combining variation in brightness, saturation, and hue was the most effective in a task requiring the rapid detection of low and high points in an image. Generally, the best way to achieve an effective color sequence is to place a good color editing tool in the hands of someone who understands both the data display requirements and the perceptual issues of color sequence construction (53). • *Numerosity*: We can tell at a glance, without counting, whether there are one, two, three, or four objects (53). • *Highlighting:* It is better to highlight a word by underlining it than to underline all the words in a paragraph except for the target word. Yellow highlighting of text works well for text that is		

	can be assessed and compared (74). **Depth of Field:** It is the extent to which visual representations provide contextual overview versus detail information or enable decision makers to keep both levels in focus at the same time.	black on white (53). • *Text size:* The authors chose a font with the following characteristics: a sans serif font; a font with eight different weights; has a consistent thickness, which facilitates use in small sizes without affecting the perception of individual elements of a letter; well-resolved endings, preventing confusion between letters (34). • Orientation steps: The number of orientation steps that we can easily distinguish is 4 (53). • Size steps: The number of size steps that we can easily distinguish is 4 (53). • *Framing*: What it does: By changing the presentation of a given problem, visual representations may accentuate biases and heuristics in decision making. Example: Smart-Money.com's MarketMap (Fidelity Investments 2006) presents daily gains and losses. Because daily losses are more frequent and dramatic than losses over longer periods, a daily presentation is more likely to show losses than a longer-term presentation. Because decision makers are often risk seeking for losses but risk averse for gains, visualization with a more recent reference point may lead investors to riskier behavior. Example: if foods marked as green are perceived as healthful and foods marked as red are perceived as unhealthful, the perceived difference between nutritional pie charts that are 75% green and 25% red versus 25% green and 75% red may be greater than that between black and white versions of the same information (74). • *Evaluability:* What it does: Making information easier to compare is likely to lead to increased acquisition, weighting, and processing of this information. How to: Tasks that are predominately spatial in nature include comparisons and assessments of trends, associations, and other relationships in the data. Primarily symbolic tasks include those that focus on discrete data values. Although the same information is presented, graphic presentations enhance the evaluability of spatial information, whereas tables (of numbers) enhance the evaluability of symbolic information. Example: a manager may be more likely to identify a competitor's product as a threat when viewing a visual representation that shows sales of his or her product and the		

		competitor's product over time than when viewing the same information in a table. In contrast, tabular representations are superior for retrieving specific data values (74). • *Depth of field:* What it does: Depth of field is likely to affect how information is accessed and evaluated. Example: Spotfire's zooming scrollbars enable marketers to change the level of detail to see characteristics of a specific item sold in a specific store on a specific day or to see sales of a product and those of its competitors in multiple retailers over time. More detailed views with more information on each alternative tend to limit the number of alternatives considered, leading to more alternative-based (compensatory) processing. Thus, a detailed view may lead a manager to focus on why sales were particularly high or low on a given day, whereas a context view may lead the manager to examine why sales have changed over time relative to competitive products. Tradeoff: whether combining context and detail is superior to either one alone depends on whether the goal is to maximize accuracy or minimize effort. Disadvantage: visual representations that provide detailed views of alternatives may lead decision makers to make incorrect evaluations by considering only a portion of the data.		

CODEBOOK - Format

Attribute: Versions

Concept	CODEBOOK DEFINITION	OPERATIONALIZATION – *"How-to"*	CONTEXT	RELATIONSHIP WITH UPTAKE
Versions	Levels of guidelines typically progress from a research-based, information-gathering and analysis tool (which can be used to understand the basis of the recommendations in detail), to a briefer guide for clinical education, to a short version for actual clinical use, and finally to a lay-language version for patient education and discussion (61) (this is evidence for multiple formats).	**Examples:** • Channel of communication: The way information is received. The most popular channel of communication was print, followed by PDA, individual respondents also gave high scores to RxFiles, contact with specialists, and role models. Some participants mentioned that ratings of the PDA were based in part on the assumption that the information being accessed would fit on the small screen (42). • The Quick Reference GuideQRG is a practical resource for healthcare professionals to use on a day-to-day basis. It presents the guideline recommendations in a concise, easy-to-use format, and is printed and distributed to healthcare professionals and managers in the NHS. It contains the key priorities for implementation verbatim, as well as a summary of the guideline recommendations. It usually includes all the recommendations, but occasionally highly specialized recommendations may be omitted, with signposting to the NICE version of the guideline for more details if needed (25, 77).	**Medicine** (25, 61, 77) **Design** (42)	• None.

Sub-attribute: Tailored; Document Type

Concept	CODEBOOK DEFINITION	OPERATIONALIZATION – *"How-to"*	CONTEXT	RELATIONSHIP WITH UPTAKE
Adaptive function of guidelines	Guideline delivery forms that are dynamically generated and adaptable to the specific expertise level of the user may be more effective at achieving a standard level of practice across providers with varying levels of expertise (58) It is the user's ability to change perspective. Interactive tools enable the user to restructure the representation of information by interactively changing which variables are shown, cut points for displaying variables, and whether particular variables are shown by colors or shapes (74). **Control over Content:** • Communication where consumer has control over content, order and duration or product relevant information (78). The ability to customize the system and information to satisfy his or her preferences (37).	**How-to (control over content):** • Interactive communication that gives consumers control over the content, order, and duration of product relevant information causes information to have higher value and to become increasingly usable over time. • Tradeoffs: The work also shows that there is a tradeoff since controlling information is shown to create demands on processing resources and therefore under some circumstances can have a detrimental effect on consumer's ability to utilise information (78). **Examples (control over content):** • The user should be able to custom tailor the presentation view (i.e., problem-oriented, chronological graphical, tabular), the interaction style (i.e. menu-drive, command-driven), and the interaction mode (i.e. expert system user, novice, etc.) (37). • Example: by rotating or simulating movement around an image. Sprint's (2006) 360-degree views of telephones and Volkswagen's (2006) full motion tour enable users to walk around or through a product. What it does: By enabling decision makers to restructure the information environment, interactive visualization tools (virtual reality) may create a better match between the task and the decision environment, which should improve decision quality and/or reduce the effort required. By making users more comfortable it can increase product trial and adoption. Interactivity distinguishes many current visualization tools from more traditional graphic representations (74).	**Medicine** (37, 58) **Psychology** (78) **Design** (74)	• (control over content)The experiments presented here demonstrate that control over the information control has a substantial impact on the consumers' ability to integrate, remember, and understand inputs to their judgments (78). • By giving users increased control over the information flow, interactive visualization tools have important implications for decision making (74).
Straightforward guidelines	• None.	**How-to:** • Details should be provided at various levels of granularity underlying the overt features such that guidelines are equally usable for generalists as well as specialists (study results) (58). **Examples:** • More straightforward guidelines with less detail up front could be designed for all physicians (58).	**Medicine** (58)	• None.
Context Sensitive	Information is presented in the context of the patient, the provider, and the task (37).	• None.	**Medical** (37)	• Shared context is key to the rapid and effective communication of information (37).
Patient Tailored	Text-based guidelines are not contextualized on a specific patient (67). GPs believe that it is their responsibility to adapt guidance to fit circumstances (39, 79).	**How-to:** • To tackle these problems, and produce patient-tailored suggestions, authors suggest computerizing guidelines (39, 67).	**Medicine** (39, 67, 79, 80)	• None.

		• These patient versions are lay translations of the clinical guidelines and are intended to act as a tool for healthcare professionals to use when discussing management and treatment options with patients and their families. SIGN plans to carry out an evaluation of these and if results are positive they will become integrated with SIGN methodology (80). **Examples:** • All SIGN guidelines now include an 'information for patients and carers' chapter, which highlight those issues where patients and their families will most likely require information to help them understand and cope with the diagnosis, treatment options and possible outcomes. This chapter is targeted at health professionals, to help them produce local evidence based information materials although patients and carers themselves may also find this chapter useful (80). • SIGN has introduced patient versions of the guidelines (80).		
Multiple formats	Presenting guidelines in multiple formats (i.e. algorithms, summary pages, paper versions, and/or electronic versions, etc.)(39) influence accessibility and ease of use, which may overcome attitudinal barriers of guideline adoption, and appear to be important to all stakeholders (36, 65, 81).	**How-to:** • Presenting guideline recommendations in multiple formats, such as algorithms, one or two page summaries and electronic web-based versions with hyperlinks to more detailed information might serve the varying needs of physicians and patients (39). **Examples:** • Guidelines using multiple formats had significantly higher mean domain scores for "rigour of development" compared with "paper-only" guidelines. Electronic formats (I.e. the use of hyperlinks) could help overcome difficulties with including all the necessary information (see domain availability of background information) and making guidelines "unweildy" and difficult to use (82).	**Medicine** (36, 39, 65, 81, 82)	• A combined format was preferred by 55% of the physicians surveyed in this study (6).
Supplementary Information	The inclusion of links, supplementary resources and patient handouts that clinicians can use if they wish following interaction with the guideline (31).	**Examples:** • We envision additional data that can be included to make the guideline's recommendation more meaningful. For instance, knowing details of the context of the visit can help determine the most appropriate mode of messaging (31). • Indicated that the executive summary enabled them to access the evidence quickly (83).	**Medicine** (31, 83)	• None.
Customizable	Details should be provided at various levels of granularity underlying the overt features such that guidelines are equally usable for generalists as well as specialists (study results) (58).	**How-to:** • Elements within Usability/Content domain: (1) Navigation example: table of content; (2) Evidence format, example: narrative, tabulated or both; (3) recommendation format example: narrative, graphic	**Engineering** (58, 84, 85)	• None.

		(algorithms) or both; (4) recommendation summary example: single list in full or summary version (84). **Examples:** • When checklists are sent from manufacturers to airlines, some airlines use them as-is, but most went on to make their own adjustments, so the checklists fit into their usual procedures (85).		

Sub-attribute: Modalities

Attribute	CODEBOOK DEFINITION	OPERATIONALIZATION – *"How-to"*	CONTEXT	RELATIONSHIP WITH UPTAKE
Electronic Guidelines	Electronic guideline, potentially integrated into an EMR (58). **Visibility of system status:** • This principle states that the user should be informed as to the state of the system at any given moment (46). **Prioritization:** • Ensuring the most important recommendations of the guideline were being followed (31). **Minimalist interface design:** • often the simplest and most minimal design options are often the best for ensuring usability (46). **Interface consistency and standards:** • The user interface and basic system operations should be consistent. Consistency also applies to the general layout and position on the screen of things like menus, exit buttons and other controls, use of standard terminology (46). Important for information presentation to be laid out consistently so that they are easier to understand and quicker (86). **Computability:** • Ease with which a recommendation can be operationalized in an electronic information system (87, 88). Recommendations should be straightforward enough that they can be transformed readily into the computer-based protocols and similar formats that can make the review process more efficient for all involved parties. **Flexibility**: To increase flexibility, an automated assistant should recognize cases in which the care provider's actions, although different from the guideline's prescribed actions, adhere to the overall intentions of the guidelines' designer (71). Flexible format to accommodate specific needs and circumstances (2). **Error Prevention:** • This principle states that designers should design interfaces that prevent error from occurring. 2 kinds of error: Slip - unintentional error; Mistake - error	**How-to:** • (electronic guidelines) The best way to present a guideline with different levels of granularity may be to have an electronic guideline that is integrated into an EMR (58). • (Visibility of system status) The user should know where he or she is in terms of carrying out a procedure using the system (e.g., if patient data are being uploaded, or if the system is currently processing in response to a user request for data retrieval). Users should know if an operation was successfully completed (e.g., a medication was discontinued in a computerized patient record system) or what additional steps are needed in order to complete a task successfully (46). • (prioritization) Although initial efforts tried to put too much corrective action into the algorithms recommendations, the experts ultimately focused on simply trying to ensure that the most important recommendations of the guidelines were being followed. This is opposed to specifying every medical decision related to the management of hypercholesterolemia or to replace the clinician or substitute for his or her medical education. Example: rather than recommend one particular drug (or drug class) over another, we decided to implement the more general reminder that the patient simply qualified for pharmacologic management (31). • (Minimalist interface design) Approaches to ensuring minimalist design include the "layering" of information, so that instead of providing too much complex information on one screen, information is layered into a number of simple and easier to understand screens (46). • (interface consistency and standards) Due to lack of consistency, users may end up being confused and find learning the basic operations of the interface more difficult than if consistent standards for carrying out such a basic operation were employed (46). • (Error prevention) includes simplifying screens, avoiding complex modes that may be confusing to users and testing interfaces to ensure that they are simple and easy to use (46). • (recognize, diagnose and recover from errors) Error messages should be phrased in clear and meaningful language and should be precise, constructive, and polite. If users make mistakes, there should be obvious	**Biomedical informatics/Cognitive Science** (46) **Cognitive Ergonomics** (31) **Medical Informatics** (58, 71) **Medicine** (2, 33, 66, 87-89)	• None.

	occurring from conscious deliberation (46). **Recognize, diagnose and recover from errors:** • If the user makes a mistake, the system should provide clear, easy to understand information about how to recover from error (46).	ways to correct them (46). **Examples:** • (electronic guidelines) With a written PG a clinician can still decide what is relevant to a particular patient and what to prioritize. With a computerized PG it is the computer that compares what is known about the patient with formalized knowledge and presents solutions, but without the clinician's ability to judge the quality of the data and the relevance to a particular patient at a particular time (17). Instead of simplifying the process, this gives the clinician a new task - they evaluate the computer's choices and decisions (89). • (minimalist interface design) adding many features and more items to a user interface will not necessarily make it easier to use and at some point detract from the system's overall usability. • All SIGN guidelines and quick reference guides, along with any updates to guidelines, are available free of charge on the SIGN website: www.sign.ac.uk. With advances in access to technology, and the increasing importance of currency of information, these electronic versions are now the definitive versions of SIGN guidelines. Paper copies will continue to be produced, but it is anticipated that the number of copies printed will be substantially reduced in coming years (80). • There were a number of necessary clinical tasks for which the EPR-3 provides no support. The EPR-3 does not address documentation activities, and it does not give explicit advice about what the patient should do in the case of an extreme exacerbation. It does not explicitly address situations in which the patient's resources limit the ability to execute its recommendations. The EPR-3 indicates that there are 2048 possible treatment plans for medication management, but describes 20-24 of them (33). • Providing guidelines on portable laptops or bedside computers improves access at the point of patient care and minimizes frustration searching for guidelines, especially when faced with an acutely ill patient. "You just look at it right online… you can see a picture online so it's much better than the paper... You can scan through it so fast and find what you need" (66). • Electronic methods were used less commonly than the traditional routes to the published evidence that may change over time, but we found not difference in Internet use to access evidence based PG by the health professionals across any of the settings; senior health professionals in any setting were not particularly proactive in seeking out PG on the Internet and relied on it being disseminated to them by post; 29% of GPs		

		used the Internet to access PG (90).		
Paper–based Guidelines	Text guidelines consist of the description of a procedure together with supporting information for the procedures, usually in forms of scientific evidence from clinical studies (58). **Clear, Laminated cards:** • Guidelines that come on clear, easy to follow laminated cards (91).	**Examples:** • (Paper-based guidelines) Research suggests that physicians do not use text-based guidelines at the point of care because they are very time consuming and are not suitable for just-in-time use. When they are used, it is probably when the physician has time to review the case, before or after the patient interviews. New forms of guidelines that are more readily accessible are needed (58). • (Clear laminated cards) SIGN guidelines are always very good because they come on clear to follow laminated cards, which are kind of summary versions of them. Many other guidelines are not so good…much longer and difficult to use (91).	**Medical Informatics** (58) **Medicine** (91)	• None.

References

1. Stone TT, Schweikhart SB, Mantese A, Sonnad SS. Guideline attribute and implementation preferences among physicians in multiple health systems. Quality Management in Health Care. 2005;14(3):177-87.
2. Brouwers MC, Stacey D, O'Connor AM. Knowledge Created: Knowledge Tools. In: Straus S, Tetroe JM, Graham ID, editors. Knowledge Translation in Health Care: Moving from Evidence to Practice. Oxford: Wiley-Blackwell Publishing; 2009. p. 34-45.
3. Hayward RSA, Wilson MC, Tunis SR, Bass EB, Guyatt G. Users' guide to the medical literature: VIII. How to use clinical practice guidelines. Are the recommendations valid? JAMA. 1995;274(7):570-4.
4. American Psychological Association. Criteria for practice guideline development and evaluation. The American Psychologist. 2002;57(12):1048-51.
5. McKinlay E, McLeod D, Dowell A, Marshall C. Clinical practice guidelines' development and use in New Zealand: an evolving process. The New Zealand Medical Journal. 2004;117(1199):U999.
6. Wolff M, Bower DJ, Marbella AM, Casanova JE. US family physicians' experiences with practice guidelines. Fam Med. 1998;30(2):117-21.
7. Grimshaw JM RI. Achieving health gain through clinical guidelines II: Ensuring guidelines change medical practice. Quality in Health Care. 1994;3:45-52.
8. Powell CV. How to implement change in clinical practice. Paediatric Respiratory Review. 2003;4(4):340-6.
9. Veldhuijzen W, Ram PM, van der Weijden T, Niemantsverdriet S, van der Vleuten CP. Characteristics of communication guidelines that facilitate or impede guideline use: a focus group study. BMC Family Practice. 2007;8(31).
10. Tu SW, Campbell J, Musen MA. The Structure of Guideline Recommendations: A Synthesis. AMIA Annual Symposium Proceedings. 2003;2003:679-83.
11. Foy R, MacLennan G, Grimshaw J, Penney G, Campbell MK, Grol R. Attributes of clinical recommendations that influence change in practice following audit and feedback. Journal of Clinical Epidemiology. 2002;55(7):717-22.
12. Grol R, Dalhuijsen J, Thomas S, Veld C, Rutten G, Mokkink H. Attributes of clinical guidelines that influence use of guidelines in general practice: observational study. British Medical Journal. 1998 Sep 26;317(7162):858-61. PubMed PMID: ISI:000076222300021. English.
13. Keeley PW. Clinical guidelines. Palliat Med. 2003 Jun;17(4):368-74. PubMed PMID: 12822854. Epub 2003/06/26. eng.
14. Vlayen J, Aertgeerts B, Hannes K, Sermeus W, Ramaekers D. A systematic review of appraisal tools for clinical practice guidelines: multiple similarities and one common deficit. International Journal for Quality in Health Care. 2005;17(3):235-42.
15. Graham ID, Calder LA, Hebert PC, Carter AO, Tetroe JM. A comparison of clinical practice guideline appraisal instruments. International Journal of Technology Assessment in Health Care. 2000;16(4):1024-38.
16. Oxman A, Schunemann HJ, Fretheim A. Improving the use of research evidence in guideline development: 16. Evaluation. Health Research Policy and Systems. 2006;4(28).
17. McDonnell Norms Group. Enhancing the use of clinical guidelines: a social norms perspective. Journal of the American College of Surgeons. 2006;202(5):826-36.
18. Turner T, Misso M, Harris C, Green S. Development of evidence-based clinical practice guidelines (CPGs): comparing approaches. Implementation Science. 2008;3(45).
19. Dufour JC, Bouvenot J, Ambrosi P, Fieschi D, Fieschi M. Textual guidelines versus computable guidelines: a comparative study in the framework of the PRESGUID project in order to appreciate the impact of guideline format on physician compliance. AMIA Annual Symposium Proceedings. 2006:219-23.
20. Grimshaw JM, Shirran L, Thomas R, Mowatt G, Fraser C, Bero L, et al. Changing provider behavior: an overview of systematic reviews of interventions. Medical Care. 2001.
21. Jackson R, Feder G. Guidelines for clinical guidelines. British Medical Journal. 1998;317:427-8.
22. Fontanesi J, Messonnier M, Hill L, Shefer A. A new model of adoption of clinical practice guidelines. Journal of Public Health Management and Practice. 2007;13(6):605-11.
23. Sackett D, Straus S, Richardson W, Rosenberg W, Haynes R. Evidence based medicine: how to practice and teach EBM. Edinburgh Churchill Livingstone; 2000.

24. Rashidian A, Eccles MP, Russell I. Falling on stony ground? A qualitative study of implementation of clinical guidelines' prescribing recommendations in primary care. Health Policy. 2008;85(2):148-61.
25. National Institute for Health and Clinical Excellence. The guidelines manual. London: National Institute for Health and Clinical Excellence, 2009.
26. Michie S, Lester K. Words matter: increasing the implementation of clinical guidelines. Qual Saf Health Care. 2005;14:367-70.
27. Connelly DP, Rich EC, Curley SP, Kelly JT. Knowledge resource preferences of family physicians. Journal of Family Practice. 1990;30(3):353-9.
28. Wang A, Dowding T. Effects of visual priming on improving web disclosure to investors. The Journal of Behavioral Finance. 2010;11(1):11-20.
29. Underwood RL, Klein NM, Burke RR. Packaging communication: attentional effects of product imagery. Journal of Product & Brand Management. 2001;10(7):403-22.
30. Walshe K, Rundall TG. Evidence-based management: from theory to practice in health care. Milbank Quarterly. 2001;79(3):429-57.
31. Maviglia SM, Zielstorff RD, Paterno M, Teich JM, Bates DW, Kuperman GJ. Automating complex guidelines for chronic disease: lessons learned. Journal of the American Medical Informatics Association. 2003;10(2):154-65.
32. Krosnick JA, Brannon LA. The impact of war on the ingredients of presidential evaluations: George Bush and the golf conflict. . American Political Science Review. 1993;87:963-75.
33. Bracha Y, Brottman G, Carlson A. Physicians, Guidelines, and Cognitive Tasks. Evaluation & the Health Profession. 2011;34(3):309-35.
34. Frascara J, Ruecker S. Medical communications and information design. Information Design Journal. 2007;15(1):44-63.
35. Silayoi P, Speece M. The importance of packaging attributes: a conjoint analysis approach. European Journal of Marketing. 2007;41(11/12):1495-517.
36. Gagliardi AR, Brouwers MC, Palda VA, Lemieux-Charles L, Grimshaw JM. An exploration of how guideline developer capacity and guideline implementability influence implementation and adoption: study protocol. Implement Sci. 2009 /;4:36.
37. Tang PC, Patel VL. Major issues in user interface design for health professional workstations: summary and recommendations. International Journal of Bio-medical Computing. 1994;34(1-4):139-48.
38. Wright J, Bibby J, Eastham J, Harrison S, McGeorge M, Patterson C, et al. Multifaceted implementation of stroke prevention guidelines in primary care: cluster-randomised evaluation of clinical and cost effectiveness. Quality and Safety in Health Care. 2007;16(1):51-9.
39. Lugtenberg M, Zegers-van Schaick JM, Westert GP, Burgers JS. Why don't physicians adhere to guideline recommendations in practice? An analysis of barriers among Dutch general practitioners. Implementation Science. 2009;4(54).
40. Moffat M, Cleland J, van der Molen T, Price D. Poor communication may impair optimal asthma care: a qualitative study. Family Practice. 2007;24(1):65-70.
41. Mazza D, Russell SJ. Are GPs using clinical practice guidelines? Australian Family Physician. 2001;30(8):817-21.
42. Ruecker S, Boessler B. Benchmarking design performance of selected Canadian academic detailing materials.: International Association of Societies of Design Research Conference; 2007.
43. Cabana MD, Rushton JL, Rush AJ. Implementing practice guidelines for depression: Applying a new framework to an old problem. General Hospital Psychiatry. 2002;24(1):35-42.
44. Grol R. Development of guidelines for general practice care. British Journal of General Practice. 1993;43:146-51.
45. Conroy M, Shannon W. Clinical guidelines: their implementation in general practice. British Journal of General Practice. 2005;45:371-5.
46. Kushniruk AW, Patel VL. Cognitive and usability engineering methods for the evaluation of clinical information systems. Journal of Biomedical Informatics. 2004;37(1):56-76.
47. Harris JS. Development, use, and evaluation of clinical practice guidelines. Journal of Occupational and Environmental Medicine. 1997;39(1):23-34.
48. Philips Z, Ginnelly L, Sculpher M, Claxton K, Golder S, Riemsma R, et al. Review of guidelines for good practice in decision-analytic modelling in health technology assessment. Health Technology Assessment. 2004;8(36):1-170.
49. Rosser WW, Davis D, Gilbart E. Assessing guidelines for use in family practice. The Journal of family practice. 2001;50(11):969.
50. Doumont JL. Magical Numbers: The Seven-Plus-or-Minus-Two Myth. IEEE Transactions on Professional Communication. 2002;45(2):123-7.
51. Schmidt HG, Rikers RM. How expertise develops in medicine: knowledge encapsulation and illness script formation. Medical Education. 2007;41(12):1133-9.

52. Ariely D. Predictably Irrational: The Hidden Forces That Shape Our Decisions. New York: Harper Perennial; 2009.
53. Ware C. Information Visualization. San Francisco: Morgan Kaufman; 2004.
54. Kosslyn SM. Elements of Graph Design. New York: W.H. Freeman; 1994.
55. Payne JW. Contingent decision behavior. Psychological Bulletin. 1982;92(2):382-402.
56. Rosenfeld RM, Shiffman RN. Clinical practice guideline development manual: a quality driven approach for translating evidence into action Otolaryngology Head Neck Surg. 2009;140(6 Suppl 1):S1-S43.
57. Woolf SH, Grol R, Hutchinson A, Eccles M, Grimshaw J. Clinical guidelines: Potential benefits, limitations, and harms of clinical guidelines. BMJ. 1999;318(7182):527-30.
58. Patel VL, Arocha JF, Diermeier M, How J, Mottur-Pilson C. Cognitive psychological studies of representation and use of clinical practice guidelines. International Journal of Medical Informatics. 2001;63(3):147-67.
59. Banks NJ. Constructing algorithm flowcharts for clinical performance measurement. International Journal for Quality in Health Care. 1996;8(4):395-400.
60. Grimshaw JM, Russell IT. Achieving health gain through clinical guidelines II: Ensuring guidelines change medical practice. Quality in Health Care. 1994;3(1):45.
61. Harris JS, Meuller KL, Low P, Phelan J, Ossler C, Koziol-McLain J, et al. Beliefs about and use of occupational medicine practice guidelines by case managers and insurance adjusters. . J Occup Environ Med. 2000;42:370-6.
62. Baldwin DS. Evidence-based guidelines for anxiety disorders: can they improve clinical outcomes? CNS Spectrums. 2006;11(10 (Suppl 12)):34-9.
63. Van der Weijden T, Grol R, Schouten B, Knottnerus JA. Barriers to working according to cholesterol guidelines A randomized controlled trial on implementation of national guidelines in 20 general practices. The European Journal of Public Health. 1998;8(2):113-8.
64. Wallin L, Bostrom AM, Harvey G, Wikblad K, Ewald UWE. National guidelines for Swedish neonatal nursing care: evaluation of clinical application. International Journal for Quality in Health Care. 2000;12(6):465-74.
65. Institute of Medicine. Guidelines for clinical practice: from development to use. Washington, DC: National Academic Press; 1992.
66. Sinuff T, Cook DJ, Giacomini M, Heyland DK, Dodek P. Facilitating clinician adherence to guidelines in the intensive care unit: A multicenter, qualitative study. Critical Care Medicine. 2007;35(9):2083-9.
67. Quaglini S, Ciccarese P. Models for guideline representation. Neurological Sciences. 2006;27(Suppl 3):S240-S4.
68. Swiglo BA, Murad MH, Schunemann HJ, Kunz R, Vigersky RA, Guyatt G, et al. A case for clarity, consistency, and helpfulness: state-of-the-art clinical practice guidelines in endocrinology using the grading of recommendations, assessment, development, and evaluation system. Journal of clinical endocrinology and metabolism. 2008;93(3):666-73.
69. Reyna VF. A theory of medical decision making and health: fuzzy trace theory. Medical Decision Making. 2008;28(6):850-65.
70. Dolan JG, Qian F, Veazie PJ. How well do commonly used data presentation formats support comparative effectiveness evaluations? Medical Decision Making. 2012;32(6):840-50.
71. Shahar Y, Miksch S, Johnson P. The Asgaard project: a task-specific framework for the application and critiquing of time-oriented clinical guidelines. Artificial Intelligence in Medicine. 1998;14(1-2):29-51.
72. Grossman RP, Wisenblit JZ. What we know about consumers' colour choices. Journal of Marketing Practice: Applied Marketing Science. 1999;5(3):78-88.
73. Nisbett RE, Ross L. Human inference strategies and schortcomings of social judgment. Englewood Cliffs. Englewood Cliffs, NJ: Prentice-Hall; 1980.
74. Lurie NH, Mason C. Visual Representation: Implications for Decision Making. Journal of Marketing. 2007;71.
75. McGill AL, Anand P. The Effect of Vivid Attributes on the Evaluation of Alternatives: The Role of Differential Attention and Cognitive Elaboration. Journal of Consumer Research. 1989;16(Sept 1989):188-96.
76. Taylor SE, Thompson SC. Stalking the elusive "vividness" effect. . Psychological Review. 1982;89(2):155-81.
77. Scottish Intercollegiate Guidelines Network. SIGN 50: A guideline developer's handbook. Edinburgh: Scottish Intercollegiate Guidelines Network, 2011.
78. Ariely D. Controlling the Information Flow: Effects on Consumers' Decision Making and Preference. Journal of Consumer Research. 2000;27(Sept):233-48.

79. Carlsen B, Glenton C, Pope C. Thou shalt versus thou shalt not: a meta-synthesis of GPs' attitudes to clinical practice guidelines. British Journal of General Practice. 2007;57(545):971-8.
80. Scottish Intercollegiate Guidelines Network. SIGN 50: A guideline developer's handbook. Edinburgh: Scottish Intercollegiate Guidelines Network, 2012.
81. Cabana MD, Ebel BE, Cooper-Patrick L, Powe NR, Rubin HR, Rand CS. Barriers pediatricians face when using asthma practice guidelines. Archives of Pediatrics and Adolescent Medicine. 2000;154(7):685-93.
82. Fervers B, Burgers JS, Haugh MC, Brouwers MC, Cluzeau F, Phillip T. Predictors of high quality clinical practice guidelines: examples in oncology. International Journal for Quality in Health Care. 2005;17(2):123-32.
83. Irving MJ, Tong A, Bychetnik L, Walker RG, Frommer MS, Craig JC. Nephrologists' perspectives on the effect of guidelines on clinical practice: a semistructured interview study. American Journal of Kidney Disease. 2010;55(2):241-9.
84. Gagliardi AR, Brouwers MC, Palda VA, Lemieux-Charles L, Grimshaw JM. How can we improve guideline use? a conceptual framework of implementability. Implementation Science. 2011;6:26.
85. Gawande A. The Checklist Manifesto: How to Get Things Right. New York: Metropolis Books; 2010.
86. Mitchell M, Papavassiliou V. Marketing causes and implications of consumer confusion. . Journal of Product & Brand Management. 1999;8(4):319-39.
87. Michie S, Johnston M. Changing clinical behaviour by making guidelines specific. British Medical Journal. 2004 02/07;328(7435):343-5.
88. Shekelle PG, Kravitz RL, Beart J, Marger M, Wang M, Lee M. Are nonspecific practice guidelines potentially harmful? A randomized comparison of the effect of nonspecific versus specific guidelines on physician decision making. Health services research. 2000;34(7):1429.
89. Rousseau N, McColl E, Newton J, Grimshaw J, Eccles M. Practice based, longitudinal, qualitative interview study of computerised evidence based guidelines in primary care. BMJ. 2003;326(7384):314.
90. Coleman P, Nicholl J. Influence of evidence-based guidance on health policy and clinical practice in England. Quality in Health Care. 2001;10(4):229-37.
91. Smith L, Walker A, Gilhooly K. Clinical guidelines of depression: a qualitative study of GPs' views. Journal of Family Practice. 2004;53(7):556-61.