PEER REVIEW HISTORY

ARTICLE DETAILS

TITLE (PROVISIONAL)	The role of intuitive knowledge in the diagnostic reasoning of hospital specialists. A focus group study
AUTHORS	Van den Brink, Nydia; Holbrechts, Birgit; Brand, Paul; Stolper, Erik; Van Royen, Paul

VERSION 1 – REVIEW

REVIEWER	Reviewer name: Dr Elaine Jefford Institution and Country: Southern Cross University -Australia Competing interests: None Declared
REVIEW RETURNED	29-Mar-2018

GENERAL COMMENTS	Thank you for asking me to review this manuscript. This paper reports on a study undertaken in two countries exploring if, when and how intuition is used by medical practitioners in their current practice. The topic area is pertinent to the health profession. I have a few suggestions which might enhance this paper: 1. Introduction – this requires a more extensive and analytical approach to the literature. 2. Result – This section needs revisiting as : a. Some quotes applied to categories do not marry with the authors claims – For example quote 3.3 is linked with intuitive process, yet when reading it, it appears to be sensory data collection of cues so not intuition as this forms part of medical clinical reasoning or hypothetico-deductive reasoning. b. Differences & Similarities between Specialists - This section needs great clarification – also empathy is implied to mean intuition – c. Defensive medicine – quote and text does not marry with authors claims – also the reference to EBM is not within the quote – an explanation on how intuitive knowledge is different from theoretical knowledge – the authors state intuition cant be taught theoretically – this was first cited in 1977 Dryfus & Dryfus and forms a large part of Benner 1984 work –and is the constant challenge in the literature still today. d. I am wondering if in this section you are saying is that a practitioner needs to support intuitive feelings with cue acquisition? e. Differences between 2 countries – quote does not support what is being claimed 3. Discussion – this requires a more extensive and analytical approach – also how many does “many participants” or ‘majority’ mean– use of such words needs clearly stating numercially

REVIEWER	Reviewer name: Mathieu Lorenzo Institution and Country: Department of General Practice, Faculty of Medicine, University of Strasbourg, Strasbourg, France – Center for teaching and research in medical education (CFRPS), University of Strasbourg, Strasbourg, France

	Competing interests: none declared
REVIEW RETURNED	03-Jul-2018

GENERAL COMMENTS	Thank you for this interesting research paper. I was surprised at first because I thought intuition to be universally admitted in literature among all health professions. However, your paper emphases on gut-feeling more than on general reasoning process and it adds new information on this topic. I guess you were limited to 30 references for this paper. This might explain why some you dismissed some useful papers like the one from Croskerry in 2009 (a universal model for diagnostic reasoning) or the one from Pelaccia in 2011 (An analysis of clinical reasoning through a recent and comprehensive approach: the dual-process theory). I also have a few questions and suggestions: -page 5, line 21: "They often make quick assessments of the seriousness of a patient's situation, in which intuitive knowledge may play a recognizable role". Is this a well-established fact from literature? No reference is cited here. -page 5, line 28: "Audio recordings of all discussions were transcribed verbatim and checked". What was checked? -page 6, line 40: Why indicate « hospital specialists » instead of participant? All participants were HS -page 13, line 13: Ref 27 seems to be wrong. Cite instead Health profession education Volume 3, Issue 1, June 2017, Pages 15-25. This citation seems also to be over-interpreted to me. General question: how did you introduce intuition and gut-feeling to the participants? reading a definition? General suggestion: you might make your research question more clear at the end of the introduction.

REVIEWER	Reviewer name: Lois Isenman Institution and Country: Brandeis University Competing interests: None declared
REVIEW RETURNED	06-Jul-2018

GENERAL COMMENTS	Comments on: The role of intuitive knowledge in the diagnostic reasoning of hospital specialists by Lois Isenman, PhD. This paper explores the reactions of groups of Dutch and Flemish hospital specialists to the idea that intuition and intuitive knowledge plays a role in their diagnostic activity. The authors compare their results to earlier studies of the same type with groups of GP. Although the current work is not groundbreaking, it is worthy of publication. The topic is important and the results are thought provoking. My comments are geared towards the possibility of increasing the depth of the paper-the analysis and the conclusions. One relatively trivial point: It would be useful to right up front define what a hospital specialist is in this context. I believe that the terminology may be different from country to country. Although it is possible to get the meaning from the paper, better to save the reader the uncertainty right from the beginning

	A logical problem: In the Introduction the paper states that both intuitive and analytic processes use/have access to the same information. (The reference given does not really address this problem, although it does address something else mentioned in the same sentence.) However in the Discussion the paper cites a dissertation that stresses the importance of implicit or tacit knowledge in intuitive processes. Tacit knowledge cannot function in analysis, because what cannot be stated consciously is not available for rigorous analysis. It might serve as an intuitive premise for analytic activity. It also might influence the choice of a premise for analysis—which complicates things even further if one is trying to assess the use of intuitive knowledge (Isenman, 2018). A more mitigated statement seems to be required about what knowledge is available to each of these so-called processes: Intuition-based processes appear to access the same knowledge base as analysis and they also may also have access to additional, implicit or other tacit information. A point that the paper does make very clearly is that type 1 processes are not homogeneous. This is of course a serious limitation of the dual-process view: There is rigorous conscious analysis and then everything else (as recognized by the catch-all term “non-analytic reasoning”). I will focus on what are clearly intuitive phenomena. Hunches, gut feelings, pattern recognition, and the feeling that something doesn’t fit, are related and they are not always completely distinguishable. But they are separable (Isenman, 2018). A hunch may be little more than a guess, gut feelings are largely based on past experience—and sometimes only recent past experience (Shia, 2005), pattern recognition includes, in addition to recognizing patterns based on past experience, the creation of de novo patterns. Gut feelings give less information and tend to carry less certainty than does actual pattern recognition, which generally comes with a sense of a specific meaning and also carries more certainty. Novel pattern formation creates new meaning and tends to come, to a greater or lessor extent, with the aha feeling. In this regard, I wonder if there is not something more systematic that can be pulled out of the data. Does the way the word intuition (or the word non-analytic reasoning) is interpreted by various participants in the groups have any relationship to their view of its trustworthiness? Whether or not there is more that can be pulled out of the data, given the diversity of types of experiences that fall under the rubric of intuition, it would seem that trying to come up with a standard definition of intuition in clinical diagnosis may not be a good idea and may be counter-productive. Rather I would recommend that students be taught the different ways intuition can partake in and guide clinical diagnosis in hospital settings. They should then be encouraged to reflect on their own experience in order to recognize these different processes in their diagnostic activity and keep tabs on the success rate of each for them personally. Isenman, L. Understanding Intuition: A Journey In and Out of Science. Cambridge MA: Academic Press, 2018

	Shia B, Lowenstein G, Bechara A, Damasio H, Damasio AR. Investment and the negative side of emotion. Psychol Sci 2005;16:435–9.

VERSION 1 – AUTHOR RESPONSE

Reviewer: 1

Reviewer Name: Dr Elaine Jefford

Institution and Country: Southern Cross University -Australia

Please state any competing interests or state 'None declared': None Declared

Please leave your comments for the authors below

Thank you for asking me to review this manuscript. This paper reports on a study undertaken in two countries exploring if, when and how intuition is used by medical practitioners in their current practice. The topic area is pertinent to the health profession. I have a few suggestions which might enhance this paper:

Thanks for your comments which enabled us to improve our manuscript. Please find below our replies.

1. Introduction – this requires a more extensive and analytical approach to the literature.

We have revised the introduction section and added some relevant references.

2. Result – This section needs revisiting as :

a. Some quotes applied to categories do not marry with the authors claims – For example quote 3.3 is linked with intuitive process, yet when reading it, it appears to be sensory data collection of cues so not intuition as this forms part of medical clinical reasoning or hypothetico-deductive reasoning.

Thanks for your question. The participant meant that a lot of data were automatically recorded, on an intuitive way. We explained this in the text of that section 'one specialist described it as a multisensory experience of intuitively received impressions of the patient.'

b. Differences & Similarities between Specialists - This section needs great clarification – also empathy is implied to mean intuition –

We understand your suggestion and we added an clarifying sentence. Empathy was not considered to be a kind of intuition but is a prerequisite for the use of intuition, according to the participant.

c. Defensive medicine – quote and text does not marry with authors claims – also the reference to EBM is not within the quote – an explanation on how intuitive knowledge is different from theoretical knowledge – the authors state intuition cant be taught theoretically – this was first cited in 1977 Dryfus & Dryfus and forms a large part of Benner 1984 work –and is the constant challenge in the literature still today.

Quote 6.2 mentioned 'the evidence from the literature' which is about EBM in our view. As to your second remark, it is about the text in the Medical Education section, we can only report what participants said and meant in the focus group discussion. So we did not state here that intuition cannot be taught theoretically; that was the view of (all) participants. We are familiar with the literature you mentioned and we agree upon your remarks about 'the constant challenge'.

d. I am wondering if in this section you are saying is that a practitioner needs to support intuitive feelings with cue acquisition?

We understand you indicated the Medical Education section. We have added some words to avoid misunderstanding.

e. Differences between 2 countries – quote does not support what is being claimed.

We changed the sentences a bit, clarifying what we found.

3. Discussion – this requires a more extensive and analytical approach – also how many does "many participants" or 'majority' mean– use of such words needs clearly stating numerically.

Thanks for your suggestions. In qualitative research, it is unusual to mention exact numbers as the numbers have much less power of evidence compared to quantitative research methods. In a qualitative research method such as in focus groups, researchers focus on the views of the participants regarding a specific topic and not on the exact numbers of views. For that reason we used terms like one, some and many to give a rough idea about how often an opinion was found in our data.

Reviewer: 2

Reviewer Name: Mathieu Lorenzo

Institution and Country: Department of General Practice, Faculty of Medicine, University of Strasbourg, Strasbourg, France – Center for teaching and research in medical education (CFRPS), University of Strasbourg, Strasbourg, France

Please state any competing interests or state 'None declared': none declared

Please leave your comments for the authors below

Thank you for this interesting research paper. I was surprised at first because I thought intuition to be universally admitted in literature among all health professions. However, your paper emphases on gut-feeling more than on general reasoning process and it adds new information on this topic.

I guess you were limited to 30 references for this paper. This might explain why some you dismissed some useful papers like the one from Croskerry in 2009 (a universal model for diagnostic reasoning) or the one from Pelaccia in 2011 (An analysis of clinical reasoning through a recent and comprehensive approach: the dual-process theory).

Thanks for your positive comments, and your suggestions. We added the reference of Pelaccia..

I also have a few questions and suggestions:

-page 5, line 21: "They often make quick assessments of the seriousness of a patient's situation, in which intuitive knowledge may play a recognizable role". Is this a well-established fact from literature? No reference is cited here.

Yes, it is a fact from literature. We added a reference (Wiswell et al 2013).

-page 5, line 28: "Audio recordings of all discussions were transcribed verbatim and checked". What was checked?

We checked for errors in the verbatim text; we now have explained it in the manuscript.

-page 6, line 40: Why indicate « hospital specialists » instead of participant? All participants were HS.

Yes, you are right. We changed the wordings.

-page 13, line 13: Ref 27 seems to be wrong. Cite instead Health profession education Volume 3, Issue 1, June 2017, Pages 15-25. This citation seems also to be over-interpreted to me.

In the cited article, based on the review study, the authors state that reflection in the diagnostic phase could be helpful. We adapted the reference.

General question: how did you introduce intuition and gut-feeling to the participants? reading a definition?

Thanks for your question. We did not use definitions. We now have mentioned this topic in the results, in the Differences between countries section.

General suggestion: you might make your research question more clear at the end of the introduction.

We changed the last sentences at the end of the Introduction.

Reviewer: 3

Reviewer Name: Lois Isenman

Institution and Country: Brandeis University

Please state any competing interests or state 'None declared': None declared

Please leave your comments for the authors below

Comments on: The role of intuitive knowledge in the diagnostic reasoning of hospital specialists by Lois Isenman, PhD.

-This paper explores the reactions of groups of Dutch and Flemish hospital specialists to the idea that intuition and intuitive knowledge plays a role in their diagnostic activity. The authors compare their results to earlier studies of the same type with groups of GP. Although the current work is not groundbreaking, it is worthy of publication. The topic is important and the results are thought provoking. My comments are geared towards the possibility of increasing the depth of the paper-the analysis and the conclusions.

Response: Thanks for your comments enabling us to improve the quality of our manuscript. We have tried to increase the depth of the paper. Please find below our replies.

-One relatively trivial point: It would be useful to right up front define what a hospital specialist is in this context. I believe that the terminology may be different from country to country. Although it is possible to get the meaning from the paper, better to save the reader the uncertainty right from the beginning.

Response:Yes, thanks, we have specified the term hospital specialist.

-A logical problem: In the Introduction the paper states that both intuitive and analytic processes use/have access to the same information. (The reference given does not really address this problem, although it does address something else mentioned in the same sentence.) However in the Discussion the paper cites a dissertation that stresses the importance of implicit or tacit knowledge in intuitive processes. Tacit knowledge cannot function in analysis, because what cannot be stated consciously is not available for rigorous analysis. 'It might serve as an intuitive premise for analytic

activity. It also might influence the choice of a premise for analysis—which complicates things even further if one is trying to assess the use of intuitive knowledge (Isenman, 2018). A more mitigated statement seems to be required about what knowledge is available to each of these so-called processes: Intuition-based processes appear to access the same knowledge base as analysis and they also may also have access to additional, implicit or other tacit information.

Response:Thank you very much for questioning of our theoretical starting points. Concerning reference 16, Norman et al literally wrote in their article that both analytical reasoning and non-analytical reasoning use the same knowledge base. In our view, that knowledge is a huge network with a lot of interlinked nodes, composed of medical knowledge such as evidence, contextual knowledge (everything a physician knows about the patient apart from the signs and symptoms) and experiential knowledge. Most of this knowledge is tacit, but can often easily be retrieved induced by a specific medical problem, e.g., by cues in the patient's history. Relevant tacit knowledge becomes automatically conscious knowledge, and so available for analysis of the medical problem. It depends upon the physician' knowledge and experience how accurately this automatic retrieval process of relevant knowledge will work out. In our view, there is no logical problem. However, apart from this specification, we do agree with you. We suppose that your 'intuitive premise' is a way to verbalize that knowledge intuitively emerges. We add some sentences concerning this topic in the Discussion.

-A point that the paper does make very clearly is that type 1 processes are not homogeneous. This is of course a serious limitation of the dual-process view: There is rigorous conscious analysis and then everything else (as recognized by the catch-all term "non-analytic reasoning"). I will focus on what are clearly intuitive phenomena. Hunches, gut feelings, pattern recognition, and the feeling that something doesn't fit, are related and they are not always completely distinguishable. But they are separable (Isenman, 2018).

A hunch may be little more than a guess, gut feelings are largely based on past experience—and sometimes only recent past experience (Shia, 2005), pattern recognition includes, in addition to recognizing patterns based on past experience, the creation of de novo patterns. Gut feelings give less information and tend to carry less certainty than does actual pattern recognition, which generally comes with a sense of a specific meaning and also carries more certainty. Novel pattern formation creates new meaning and tends to come, to a greater or lessor extent, with the aha feeling. In this regard, I wonder if there is not something more systematic that can be pulled out of the data. Does the way the word intuition (or the word non-analytic reasoning) is interpreted by various participants in the groups have any relationship to their view of its trustworthiness?

Thanks for your theoretical exercise. We are happy with it because we found the same diversity of terms you mention and will extend that section in our article. Upon till now we and others are focussing in our mind on the absolute value of e.g. gut feelings in the diagnostic process. What is the predictive value of gut feelings, of a hunch etc.? However, we think to have made a step forward by focussing on the significance of gut feelings in the diagnostic reasoning process. Does the physician take his gut feelings seriously? Do gut feelings act as an alert, inducing the physician to look better, to ask other questions, to formulate provisional hypotheses with potentially serious outcomes and to weigh them against each other? Sometimes the physician will become reassured based on new information, sometimes he/she decides that this patient requires specific management to prevent serious health problems. Perhaps it is not a big problem that the concept intuition is a bit vague but it will become a problem when the outcome of the intuitive process is ignored instead of integrated in the whole diagnostic reasoning process.

Whether or not there is more that can be pulled out of the data, given the diversity of types of experiences that fall under the rubric of intuition, it would seem that trying to come up with a standard definition of intuition in clinical diagnosis may not be a good idea and may be counter-productive. Rather I would recommend that students be taught the different ways intuition can partake in and guide clinical diagnosis in hospital settings.

They should then be encouraged to reflect on their own experience in order to recognize these different processes in their diagnostic activity and keep tabs on the success rate of each for them personally.

Response:We do agree with your opinion, thanks a lot. We adapted the text at the end of the Discussion section.

Isenman, L. Understanding Intuition: A Journey In and Out of Science. Cambridge MA: Academic Press, 2018

Shia B, Lowenstein G, Bechara A, Damasio H, Damasio AR. Investment and the negative side of emotion. Psychol Sci 2005;16:435–9.

VERSION 2 – REVIEW

REVIEWER	Reviewer name: Lois Isenman Institution and Country: Brandeis University, USA Competing interests: None declared
REVIEW RETURNED	24-Aug-2018

GENERAL COMMENTS	I find the much manuscript improved but still have several concerns. As a number of studies in the field of Implicit Learning as well as the Iowa Gambling Studies show, knowledge that is unavailable to awareness can influence gut feelings, and, as a result, decision making.--ie. diagnosis. Therefore I continue to have difficultly with the statement that both types of processes have access to the same information. Morevoer I have read the article that the authors cite again and I do not find confirmation for their statement. Perhaps I am missing it. Even if it does in some way imply it, I feel strongly it is wrong. Certainly some information that is potentially conscioius that informs judgement can do so from below awareness, but this is different from saying that all information that informs judgement can be brought to consciousness. Much of implicit learning is not avaialble to awarness. The kind of tacit information that can readily be brought to awareness is sometimes called preconscious to contrast it to information that is not or in some cases (or not yet) available to awarness. It would be easy enough for the authors to leave out this statement without any conscequences to the paper. My other continuing concern has to do with the section in the conclusions that says "... a Delphi procedure among hospital specialists could lead to a precise and valid description of intuitive processes in a hospital setting." Then 2 sentences later it says that "Nevertheless, it might not be a big problem that the concept intuition is a bit vague..." I am not clear whether this refers to the potential results of the a Delphi procedure, which would conflict with the goal of getting a precise description of intuition, or to what is initially presented to the participants. Perhaps the authors meant "abstract" instead of "vague" and perhaps an a Delphi procedure could reveal something close to the essence of intuition in a hospital setting. (I have my doubts, as I stated in my first go-around, but I am open to the possibility.) But then the following sentence, which I certainly do agree with, does not seem to fit this interpretation. The authors need to clarify this section.

VERSION 2 – AUTHOR RESPONSE

Reviewer: 3

Reviewer Name: Lois Isenman

Institution and Country: Brandeis University, USA

Please state any competing interests or state ‘None declared’: None declared

Please leave your comments for the authors below

I find the much manuscript improved but still have several concerns. As a number of studies in the field of Implicit Learning as well as the Iowa Gambling Studies show, knowledge that is unavailable to awareness can influence gut feelings, and, as a result, decision making.--ie. diagnosis. Therefore I continue to have difficultly with the statement that both types of processes have access to the same information. Morevoer I have read the article that the authors cite again and I do not find confirmation for their statement. Perhaps I am missing it. Even if it does in some way imply it, I feel strongly it is wrong. Certainly some information that is potentially conscioius that informs judgement can do so from below awareness, but this is different from saying that all information that informs judgement can be brought to consciousness. Much of implicit learning is not avaialble to awarness. The kind of tacit information that can readily be brought to awareness is sometimes called preconscious to contrast it to information that is not or in some cases

(or not yet) available to awarness. It would be easy enough for the authors to leave out this statement without any conscequences to the paper.

Response: Thank you very much for your comment and advice. Indeed it isn’t sure as Norman et al stated, that both types of processes have access to the same knowledge network or information. – and probably some information that informs judgment and gut feelings cannot be brought to consciousness. So we have skipped this statement in the introduction.

-My other continuing concern has to do with the section in the conclusions that says "... a Delphi procedure among hospital specialists could lead to a precise and valid description of intuitive processes in a hospital setting." Then 2 sentences later it says that "Nevertheless, it might not be a big problem that the concept intuition is a bit vague..." I am not clear whether this refers to the potential results of the a Delphi procedure, which would conflict with the goal of getting a precise description of intuition, or to what is initially presented to the participants. Perhaps the authors meant "abstract" instead of "vague" and perhaps an a Delphi procedure could reveal something close to the essence of intuition in a hospital setting. (I have my doubts, as I stated in my first go-around, but I am open to the possibility.) But then the following sentence, which I certainly do agree with, does not seem to fit this interpretation. The authors need to clarify this section.

Response:Thank you again for your question. We clarified this section by changing that specific sentence into ‘Although a precise definition of intuitive processes in hospital settings is lacking upon till now, ignoring the outcome of these processes instead of integrating them in diagnostic reasoning might be a more important problem’.

VERSION 3 – REVIEW

REVIEWER	Reviewer name: Lois Isenman Institution and Country: Brandeis University, USA Competing interests: none
REVIEW RETURNED	19-Dec-2018

GENERAL COMMENTS	Much improved from first go-around, and the authors have answered my concerns from the second go-around. Good addition to the literature on intuition. I did notice one typo--pg 14 (in stead for instead), and to my ears one sentence may have gotten a bit garbled or awkward in the editing. pg 11 line53-55. "It is induced by initially for the greater part unconsciously perceived cues ." Reads better as "It is induced initially for the greater part by---"