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After graduating with a degree in Pharmacology in 2002, Helen qualified as a RVN in 2005. She began a nine-year stint as a locum nurse working nationally and internationally, developing experience in referral medicine and surgery, charity practice, emergency nursing and exotics. During this time she spent five years on the BVNA council in a variety of roles, culminating in her being awarded honorary membership in 2016. In 2013 she qualified as a human-centred nurse. After two years working on intensive care, she moved to the transplant team supporting patients pre- and post-transplant. Currently she works at Addenbrookes Hospital, Cambridge on the Transplant High Dependency Unit. Helen remains a Registered Veterinary Nurse and has developed a strong interest in the principles of One Health and chairs the Veterinary Nursing Futures One Health Committee. She regularly lectures and writes about concepts and ways of working that may be shared between the professions to support clinical and professional practice. Her first textbook, on Veterinary Nursing Care Plans, was published earlier this year. She is currently working on an MSc in Healthcare Management.  
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# Early warning scores in the NHS: could they support early detection of deteriorating veterinary patients?

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**ABSTRACT:** Monitoring the clinical condition of a patient through measurement of physiological parameters is a crucial role of both veterinary and human centred nursing. Within the NHS, the use of Early Warning Scores (EWS) has improved patient outcomes through early detection and escalation of deteriorating patients. This article provides an introduction to EWS and challenges veterinary nurses to consider and critique this clinical decision-making tool within the context of their veterinary patients. It aims to support a broader One Health approach, whereby human-centred nursing is used as a resource to stimulate innovation within Veterinary Nursing.

**Keywords:** One Health; early warning score; NEWS; vital signs; clinical deterioration

## One Health

The concept of One Health, the collaboration between medical healthcare, veterinary healthcare and the environment is a growing subject within veterinary nursing. The veterinary media is full of examples of medico-veterinary collaboration, links with community groups and advances in veterinary practice that have been adapted from human-centred practice. One of the most unexpected elements of the recent VN Futures consultation was the high level of interest in One Health (VN Futures, 2016). VNs demonstrated they were aware of the potential benefits collaborative practice could bring to their animal patients and were keen to use their specialist skills in combination with the knowledge and skills of human-centred nurses to help their human clients.

Under the One Health umbrella, the veterinary nursing profession has the unique benefit of being able to learn from human-centred nursing by borrowing and adapting clinical tools. The adaption of the World Health Organisation Surgical

Safety Checklist is a key example where veterinary teams utilise a human-centred tool to prevent mistakes or omissions in practice that might compromise the safety of a patient. The use of nursing care plans, again adapted from human-centred healthcare, allows nurses to ensure patients are assessed holistically, their care planned, implemented and evaluated to achieve the best possible outcomes. Consultation models have been borrowed and adapted from human-centred practice to ensure appropriate questions are asked during veterinary appointments and new symptoms are not missed by veterinary professionals.

One of the most common tasks of a nurse, regardless of the species they are caring for, is to closely monitor their patient's clinical condition. Measuring physiological values creates a data set that nurses must take responsibility for; they must be able to fully comprehend the data, seek out patterns that might indicate deterioration and, crucially, escalate any concerns that the results stimulate. Human-centred nurses and veterinary nurses monitor

similar parameters within their patients. Typically, within human-centred nursing, this consists of heart rate, respiratory rate and systolic blood pressure, level of consciousness, oxygen saturation and temperature. Veterinary nurses usually monitor the same parameters, excluding oxygen saturation and blood pressure, due to the obvious complication of patient compliance.

### Early warning scores

Human-centred nurses in the National Health Service (NHS) use a specific clinical tool, the Early Warning Score (EWS) to assess physiological values. The EWS was designed to support the early detection of deteriorating patients so a timely escalation and reassessment can be made. It was introduced in response to poor clinical outcomes caused by a failure to notice the early signs of deterioration with an associated failure to escalate patients to higher levels of care, such as to a high-dependency unit or intensive care department (Patterson et al., 2011). The EWS assigns specific actions to values that deviate from normal. The greater the deviation of the observed data, the higher the level of intervention. As a primitive example, when data from a patient with tachycardia, a high respiratory rate and pyrexia is recorded on the EWS chart, the corresponding action point for this set of data will direct the nurse to call for a medical review. Alternatively, a patient with a small increase in respiratory rate and slight decrease in oxygen saturation will generate a lesser level of intervention, directing the nurse to increase the frequency of vital signs measurement.

Historically there have been many variations on this basic technique, broadly classified into single-parameter scores, multiple-parameter scores and an aggregate systems score (Patterson et al., 2011).

Veterinary nurses already use single-parameter scores where vital signs are measured against predefined thresholds or “normal range” of the vital sign and if they deviate from that “normal range” a response is prompted. Multiple-parameter systems require a deviation from the expected range in more than one parameter. Again, this is a system VNs are likely to be familiar with. A single peak in heart rate for a cat recovering from surgery with all other signs within the expected range is not likely to generate any further response other than to recheck vital signs sooner than originally

planned. However, if at the next check that cat still has a high heart rate, with the addition of a high respiratory rate and a decreased level of alertness, the appropriate action would be to perform a full assessment of the animal and escalate their care.

### Standardising early warning scores in the NHS

In 2012, a National Early Warning Score (NEWS), supported by the National Institute for Health and Clinical Excellence (NICE), was rolled out. This system was based on six simple physiological parameters,

1. respiration rate
2. oxygen saturation
3. systolic blood pressure
4. pulse rate
5. level of consciousness
6. temperature.

NEWS is an aggregate-weighted system still used throughout the NHS, where a

score is allocated to each parameter as it is measured, with the magnitude of the score reflecting how extremely the parameter varies from the norm (Royal College of Physicians, 2017). Figure 1 demonstrates the scores associated with each parameter. Figure 2 provides the detail of the relevant escalation points. Figure 3 demonstrates a NEWS observation chart, which directs staff to record the physiological parameters and calculate scores accordingly. The use of NEWS has been widely implemented, with 70% of NHS trusts using it (NHS England, 2017). There has been little standardisation, however, with evidence demonstrating a marked deviation in how these tools have been adapted and used within individual organisations (Gasper, 2018) This has resulted in a lack of familiarity when staff or patients moved between organisations. In December 2017 NHS England formally ratified the roll out of a modified NEWS across NHS England (NEWS 2) to standardise the approach to detecting and grading the severity of acute illness (Gasper, 2018). It is planned that by March 2019 it should be in place across

Physiological parameter	Score						
	3	2	1	0	1	2	3
Respiration rate (per minute)	≤8		9–11	12–20		21–24	≥25
SpO <sub>2</sub> Scale 1 (%)	≤91	92–93	94–95	≥96			
SpO <sub>2</sub> Scale 2 (%)	≤83	84–85	86–87	88–92 ≥93 on air	93–94 on oxygen	95–96 on oxygen	≥97 on oxygen
Air or oxygen?		Oxygen		Air			
Systolic blood pressure (mmHg)	≤90	91–100	101–110	111–219			≥220
Pulse (per minute)	≤40		41–50	51–90	91–110	111–130	≥131
Consciousness				Alert			CVPU
Temperature (°C)	≤35.0		35.1–36.0	36.1–38.0	38.1–39.0	≥39.1	

▲ Figure 1. The NEWS system.

NEW score	Clinical risk	Response
Aggregate score 0–4	Low	Ward-based response
Red score Score of 3 in any individual parameter	Low–medium	Urgent ward-based response*
Aggregate score 5–6	Medium	Key threshold for urgent response*
Aggregate score 7 or more	High	Urgent or emergency response**

\* Response by a clinician or team with competence in the assessment and treatment of acutely ill patients and in recognising when the escalation of care to a critical care team is appropriate.

\*\*The response team must also include staff with critical care skills, including airway management.

▲ Figure 2. The NEWS thresholds and triggers.

NEWS key		FULL NAME													
0	1	2	3	DATE OF BIRTH						DATE OF ADMISSION					
	DATE													DATE	
	TIME													TIME	
<b>A+B</b> Respirations Breaths/min	≥25													≥25	
	21-24													21-24	
	18-20													18-20	
	15-17													15-17	
	12-14													12-14	
	9-11													9-11	
≤8													≤8		
<b>A+B</b> SpO <sub>2</sub> Scale 1 Oxygen saturation (%)	≥96													≥96	
	94-95													94-95	
	92-93													92-93	
	≤91													≤91	
<b>SpO<sub>2</sub> Scale 2+</b> Oxygen saturation (%) <small>Use Scale 2 if target range is 88-92%, eg in hypercapnic respiratory failure</small>	≥97 on O <sub>2</sub>													≥97 on O <sub>2</sub>	
	95-96 on O <sub>2</sub>													95-96 on O <sub>2</sub>	
	93-94 on O <sub>2</sub>													93-94 on O <sub>2</sub>	
	≥93 on air													≥93 on air	
	88-92													88-92	
	86-87													86-87	
	84-85													84-85	
≤83%													≤83%		
<small>ONLY use Scale 2 under the direction of a qualified clinician</small>															
<b>Air or oxygen?</b>	A=Air													A=Air	
	O <sub>2</sub> L/min													O <sub>2</sub> L/min	
	Device													Device	
<b>C</b> Blood pressure mmHg <small>Score uses systolic BP only</small>	≥220													≥220	
	201-219													201-219	
	181-200													181-200	
	161-180													161-180	
	141-160													141-160	
	121-140													121-140	
	111-120													111-120	
	101-110													101-110	
	91-100													91-100	
	81-90													81-90	
	71-80													71-80	
61-70													61-70		
51-60													51-60		
≤50													≤50		
<b>C</b> Pulse Beats/min	≥131													≥131	
	121-130													121-130	
	111-120													111-120	
	101-110													101-110	
	91-100													91-100	
	81-90													81-90	
	71-80													71-80	
	61-70													61-70	
	51-60													51-60	
	41-50													41-50	
	31-40													31-40	
≤30													≤30		
<b>D</b> Consciousness <small>Score for NEW onset of confusion (no score if chronic)</small>	Alert													Alert	
	Confusion													Confusion	
	V													V	
	P													P	
	U													U	
<b>E</b> Temperature °C	≥39.1°													≥39.1°	
	38.1-39.0°													38.1-39.0°	
	37.1-38.0°													37.1-38.0°	
	36.1-37.0°													36.1-37.0°	
	35.1-36.0°													35.1-36.0°	
≤35.0°													≤35.0°		
<b>NEWS TOTAL</b>														<b>TOTAL</b>	
Monitoring frequency														Monitoring	
Escalation of care Y/N														Escalation	
Initials														Initials	

National Early Warning Score 2 (NEWS2) © Royal College of Physicians 2017

Figure 3. NEWS observation chart.

all hospitals and ambulance services in England. The Royal College of Physicians (RCP) believe that if NEWS is used as a standard system across NHS England, potentially 2000 lives could be saved (NHS England, 2017).

## Benefits of NEWS

Evidence supports the use of NEWS. It has been concluded that it has provided an enhanced level of surveillance of patients, with an emphasis on detecting those at risk of deterioration (Smith et al., 2013). In their recent report on NEWS, the RCP outlines how the NEWS has now been widely validated in many settings within the NHS. Evidence has demonstrated that NEWS has been shown to be a strong indicator of increased risk of serious clinical deterioration and mortality in patients with sepsis, a variety of medical illnesses, surgical patients and patients with acute trauma (RCP, 2017).

From a nursing perspective there are three key benefits of using NEWS. First, the NEWS explicitly highlights changes in a patient's condition, providing easy-to-read, comparable data that can highlight a deteriorating patient quickly and easily. Second, NEWS acts as a clinical decision-making tool. It assists nurses to decide what action they should take when a patient's vital signs are different to the predicted physiological range. Both of these benefit the patient, whose condition is more likely to be attended to in a timely manner. The third advantage of the routine use of NEWS is the educational and supportive role such a tool can have. The provision of explicit instructions for a student or inexperienced nurse based on the physiological values they have obtained from their patient may provide them with the confidence to advocate for their patient's needs. Taking this a step further, the author has experience of automated NEWS scores, where parameters are set so that when data are entered onto the computer system, if the values trigger an alert, an automatic referral is made to members of the multidisciplinary team, be it the nurse in charge, the doctor in charge, or a direct referral to the critical care unit (depending on the severity of the alert). Such a system should, in theory, provide a fail-safe way of escalating the care of patients who are becoming critically ill.

## NEWS and veterinary nursing

So, at this stage, the key question is, could an Early Warning Score be useful in veterinary nursing practice? In practice, veterinary nurses are more likely to be assessing a diverse range of patients, both differing species and conditions with associated variation in physiological values. There is an argument that standardisation of vital signs parameters could do more harm than good. While the use of a national, standardised system might not be either practicable or relevant, there are aspects of nursing a patient when such a system might potentially be useful.

Just as with human-centred nursing, providing an aggregate scoring system designed by and for a specific practice team could enhance the care of critically ill patients through early detection of deterioration. The use of such a tool may assist a veterinary nurse to make clinical decisions regarding the need to escalate their concerns, and if working out of hours contact the relevant veterinary surgeon. More effective clinical decision-making could lead to earlier interventions and the prevention of further deterioration, improving patient outcomes and patient safety. Additionally, the benefits relating to student nurses, or those inexperienced in clinical practice, are likely to be transferable to student and inexperienced VNs.

Knowing and understanding how NEWS has improved patient outcomes within the NHS emphasises the importance of vital signs in detecting a deteriorating patient, something that is equally applicable to veterinary patients. The NEWS tool might be modified with a threshold range assigned to specific physiological parameters relevant for an individual patient and their associated condition. A simple example would be the monitoring of urinary output after bladder surgery. Using the basic principles of an Early Warning Score might stimulate a VN to discuss expected values with the on-call veterinary surgeon and as part of a robust nursing care plan, document appropriate parameters with associated action points should the patient's data fall out of those parameters. This might be particularly relevant for VNs caring for unfamiliar species, or after specific surgery.

## Clinical judgement

The crucial point with Early Warning Scores, whether they be standardised throughout the NHS or utilised for specific patients within veterinary practice, is that they must not take the place of clinical judgement.

Within human-centred nursing, not all critically ill patients flag up an alert on the NEWS. Patients suffering from myocardial infarction may not generate any warning scores (Fox & Elliot, 2015), their blood pressure can be dangerously high and accompanied by acute onset chest pain, but no score is assigned to hypertension or pain. Nurses need the confidence in their own clinical judgement to escalate their concerns for patients using the NEWS as an adjuvant rather than the primary tool. There is also evidence of the NEWS system stimulating false referrals; physiological data collected from extremely fit military personnel has generated consistent alerts, often due to low resting heart rates that are normal for that person (Collins, 2018). The danger of such false referrals is alert fatigue, where nursing staff miss other critical elements of vital signs in their haste to assume the alert is a false positive. A similar analogy may exist within veterinary nursing and breed-specific parameters; the greyhound, for example, or extremely fit working dogs. Just as NEWS is only relevant to adults over the age of 16, with paediatrics and obstetrics having their own systems, a veterinary NEWS would require species-specific parameters and potentially even breed-specific parameters.

The clinical context of all vital signs data must be known and understood. Within veterinary nursing, prey species may exhibit abnormal vital signs simply due to fear and stress, the same with nervous dogs and cats not used to being taken out of their usual environment. How would such Early Warning Scores be able to take that into account? In this instance the same applies to people: white coat syndrome, the artificial elevation of blood pressure, has led to clinical guidelines advocating that anti-hypertensive medication should only be initiated once an at-home 24-hour blood pressure monitor has detected consistent hypertension. An Early Warning Score cannot take into account the fact that a patient, unbeknown to the nurse taking their vital signs, has just been working



with the physiotherapist and therefore has a higher respiratory and heart rate. NEWS will simply indicate the need for escalation.

Despite the caveats mentioned, the evidence is unequivocal that the NEWS has improved patient surveillance and detection of deteriorating patients, potentially saving many lives (RCP, 2017). Such data are impressive and as veterinary nursing moves forward within the One Health initiative, perhaps, like the Surgical Safety Checklist, it is worth thinking about Early Warning Scores for animals to see if similar benefits might be obtained.

## Disclosure statement

No potential conflict of interest was reported by the author(s).

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## Multiple Choice Questions

- Early warning scores are used in the NHS to assess which one of the following?
  - Patient feedback on their perceived standard of care
  - Hospital acquired infection rates
  - Physiological parameters
  - Staff morale in the workplace
- When was a standardised approach to early warning scores rolled out nationally in the NHS?
  - 1982
  - 1992
  - 2002
  - 2012
- How many parameters are assessed using the national early warning scores?
  - 4
  - 6
  - 10
  - 12
- According to the national early warning scores thresholds and triggers, what is the clinical risk associated with an aggregate score of 5?
  - Low
  - Low-medium
  - Medium
  - High
- The use of the national early warning scores have been implemented in approximately what percentage of NHS trusts?
  - 30%
  - 50%
  - 70%
  - 90%
- Which of the following are potential benefits of using national early warning scores?
  - Highlighting a change in a patient's condition
  - Clinical decision-making tool
  - Educational and supportive tool
  - All of the above
- Early warning scores must not take the place of clinical judgement
  - True
  - False
- The national early warning scores are only relevant to which one of the following patient groups?
  - Patients over the age of 16
  - Paediatric patients
  - Neonatal patients
  - Young adolescent patients

For the answers to the MCQs, please go to: <http://www.bvna.org.uk/publications/veterinary-nursing-journal>