


Registered Nurses' experiences of using a clinical decision support system for triage of emergency calls: A qualitative interview study

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Funding information

Financial support for manuscript preparation, revision, and open-access publication was provided by the Swedish Agency for Innovation (<https://www.vinnova.se>, grant number 2017-04652).

Abstract

Objectives: To describe how Registered Nurses make use of a Clinical Decision Support System to triage calls to emergency medical dispatch centres, from the perspective of professional autonomy.

Design: The study had a descriptive design with a qualitative inductive approach.

Methods: Interviews were done with 24 Registered Nurses during 2018–2019. Thematic analysis was conducted.

Results: Five themes and 16 subthemes were established: (a) Using the CDSS as a general support to professional competence in emergency calls, including subthemes: *Support for professional competence, an aid to reflection, a compulsory support*; (b) A specific support useful in difficult situations and calls, with subthemes: *RN being tired or stressed out; vague and unclear symptoms, rare situations, aggressive and agitated callers*; (c) Using the CDSS but changing triage recommendations/priority, including subthemes: *Recommending a higher priority than the CDSS and recommending a lower priority than the CDSS*; (d) Development areas for better use of the CDSS in collaboration with other services, with subthemes: *Request for common documentation system with ambulances and closer collaboration with the national telephone nursing helpline*; and (e) Possible technical development areas in the CDSS for optimal use, including subthemes: *image transfer, medical records, development of certain areas in the CDSS, update of maps, a need for more knowledge*.

Conclusion: The CDSS was not perceived as a restriction on professional autonomy. It was particularly useful in rare situations. Technical improvements as well as education and training should be done in close collaboration with registered nurses.

Impact: The study contributes with knowledge about how registered nurses triaging emergency calls use a decision support system. The system was a support for professional competence and did not seem to restrict them. The findings could be useful for clinicians and researchers in development of telephone triage and decision support systems.

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KEYWORDS

emergency calls, emergency medical dispatch, qualitative interviews telephone triage, registered nurses, thematic analysis

1 | INTRODUCTION

At Emergency Medical Dispatch Centres (EMDCs) in Sweden, the triage of calls is performed by either Registered Nurses (RNs) or dispatchers. This study focuses on RNs work at EMDCs. Their work is often challenging due to a lack of visual cues, limited knowledge of the patient, higher likelihood of severe illness and time pressure (van Galen & Car, 2018; Holmström & Höglund, 2007), and a fear of making wrong decision (Ek & Svedlund, 2014). To support triage, Clinical Decision Support Systems (CDSS) are commonly used (Holmström, Gustafsson, Wesström, & Skoglund, 2019; Lugtenberg, Weenink, van der Weijden, Westert, & Kool, 2015). These are often “expert systems,” consisting of a set of predetermined assessment rules. To date, little is known about RNs work at EMDCs including the use of CDSS and how their autonomy and clinical decision-making is affected by CDSS use.

1.1 | Background

Healthcare providers have traditionally been granted a high degree of autonomy due to their unique knowledge and professional ethics (Rothstein, 2001) and their autonomy is guaranteed by the state through a credentialing process (Burrage, Jarausch, & Siegrist, 1990). Autonomy here refers to the freedom of professionals to act in accordance with their own professional judgement and may be divided in two categories for analysis: Clinical autonomy, or *internal autonomy* and *external* autonomy (Freidson, 1994). *Internal autonomy* is an expression of the individual clinician's ability to guide and control the patient encounter. The RN's right to interpret patient care needs and design a care plan according to the nursing process (Henderson, 1982) is an expression of the patient's and society's trust in their work. *External autonomy* is manifested in the RNs' right to organize their own work, for instance, through their supervision of other professionals and organizing working conditions and schedules. The underlying theoretical question posed in this study is, thus, whether the use of CDSS is perceived as an infringement on RN autonomy in the context of EMDCs.

The literature on RNs use of CDSSs is limited, especially regarding potential deskilling and autonomy. Leppänen (2010) found that RNs conducting telephone triage in primary health care lost much of their professional autonomy when CDSS along with recording and monitoring of calls were introduced. Purc-Stephenson and Thrasher (2010) showed that although CDSSs contributed to consistency and reliability in general telenursing triage, RNs resisted strict adherence, instead preferring to use their own professional competence. Furthermore, Murdoch et al. (2015) found that RNs in telephone triage required substantial skills to accurately capture callers' problem in the CDSS to

ensure safe triage outcomes. More experienced RNs in a primary health-care context also use CDSSs to a lesser extent (Holmström et al., 2019) and use different strategies such as tinkering and overruling to handle CDSSs (Wouters et al., 2020). A common complaint has also been that CDSSs used by RNs in primary health care include too much information (Dowding et al., 2009; Holmström et al., 2019; North et al., 2014).

Successful emergency telephone triage is dependent on using a well-established protocol supported by a CDSS and well-trained staff (Montandon et al., 2019). Typically, information about symptoms, medications, and previous illnesses are entered into a CDSS and a priority and measures are recommended. The standardization of the CDSS' is presumed to increase the accuracy and reliability of decisions (Johannessen, 2016; Noon, 2014). However, Pope et al. (2013) showed that call-handlers experienced “deskilling” by working with CDSS. Thus, RNs use of CDSS' in primary health care can contribute to safer assessments and improve correct decision-making (Dowding et al., 2009), but may also detrimentally affect professional autonomy.

In summary, RNs CDSS use has been studied in primary health-care settings, while the use of CDSS in emergency calls needs further investigation. In emergency triage, call-handlers appear to experience deskilling when working with CDSS. As RNs have a higher professional competence and autonomy, it is reasonable to believe that they may be even more sceptical to CDSS use. While CDSSs are intended to improve decision accuracy and patient safety, the professional autonomy of RNs could be limited by working through a rigid, mechanistic system. This tension could lead to RNs overruling the CDSS or using it only partially, which in turn might hamper patient safety (Spangler et al., 2020). Hence, more knowledge is needed of RNs views in these matters to enhance both technical development of CDSS and the work situation of RNs at EMDCs.

2 | THE STUDY

2.1 | Aim

To describe how Registered Nurses make use of a Clinical Decision Support System (CDSS) to triage calls to emergency medical dispatch centres, from the perspective of professional autonomy.

2.2 | Design

The study had a descriptive qualitative design (Patton, 2014) with individual interviews of RNs, as there is limited knowledge of their use of CDSS in emergency triage at EMDCs. A thematic analysis according to Braun and Clarke (2006) was applied.

2.3 | Sample and setting

Three EMDCs in mid-Sweden, covering about 950,000 inhabitants, were included. They operated without interruption and handled around 114,000 calls yearly. They all used the same CDSS developed by the medical directors of these counties in 2013. The CDSS is structured around patient assessment mnemonics commonly employed in pre-hospital care (ABCDE/OPQRST/AMPLE) and follows a layout whereby initial questions focus on ruling out life-threatening conditions, followed by more detailed, symptom-specific questions to collect details about the patient's condition and medical history. The CDSS is regularly updated based on feedback from RNs and changes in clinical guidelines. A detailed description of the CDSS structure and workflow is provided in Appendix S1. The RNs may deviate from the CDSS recommendations but are to write a note motivating their decision. All three regions exclusively employ RNs in the primary call-taking role and all calls are recorded for quality assurance purposes.

The managers of the three included EMDC sites were contacted and asked to recruit seven RNs each. RNs at each site were requested to participate in the study via mailing list and additional RNs were recruited via direct contact. The managers were instructed to strive for a diverse sample including RNs with long and short working experience and of different ages, genders and specialist educations. After 15 interviews, adequate information power was reached (Malterud, Siersma, & Guassora, 2015), but as we wanted to include the same number of RNs from each EMDC site, interviewing continued. Overall, data were varied and rich in content.

2.4 | Data collection

To get acquainted with the setting, the authors made unstructured observations of RNs' work at EMDCs. Thereafter, three semi-structured pilot interviews were conducted by the second author to test the interview guide. This led to a reduction in questions and some reformulations. The rest of the interviews were conducted by the third author on one telephone interview. The interview questions revolved around the views and experiences of working with the CDSS, using the following interview guide:

1. What is your view of the CDSS?
2. How do you use the CDSS?
3. What are the advantages of the CDSS?
4. What are the potential developmental areas of the CDSS?
5. Could you please tell me about a call when the CDSS provided good support?
6. Could you please tell me about a call when the CDSS did not provide the support you needed?
7. In which cases do you deviate from the CDSS and make your own assessments?
8. Some parts of the CDSS have a low degree of completion. What are your thoughts about this?

9. Is there additional information you would like to have to make safe and correct assessments?
10. Finally, is there something you would like to add?

Probing questions, such as "could you please provide an example" or "please tell me more," were used to make the informants elaborate and deepen their answers, when needed. The mean time for the interviews was 37 min (range 19–57). Data were transcribed verbatim and processed as text.

2.5 | Ethical considerations

The study was carried out in accordance with the Swedish Ethical Review Act (SFS 2003:460). The RNs were included after giving informed consent. They were informed that their participation was voluntary that they could withdraw from the study at any time without providing a reason and that data were treated confidentially. The Uppsala Regional Ethical Review Board approved the study (Dnr. 2018/133/1).

2.6 | Data analysis

A thematic analysis according to Braun and Clarke (2006) was performed. Thematic analysis is a method for identifying, analysing, and reporting patterns within data. The analysis was carried out in a stepwise manner including six phases, but included a constant moving back and forth. The process began with the first author looking for patterns of meaning and issues of potential interest in the data. Phase 1: Familiarization, which included all authors repeatedly reading the data. Phase 2: Generating initial codes from the data, which was done by the first author. Phase 3: Searching for themes by sorting the different codes into potential themes by the first author. Phase 4: Discussion, review, and refinement of themes by all authors. Phase 5: Defining and labelling themes and subthemes by the first author, entailing the definition and refinement of the themes by identifying their essence. Phase 6: Producing the report, which involves the final analysis and write-up of the manuscript. The endpoint was, hence, the reporting of the content and meaning of patterns (themes) in the data, where "themes are abstract (and often fuzzy) constructs the investigators identify [sic] before, during and after analysis" (Ryan & Bernard, 2000, p. 780). Please see Table 1 for the steps in the data analysis. The analysis was repeatedly discussed at team meetings with all authors and disagreements were settled by negotiated consensus.

2.7 | Rigour

We aimed to uphold criteria for qualitative studies: transferability, credibility, confirmability and dependability, as outlined by Lincoln and Guba (1985). Credibility involves the truth of the data and the analysis. Dependability involves the stability of the data over time. In the present study, an audit trail was maintained, and we critically

TABLE 1 Examples of coding of text and establishing themes and subthemes

Quote	Code	Subtheme	Theme
<i>Then it can be pivotal for the ambulance to know some more, just on set.// But they also interview the patient, and it would be really cool if we could start documenting and they continued in the same tool, I think</i>	The ambulance services need information, and a common documentation system would enhance work	Request for common documentation system with ambulances	Development areas for better use of the CDSS in collaboration with other services
<i>If it's kids who are severely ill or cardiac arrest, then it's hard to stay focused. I use the CDSS a lot for children. I know it probably will result in me sending an ambulance, which feels good</i>	Using the CDSS as an aid for paediatric calls	Rare situations	A specific support useful in difficult situations and calls
<i>Miscarriage...generally ob./gyn is not my professional asset...I can ask a colleague for help of course, and use the CDSS. There are other areas which a rare, like burns, delivery of a baby, drowning...they are rare.</i>	Using the CDSS as an aid for areas which the RN has no expertise in	Rare situations	A specific support useful in difficult situations and calls

TABLE 2 Themes and subthemes describing registered nurses' experiences of using a clinical decision support system for triage of calls to emergency medical dispatch centres

Theme	Subthemes
Using the CDSS as a general support to professional competence in emergency calls	<i>support for professional competence an aid to reflection a compulsory support</i>
A specific support useful in difficult situations and calls	<i>RN being tired or stressed out vague and unclear symptoms rare situations aggressive and agitated callers</i>
Using the CDSS but changing triage recommendations/priority	<i>recommending a higher priority than the CDSS recommending a lower priority than the CDSS</i>
Development areas for better use of the CDSS in collaboration with other services	<i>request for common documentation system with ambulances closer collaboration with the national telephone nursing helpline</i>
Possible technical development areas in the CDSS for optimal use	<i>image transfer medical records development of certain areas in the CDSS update of maps a need for more knowledge</i>

reflected on the data collection and analysis procedures. The recruitment of the participants and the methods of data collection and analysis were, for instance, chosen to suit the aim. Our aim was to make it possible for the readers to understand the logic of the findings. To enhance confirmability, quotes are used to demonstrate the grounding of the findings in the data. Additionally, we sought to describe the context, sample, and the steps in the analysis in a way that allows the reader to judge the transferability of the findings.

3 | FINDINGS

The sample included nine men and 15 women. They were 34–64 years old, their working experience varied between 5–44 years, and 11 of them had a specialist education.

Five themes and 16 subthemes emerged from the analysis. The themes and their respective subthemes are presented below with illustrative quotes. See Table 2 for an overview of themes and subthemes.

3.1 | Using the CDSS as a general support to professional competence in emergency calls

This theme includes the subthemes: *support for professional competence, an aid to reflection, and a compulsory support.*

The CDSS was described by RNs as a *support for their professional competence* in triage, decisions, and communication with the caller. It provided a structure to follow, confirmation that their assessments were correct and was a security if an incident report should be filed. The RNs

felt "on top of" the CDSS, using it as it suited them in their professional role. The CDSS was also perceived to assure the quality of assessments:

So that you don't forget, I mean if you've forgotten something you can take a quick look during the call, which boxes you haven't ticked. So, so I think that's good, you can rely on it as a support to some extent. But there's so much that's internalized after all, it's all in my head.

(16)

Professional competence was emphasized by RNs and they stressed that the CDSS was a support that could not replace them. Education and training, previous clinical experience, and personal experiences were pivotal:

The work here with emergency triage builds on my experience in emergency nursing to a great extent. So I use the CDSS as a support, because my work is based on my professional experience and my own way of working and I use it as a support.

(17)

The CDSS could also be *an aid for reflection*, which could help RNs dwell on their assessments and recommendations:

Well, the CDSS indicates priority 1, but I think priority 2 and then I need to reconsider. The result might eventually be according to my own priority, but it helps me reflect on my assessment.

(13)

Some RNs described that they used *the CDSS as it was a compulsory support* and not because they felt a needed it:

For me personally, I do not think that it either improves or impairs my assessment... I use it because we are obliged to and it's good to work through the questions...

(17)

Some RNs described that they only used the main tabs in the system and did not work through all headings. Sometimes they filled in and ticked the boxes in the CDSS when the call was finished. They described that basically, their own competence was sufficient, but that the CDSS was a memory aid and a safety net. Thus, these RNs reported that the CDSS did not steer their work but was rather considered to be a supportive tool.

3.2 | A specific support useful in difficult situations and calls

This theme consisted of the subthemes: *RN being tired or stressed out, vague and unclear symptoms, rare situations, and aggressive and agitated callers*.

The CDSS was, according to the RNs, especially important if *they were tired or stressed out*:

The more tired I am, like if it's really busy, it helps me keep the structure in the call...I rely on the CDSS.

(13)

A difficult type of call were those were the caller presented with *vague and unclear symptoms*. This made the RNs uncertain about what was going on and where they should start to pinpoint the problem. They used the CDSS to provide structure in the call and began to explore in detail what the caller's problem was as follows:

If they are very vague in their description of the symptoms and I cannot pinpoint what's it all about...

(15)

The CDSS was especially helpful in *rare situations*, as described below:

How do you proceed if they have been exposed to chemicals, then it's really good to get help with which questions to ask.

(5)

Other rare situations when the CDSS was perceived as especially helpful were drowning, electric shock injuries, and snakebites. These occurred so rarely that the RNs might never have experienced them in their clinical practice. They, hence, had to rely on the CDSS to know what questions to ask and what actions to take in such rare cases.

When the *caller was aggressive and agitated*, the RNs used the CDSS as an aid to calm down and structure the call. Sometimes callers demanded an ambulance, not understanding why RNs posed many questions and that they had to prioritize between callers as the number of ambulances was limited. In such situations, callers could be very offensive, use bad language, or yell. Other callers were shocked by the situation and had a hard time describing it:

It's very good to have a structure, a structure to follow, if it's...agitated or upset, then I can always return to the structure and what I need to know. Sometimes you get misled by someone who calls and just screams and says a lot of nasty things and you get all stressed out by their stress and then I can calm down by looking up the CDSS.

(14)

3.3 | Using the CDSS but changing triage recommendations/priority

This theme included the subthemes: *recommending a higher priority than the CDSS and recommending a lower priority than the CDSS*.

The RNs' experience and knowledge made them sometimes overrule the recommendations in the CDSS. They did not let the CDSS steer them, but made a broader assessment and a qualitative evaluation of the situation. Hence, they considered themselves in control of the situation and the decision and not the CDSS. In some cases, nurses opted for *recommending a higher priority than the CDSS*. This was done when they were sensing that something was not right, although it was not verbalized by the caller, or captured by the CDSS:

Often, I am 100% in agreement with the CDSS in priority setting, but sometimes I have a gut feeling that this is not quite okay. And then I change to a higher priority.

(5)

In addition to the "gut feeling," the RNs described that they could hear if the caller, for instance, had trouble breathing and/or talking and they got other forms of "side-information" as well. A deficit in the CDSS was that it did not take background illnesses into account and the RNs had to rely on their professional competence and experience to account for such side information. RNs generally reported more often changing the CDSS recommendations to a higher triage level, than the opposite:

Difficulty breathing, to give a concrete example, it's a tab were I sometimes change to a higher priority, because the CDSS says a "priority 2" due to my answers, but when I talk to the person I realise that this it not a "2"...// Maybe they cannot even speak...

(6)

There were also situations when the RNs *recommend a lower priority than the CDSS*. A symptom which could be down-prioritized was longstanding chest pain. To change priority, either higher or lower, the RNs should document a free text motivation for the deviation:

You should write for instance... seems unaffected, has longstanding pain.

(8)

3.4 | Development areas for better use of the CDSS in collaboration with other services

This theme included the subthemes: *request for common documentation system with ambulances and closer collaboration with the national telephone nursing helpline*.

Although the collaboration with the ambulance service was close, one request was for *having a common documentation system and working with the same concepts*. At present, double documentation was reported as the RNs had to work through the CDSS and then write additional free text to the ambulance:

Sometimes it's double the job, you write a whole lot of free text so that the information will reach the ambulance...if the ambulance could get that by me just ticking a box it would be marvellous.

(8)

Closer collaboration with the national telephone nursing helpline (SHD) was also requested, to get a more common way of assessing, referring, and giving advice to callers, with "one voice." The RNs at SHD worked with a different CDSS, which included more advice for self-care, which was said to potentially be useful also for RNs at EMDCs.

3.5 | Possible technical development areas in the CDSS for optimal use

This theme included the subthemes: *image transfer, medical records, development of certain areas in the CDSS, update of maps, and a need for more knowledge*.

Many of the RNs described that there was continuous development of the CDSS and that they could suggest improvements that were promptly handled. This made the RNs feel that their opinions regarding the CDSS development mattered and that they could steer its development in a constructive direction. They, however, also requested further technical development areas. For instance, they desired to include *image transfer* to aid their triage:

Like if, if you could see the person over the phone and they could send...like films so that you could see the location and how the person looks.

(14)

The RNs, hence, wanted more information to aid their triage, but at the same time they thought that having access to the patient's full *medical record* would provide too much information, which they could not process in the short time they had for each call:

It's too much information and we cannot quickly screen out what's important.

(9)

RNs also stated that they could be negatively influenced by information in the medical record, which might hinder an objective assessment, for instance, if the patient had a drug addiction. They did, however, desire a "light version," including a list of the patient's medication, diagnoses, a shortlist of previous healthcare contacts for the same symptom, and warnings for contagions such as HIV/hepatitis.

Requests for *development of certain areas in the CDSS* were made. An English version of the CDSS was thought to be useful for callers who did not speak Swedish. This would help the RNs find the right words and expressions, as they were not native English-speaker themselves. There was also a desire to develop the CDSS further regarding psychiatric illnesses and postoperative conditions:

I would like to have a tab labelled "postoperative"...
eh, it's about bleeding, it's about infections, it's about
pain...

(5)

The RNs commented that the *update of maps* was too slow and that they had to spell the addresses exactly correct to be automatically located. In some interviews, RNs noted a new integration which had the potential to be an aid in the localization of the caller.

A *need for more knowledge* was also expressed. The RNs wished for Continuing Medical Education (CME) in medicine and nursing:

CME courses for us RNs are constantly needed and should be prioritized. We have way too little CME.// There has been so much focus' on directing ambulances and on technique, which I think is...well, it's their business. I'm a nurse and I want to develop in my profession.

(13)

Finally, the RNs expressed that they needed to have general knowledge of society, services, and regulations and such knowledge was not included in the CDSS. All calls were not medical and some should not have been directed to the EMDC. However, the RNs wanted to help callers, for instance, by referring them correctly, as exemplified below:

He was disabled in some way and had problems expressing himself.. had financial problems because he was studying, but his course had finished and he did not know where to turn to with all his queries.// And were should I refer him?

(14)

4 | DISCUSSION

The main finding was that the RNs were generally positive to the CDSS and perceived it as a support, especially in rare and difficult situations. Overall, their autonomy did not seem to be affected by the CDSS, as they had learned to navigate and use it as it best suited them and the situation at hand.

According to the literature, the CDSS may infringe on autonomy in different ways. Firstly, a CDSS may affect a nurses' ability to freely determine their working conditions, i.e., their *external autonomy*, since it could imply more time-consuming tasks, such as increased demands to fill in information and replicate documentation. The results point to some extra administrative work, mainly in the form of double documentation, as they had to write in free text to the ambulance services, but also spend time on filling in other types of patient information. An area for improvement was, hence, the desire for a common documentation system with the ambulance to save time and enhance collaboration. Overall, external autonomy did not seem to be particularly challenged by using

CDSS, as the RNs expressed that they were on top of it and could use the system in a manner that suited their way of working. Most RNs seemed to consider the CDSS more as a support than as an infringement on their care provision. This is in line with findings from primary healthcare settings (Holmström et al., 2019; Wouters et al., 2020), but contradicts the study by Leppänen (2010) that showed how CDSS and audio recording of calls reduced RNs freedom of action. However, the data in Leppänen's (2010) paper were collected over 20 years ago in 1999. The technical development of CDSSs as well as the training of RNs in their use have made great improvements during these 20 years and findings might not be comparable. Furthermore, unlike many Anglo-American EMDCs, in particular, compliance with the CDSS in this setting is encouraged but not mandatory.

CDSSs could also potentially create a conflict between what the RN considers to be the right decision and what the CDSS stipulates, constituting an infringement on *internal autonomy*. In this study, however, most RNs viewed the CDSS as a support rather than an encroachment on their internal autonomy and used it as an aid for their questions and decisions. It was mainly used as a structure to follow and a confirmation of assessments. The RNs' clinical knowledge seemed so deeply internalized that they could hardly comprehend how a CDSS could change or challenge their professional judgements, which is in line with finding of Dowding et al., (2009). The EMDC RNs seemed to use intuition, experience, and the CDSS to safeguard the patient or relative reporting the emergency. They also seemed to adapt their knowledge to the situation at hand using CDSS as an aid and signs of de-skilling were not discernible in our data. The same pattern was found by Holmström et al. (2019) in a primary healthcare setting, where experienced RNs used CDSS' to a lesser extent than more novice RNs and expressed having internalized it. Randell, Mitchell, Thompson, McCaughan, and Dowding (2009) also found that CDSS was often used to confirm assessments after the call was finished. In the present study, RNs used the CDSS in a selective way, for instance, only filling in the main tabs and not working through all headings, or by using it more thoroughly in specific and rare situations. There were also situations when they actively did not follow the given advice and changed the recommendations. In most cases, the recommendation was changed to a higher priority than the one recommended by the CDSS. This willingness to deviate from the CDSS indicates that RNs used their professional competence and autonomy, instead of being steered by the CDSS. While professional autonomy is desirable, previous studies have showed that triage errors in the context of EMDCs could have been avoided by greater compliance with CDSS (Andersen et al., 2014; Spangler et al., 2020). As such, optimal methods to gain the benefits of both professional autonomy and CDSS compliance should be identified through further research.

In contrast to findings by Dowding et al., (2009), RNs did not complain about information overload in the CDSS. The present RNs did, however, note that access to full patient medical records would be too much to handle, desiring a "light version" containing only necessary information. Data in the Dowding et al., (2009) study was,

however, collected in 2002–2004, which makes the comparison less relevant, given the rapid development of technology. And while the present study was based on interviews only, Dowding et al., (2009) also made observations of RNs work with CDSS in primary health care.

In conclusion, the CDSS, based on the theoretical discourse about healthcare professionals' autonomy, cannot be perceived as a restriction on internal and external autonomy, i.e., their traditional control over both patient care and their own work process. It may also be possible to address potential "rigidity" of the CDSS by analysing the collected CDSS data using machine learning models instead of pre-specified decision rules (Spangler, Hermansson, Smekal, & Blomberg, 2019). This should, however, be implemented with cautious monitoring of patient outcomes and the RNs work situation.

4.1 | Limitations

Data were limited to interviews and no structured observations of how RNs worked with the CDSS were conducted. This could be a topic for a future study. The informants were recruited by managers at the three EMDC sites. This could be a potential limitation, as they might have avoided to ask RNs who were critical to the CDSS to participate. However, the interviews were rich in content and both positive and negative experiences of CDSS use were expressed. The analysis was performed by researchers with a broad experience of qualitative research in nursing and health care, of which two had experiences of working with telephone triage. One of the authors (DS) is employed by one of the studied EMDCs and to ensure objectivity he was not involved in the collection or analysis of the data. During the analysis, the researchers discussed the findings to ensure the validity of the results and themes described. The study was limited to a specific Swedish context, which may impair transferability to other contexts.

5 | CONCLUSION

CDSS use did not seem to restrict professional autonomy for RNs at these EMDCs. The CDSS was perceived as a support rather than an encroachment on their autonomy. The CDSS was mainly used as a structure to follow and a confirmation of assessments. The RNs pointed to the usefulness of the CDSS in specific and rare situations, but also had ideas for further improvement. Technical improvements of CDSS, closer collaboration with other services, and education and training should be undertaken in close cooperation with the RNs using the CDSS.

ACKNOWLEDGEMENTS

We are indebted to the Registered Nurses who willingly shared their experiences with us.

CONFLICT OF INTEREST

No conflict of interest has been declared by the author(s).

PEER REVIEW

The peer review history for this article is available at <https://publons.com/publon/10.1111/jan.14542>.

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Additional supporting information may be found online in the Supporting Information section.

How to cite this article: Holmström IK, Kaminsky E, Lindberg Y, Spangler D, Winblad U. Registered Nurses' experiences of using a clinical decision support system for triage of emergency calls: A qualitative interview study. *J Adv Nurs*. 2020;76:3104–3112. <https://doi.org/10.1111/jan.14542>

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