



CLINICIAN'S CORNER

The Canadian Cervical Spine Rule

By Allan Lai, MSN RN ENC(C), Monique Mclaughlin, MN, NP(F), and Nicole Cook, MSN, APRN, AGCNS-BC, CEN, CCRN, TCRN

A 44-year-old driver of a small sedan self-presents to your emergency department (ED) triage area indicating they developed a stiff neck 30 minutes after they were rear-ended by a small van when they were stopped at a traffic light. The rear bumper of the patient's vehicle is slightly dented, and there is scuffing to the front bumper of the van. No airbags were deployed and the driver of the sedan did not hit their head. The van was estimated to be travelling between 10-20 km/h at the time of impact. The patient self-extricated from their vehicle and was ambulatory at the scene. Currently, the patient is alert, oriented, and in no distress. The patient denies paresthesia, has no midline cervical spine (c-spine) tenderness, and is able to actively rotate their neck 45° left and right.

As the triage nurse, you ask yourself: Will this patient need some form of diagnostic imaging of their neck? And if they do, should they be wearing a hard neck collar (henceforth referred to as hard collar) to theoretically protect their spine from injury? You are hesitant to apply a hard collar because you have heard that hard collars can cause patient harm and its use to truly protect the c-spine has been questioned (Kwan et al., 2001; Lai & Paquin, 2019; Rezaie, 2017). You decide to use the Canadian C-Spine Rule (CCR) to help guide your decision-making.

What is the CCR?

The CCR takes a patient's history and physical symptoms and combines them into a clinical decision-making tool to help guide a clinician decide if diagnostic imaging of the c-spine is needed to capture a clinically significant neck injury (Stiell et al., 2001). Clinically significant neck injuries are defined as a c-spine fracture, dislocation, or ligamentous instability, in alert and stable patients who have suffered a blunt traumatic injury (Stiell et al., 2001). The CCR has a 100% sensitivity and 43.4% specificity when applied by triage nurses in the ED (Stiell et al., 2010), 100% sensitivity and a 42.5% specificity when applied by emergency physicians (Stiell et al., 2003), and 100% sensitivity and 37.7% specificity when applied by paramedics in an out-of-hospital setting (Vaillancourt et al., 2009). The CCR has been shown to be superior to unstructured physician judgement (Bandiera

et al., 2003) and more sensitive and specific than the National Emergency X-Radiography Utilization Study (NEXUS) tool (Stiell et al., 2003).

How does the CCR help me decide if the patient needs a hard neck brace?

The CCR does not directly instruct you to use a hard collar, rather the CCR suggests if diagnostic imaging of the neck is needed; *this means the CCR indirectly suggests when a hard collar should be applied*. A patient with a CCR that suggests no diagnostic imaging is needed implies that a hard collar is probably not required and, conversely, a CCR suggesting the need for diagnostic imaging implies a hard collar may be required.

What is the evidence supporting nurses to use the CCR?

A prospective cohort study in six Canadian EDs found that triage nurses who had additional training in the CCR could appropriately apply the CCR to both apply *and* discontinue a hard neck brace (Stiell et al., 2010); these findings were validated in 2018 by Stiell et al.

When can I use the CCR?

The CCR is validated for use in patients who have experienced a blunt traumatic injury, have a Glasgow Coma Scale (GCS) of 15, and where there is a concern for c-spine injury. If the patient meets these criteria, the CCR algorithm is followed (Figure 1).

How do I apply the CCR?

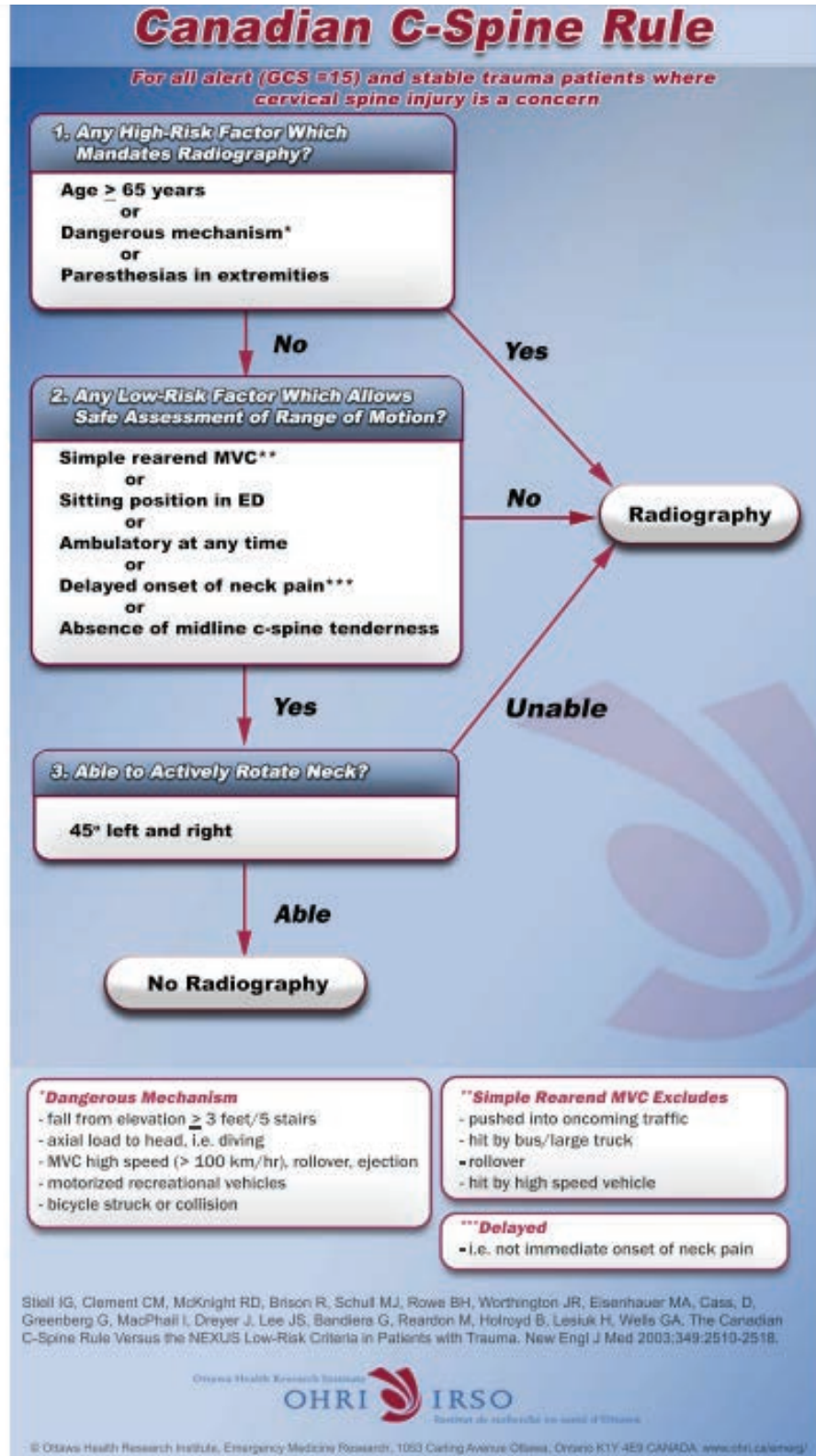
Using the case above as an example, the CCR would be applied in the following steps:

1. **MEETS** inclusion criteria: GCS 15, stable, and sustained blunt trauma where c-spine injury is a concern
2. **NO** high risk-factor: Age less than or equal to 65, no dangerous mechanism, and no paraesthesia
3. **ABLE TO** actively rotate neck 45° to the left and right.

The CCR *suggests* the patient does not need diagnostic imaging of the c-spine and *indirectly suggests* the patient does not need a hard collar.

Figure 1

Canadian Cervical Spine Rule



Note. Image courtesy of the Ottawa Hospital Research Institute (n.d.).

Do I need extra training to use the CCR?

Assessment of c-spine injuries and application of a hard collar will likely require some degree of extra training. One pilot study found that nurses learning to apply the CCR required further training to assess for c-spine midline tenderness and range of motion and to remove hard collars (Kelly et al., 2004). Moreover, the nurses in the Stiell et al. (2010; 2018) studies received additional education and training ranging from 90–120 minutes to implement the CCR. It is unclear what type and how much experience nurses must have in order to competently implement the CCR because the studies largely included senior ED nurses and there was little description of their characteristics; however, given that the Stiell et al. (2010; 2018) articles included ED triage nurses, a position that often requires emergency nursing experience, who then acquired additional education to implement the CCR, it is reasonable to infer that ED nurses should have some experience, and take additional training before implementing the CCR.

Summary

ED nurses can use the CCR to support their decision to place hard collars for alert, stable patients under 65 years of age who

present with delayed, non-midline neck pain, and without paraesthesia following a non-dangerous blunt traumatic injury. Integration of ED nurse-performed CCR will require additional education and policy changes at local and governing levels. Finally, always practice within your own local scope of practice, policies, and level of comfort.

About the authors

Allan Lai, MSN, RN, ENC(C), is an emergency and critical care nurse and clinician educator in Vancouver, BC. He is co-host of the *Resus Tonight* podcast, co-founder of the EPICC-COVID19 Project, and can be found on Twitter at @RespRate16.

Monique McLaughlin, MN, NP(F), is an emergency nurse practitioner in Vancouver, BC, the managing editor for the *Emergency Practice, Interventions, Care – Canada* program, and the co-host of the *NursEM* podcast.

Nicole Cook, MSN, APRN, AGCNS-BC, CEN, CCRN, TCRN, is a trauma clinical nurse specialist in Raleigh, North Carolina. She is a trauma educator and bedside clinician, and can be found on Twitter @traumasoapboxes.

References

- Bandiera, G., Stiell, I. G., Wells, G. A., Clement, C., De Maio, V., Vandemheen, K. L., Greenberg, G. H., Lesiuk, H., Brison, R., Cass, D., Dreyer, J., Eisenhauer, M. A., Macphail, I., McKnight, R. D., Morrison, L., Reardon, M., Schull, M., Worthington, J., & Canadian C-Spine and CT Head Study Group. (2003). The Canadian C-spine Rule performs better than unstructured physician judgment. *Annals of Emergency Medicine*, 42(3), 395–402. [https://doi.org/10.1016/s0196-0644\(03\)00422-0](https://doi.org/10.1016/s0196-0644(03)00422-0)
- Kelly, A., Bradshaw, L., & Kerr, D. (2004). Can nurses apply the Canadian C-Spine Rule? A pilot study. *Canadian Journal of Emergency Medicine*, 6(3), 161–164. <https://doi.org/10.1017/s1481803500006850>
- Kwan, I., Bunn, F., & Roberts, I. (2001). Spinal immobilisation for trauma patients. *The Cochrane Database of Systematic Reviews*, 2001(2), Article CD002803. <https://doi.org/10.1002/14651858.CD002803>
- Lai, A. P., & Paquin, R. C. (Hosts). (2019). Ep. 11 – ResusX Series – Hard collar facts with the rebel, Salim Rezaie [Audio podcast episode]. In *Resus Tonight with Allan and Rob*. Buzzsprout. <https://resustonight.buzzsprout.com/478678/1838497-ep-11-resusx-series-hard-collar-facts-with-the-rebel-salim-rezaie>
- Ottawa Hospital Research Institute. (n.d.). *Canadian cervical spine rule*. https://www.ohri.ca/emerg/cdr/docs/cdr_cspine_poster.pdf
- Rezaie, S. R. (2017, August 7). Spinal immobilization in trauma patients. *REBELEM*. <https://rebelem.com/spinal-immobilization-in-trauma-patients/>
- Stiell, I. G., Clement, C. M., Lowe, M., Sheehan, C., Miller, J., Armstrong, S., Bailey, B., Posselwhite, K., Langlais, J., Ruddy, K., Thorne, S., Armstrong, A., Dain, C., Perry, J. J., & Vaillancourt, C. (2018). A multicenter program to implement the Canadian c-spine rule by emergency department triage nurses. *Annals of Emergency Medicine*, 72(4), 333–341. <https://doi.org/10.1016/j.annemergmed.2018.03.033>
- Stiell, I. G., Clement, C. M., McKnight, R. D., Brison, R., Schull, M. J., Rowe, B. H., Worthington, J. R., Eisenhauer, M. A., Cass, D., Greenberg, G., MacPhail, I., Dreyer, J., Lee, J. S., Bandiera, G., Reardon, M., Holroyd, B., Lesiuk, H., & Wells, G. A. (2003). The Canadian C-spine Rule versus the NEXUS low-risk criteria in patients with trauma. *New England Journal of Medicine*, 349(26), 2510–2518. <https://doi.org/10.1056/NEJMoa031375>
- Stiell, I. G., Clement, C. M., O'Connor, A., Davies, B., Leclair, C., Sheehan, P., Clavet, T., Beland, C., MacKenzie, T., & Wells, G. A. (2010). Multicentre prospective validation of use of the Canadian C-Spine Rule by triage nurses in the emergency department. *Canadian Medical Association Journal*, 182(11), 1173–1179. <https://doi.org/10.1503/cmaj.091430>
- Stiell, I. G., Wells, G. A., Vandemheen, K. L., Clement, C. M., Lesiuk, H., De Maio, V. J., Laupacis, A., Schull, M., McKnight, R. D., Verbeek, R., Brison, R., Cass, D., Dreyer, J., Eisenhauer, M. A., Greenberg, G. H., MacPhail, I., Morrison, L., Reardon, M., & Worthington, J. (2001). The Canadian C-Spine Rule for radiography in alert and stable trauma patients. *JAMA*, 286(15), 1841–1848. <https://doi.org/10.1001/jama.286.15.1841>
- Vaillancourt, C., Stiell, I. G., Beaudoin, T., Maloney, J., Anton, A. R., Bradford, P., Cain, E., Travers, A., Stempien, M., Lees, M., Munkley, D., Battam, E., Banek, J., & Wells, G. A. (2009). The out-of-hospital validation of the Canadian C-Spine Rule by paramedics. *Annals of Emergency Medicine*, 54(5), 663–671. <https://doi.org/10.1016/j.annemergmed.2009.03.008>