

## CASE REPORT

# ICU at home, with the use of mobile IC unit services: intensive care goes that extra mile

I. Hollenga, L. Bouma, M. Smit, J.M. Droogh, M. van Meurs

Department of Critical Care, University of Groningen, University Medical Center Groningen, Groningen, the Netherlands

## Correspondence

M. van Meurs - m.van.meurs@umcg.nl

**Keywords** - Guillain Barré syndrome, mobile ICU, patient-centred ICU, home visit

## Abstract

In this report we describe a patient with a long ICU stay because of severe Guillain Barré syndrome. Treatment was patient-centred and Mobile ICU facilities were used to facilitate an ICU at home for one day. Early focus on individual needs and wishes and close communication with and within ICU treatment teams can help to improve the long-term consequences of ICU admission. Research on which interventions are effective and most cost-effective need to be performed.

The first intensive care unit (ICU) was opened in Copenhagen in 1953, because of the need for mechanical ventilation during the polio epidemic.<sup>[1]</sup> Since then ICU patients have been transported. Initially this transport was necessary because not all hospitals had ICU facilities. In later years the need for additional diagnostic or therapeutic possibilities available at ICUs in larger hospitals was the main reason for transport. Recently, the unavailability of ICU beds has further increased the need for transport between ICUs.<sup>[2]</sup> This need for transport led to the development of professional mobile ICU (MICU) teams in the Netherlands. The Dutch Ministry of Public Health developed guidelines in 2007 for the transport of critically ill patients transferred between ICUs. These guidelines led to the deployment of a nationwide system of seven MICU centres in the Netherlands. The University Medical Center Groningen (UMCG) MICU service started in 2009.

Since the start of ICU therapy, lengthy ICU admission is increasingly identified as a mental challenge for the patient. It can lead to psychiatric disorders as depression and post-traumatic stress syndrome. Ventilator weaning and ICU discharge require optimal patient efforts and cooperation. Several measures such as early mobilisation and music therapy have been proposed to improve mental health. However, for the individual patient the measures that are most effective may vary.

In this report we describe a case in which the MICU was used to facilitate an ICU at home for one day. The aim of this short narrative case report is to advocate patient-centred intensive care by using all the available facilities; methods to improve advocate patient-centred intensive care and the planning for MICU transport are excellently and extensively reviewed elsewhere.<sup>[3,4]</sup> The patient is a previously healthy 17-year-old girl. Seven days before admission she started coughing and vomiting. The general practitioner started amoxicillin which was later supplemented with clavulanic acid for a lower respiratory tract infection. During the following week the patient deteriorated; she developed severe pains in her arms and legs and had difficulties in moving. She had a feeling of weakness of the limbs. She was admitted to a regional hospital because of a lower tract respiratory infection with respiratory insufficiency. Due to total respiratory insufficiency, she was admitted to the ICU, intubated and treated for pneumonia. At that time, her neurological diagnosis was unknown. For further neurological analysis, the patient was transferred with the paediatric ICU transport system to the UMCG. During the second week of illness, the patient deteriorated neurologically and developed a total flaccid paralysis with dilated pupils, cranial nerve involvement and autonomic dysfunction. In her nose, rhinovirus RNA and mycoplasma pneumoniae DNA were detected by PCR; these pathogens were also observed in the sputum in the regional hospital. After a diagnostic work up, the diagnosis of Guillain Barré syndrome (GBS) following mycoplasma pneumonia was made. The patient was initially treated with antibiotics against mycoplasma pneumonia, intravenous immunoglobulins, mechanical ventilation and supportive ICU therapy. The diagnosis, treatment and prognosis have been described and extensively reviewed elsewhere.<sup>[5,6]</sup> The patient was transferred to the adult ICU of the UMCG in the plateau phase of her illness. She had severe pain and was treated with a multi-modal pharmacological pain therapy regime. She



was afraid and angry; these were difficult to express as she could only move her eyes in the initial recovery phase. When the paralysis of her face weaned off during the recovery phase, the patient started to speak while on the mechanical ventilator.<sup>[7,8]</sup> The patient and relatives were moved by hearing the sound of her voice. One of the first things the patient said was that she wanted to see her horse, which was stabled at her home.

Her wish to visit home while fully dependent on invasive mechanical ventilation with a flaccid paralysis of arms and legs and severe neuropathic pain was discussed in the MICU team. Part of the recovery phase of the ICU treatment of GBS patients is that 'the art of medicine consists of amusing the patient while nature cures the disease'. This statement is attributed to Voltaire. The team regarded her wish as important, as they had the impression that this home ICU visit could help the patient and family to bear the long and slow recovery phase of her GBS. While MICU and ICU physicians use resources for transporting patients home in the last part of their lives<sup>[9]</sup> or to attend a funeral of a relative, the indication for a home visit during full ICU therapy was new for the UMCG-MICU team.

ICU therapy during transport and on location takes extensive planning and the need to be prepared for the unexpected.<sup>[4]</sup> During the waiting time for the planned transport, the ICU and the local ambulance services drafted a plan for the home visit. As this off label use of the MICU is not formally financed in the Dutch healthcare insurance system, both the "Intensive Care Volwassenen" UMCG and the Regional Ambulance Provider shared the additional in-kind costs. The patient practised with positioning on an MICU transport trolley, transporting through the hospital and visiting the ambulance hall. MICU medical

supplies were adjusted where needed. The family prepared their family farm with road plates in such a way that the MICU trolley could enter the barns and home. On the day of the visit the patient and her mother were transported home in the MICU. Several photographs were taken (*figure 1*). The family and the patient were extremely happy to be home and found something to strive for. The grandmother prepared soup and sandwiches for the team and motivated her granddaughter by telling her: 'next time you come home you can come in a wheelchair'. Whether the trip home has helped in the recovery of the patient cannot be concluded from this n=1 observational case story. However, the trip did have positive effects, both beforehand as the patient was practising for the transport in the preceding week (by being wheeled through the hospital on the trolley) and afterwards as she had sweet memories because photographs of the trip (*figure 1*) were placed on her ICU bed. Research on the effect of ICU outside the hospital and other factors that limit the impact of ICU admission for patients and relatives is a hot topic in the ICU literature. In the Netherlands this is, amongst others, advocated by the 'family- and patient-centred intensive care' foundation ([www.fcic.nl](http://www.fcic.nl)).

There are some tips to learn from this case. First prepare well and prepare well in advance. Prepare during the ICU stay with the patient in the same team that will perform the transport. Discuss with the team, including patient and relatives, what will happen in the likely scenario (a nice home visit), but also in an unlikely and maybe devastating scenario (for instance loss of the airway). As always use leadership skills that can be trained in crew resource management training environments. Furthermore, check with local hospital legal advisors and the transporting ambulance what

the responsibilities are with regard to care outside the hospital for the trip as well as for the stay at home.

Family- and patient-centred intensive care takes centre stage as ICU treatment shifts its focus from initial patient survival to long-term ICU consequences.<sup>[10,11]</sup> Early focus on individual needs and wishes and close communication with and within ICU treatment teams can help to improve the long-term consequences of ICU admission for the most vulnerable patients, but research on which interventions are effective and most cost-effective needs to be performed. In the interest of every ICU patient, it is important to offer the best individualised medical, nursing and supportive treatment during the ICU stay. For patient-centred outcomes, modern intensive care goes that extra mile.

### Acknowledgements

Jeroen Andringa MICU driver and Bastiaan Dost, manager RAV Groningen are acknowledged for helping to arrange the MICU trip.

The patient (JP) and relatives read the case description and commented on the conclusion and consented for its publication, including the pictures, in the Netherlands Journal of Critical Care.

### Disclosures

All authors declare no conflict of interest. No funding or financial support was received.

### References

- [1] Berthelsen PG, Cronqvist M. The first intensive care unit in the world: Copenhagen 1953. *Acta Anaesthesiol Scand.* 2003;47:6.
- [2] Droogh J. Interhospital transport of the critically ill patient. Focus on the journey. 2014 rugnl.
- [3] Goldfarb MJ, Bibas L, Bartlett V, Jones H, Khan N. Outcomes of Patient- and Family-Centered Care Interventions in the ICU: A Systematic Review and Meta-Analysis. *Crit Care Med.* 2017;45:1751-61.
- [4] Droogh JM, Smit M, Hut J, de Vos R, Ligtenberg JMM, Zijlstra JG. Inter-hospital transport of critically ill patients; expect surprises. *Crit Care.* 2012;16:R26.
- [5] Yuki N, Hartung H-P. Guillain-Barré syndrome. *New Engl J Med.* 2012;366:2294-304.
- [6] Willison HJ, Jacobs BC, van Doorn PA. Guillain-Barré syndrome. *Lancet.* 2016;388:717-27.
- [7] Freeman-Sanderson AL, Togher L, Elkins MR, Phipps PR. Return of Voice for Ventilated Tracheostomy Patients in ICU: A Randomized Controlled Trial of Early-Targeted Intervention. *Crit Care Med.* 2016;44:1075-81.
- [8] Egbers PH, Bultsma R, Middelkamp H, Boerma EC. Enabling speech in ICU patients during mechanical ventilation. *Intensive Care Med.* 2014;40:1057-8.
- [9] de Vries AJH, van Wijlick EHJ, Blom JM, Meijer I, Zijlstra JG. [When the end is near: an ICU patient who died at home]. *Ned Tijdschr Geneesk.* 2011;155:A3025.
- [10] Davidson JE, Powers K, Hedayat KM, et al. Clinical practice guidelines for support of the family in the patient-centered intensive care unit: American College of Critical Care Medicine Task Force 2004-2005. *Crit Care Med.* 2007;35:605-22.
- [11] Needham DM, Davidson J, Cohen H, et al. Improving long-term outcomes after discharge from intensive care unit: report from a stakeholders' conference. *Crit Care Med.* 2012;40:502-9.