

Automated CSF Management

Optimize Resource Utilization

Decrease Cost



Gravity drip chambers for external ventricular and lumbar CSF drainage are difficult to manage and fraught with problems, especially restrictions on patient movement and inadvertent “dumping” of CSF.

Our automated CSF management technology, LiquoGuard®7, is easy to manage, and eliminates the challenges associated with gravity drains. Handling mistakes are prevented, which leads to improved patient safety and faster recovery times.

LiquoGuard®7 continuously monitors the patient and drain lines for problems associated with CSF drainage, for example, pressure discrepancies, occlusions, and catheter disconnections. Intervention is only required if or when the device senses an issue with the drainage process.

Improved Patient Safety

Lower the risk of inadvertent under and over-drainage by precisely controlling CSF outflow and eliminating the need to re-level a transducer.

Fully Automated

Drain CSF based on a set pressure, a desired hourly volume, or a combination of both.

Get Patients Moving

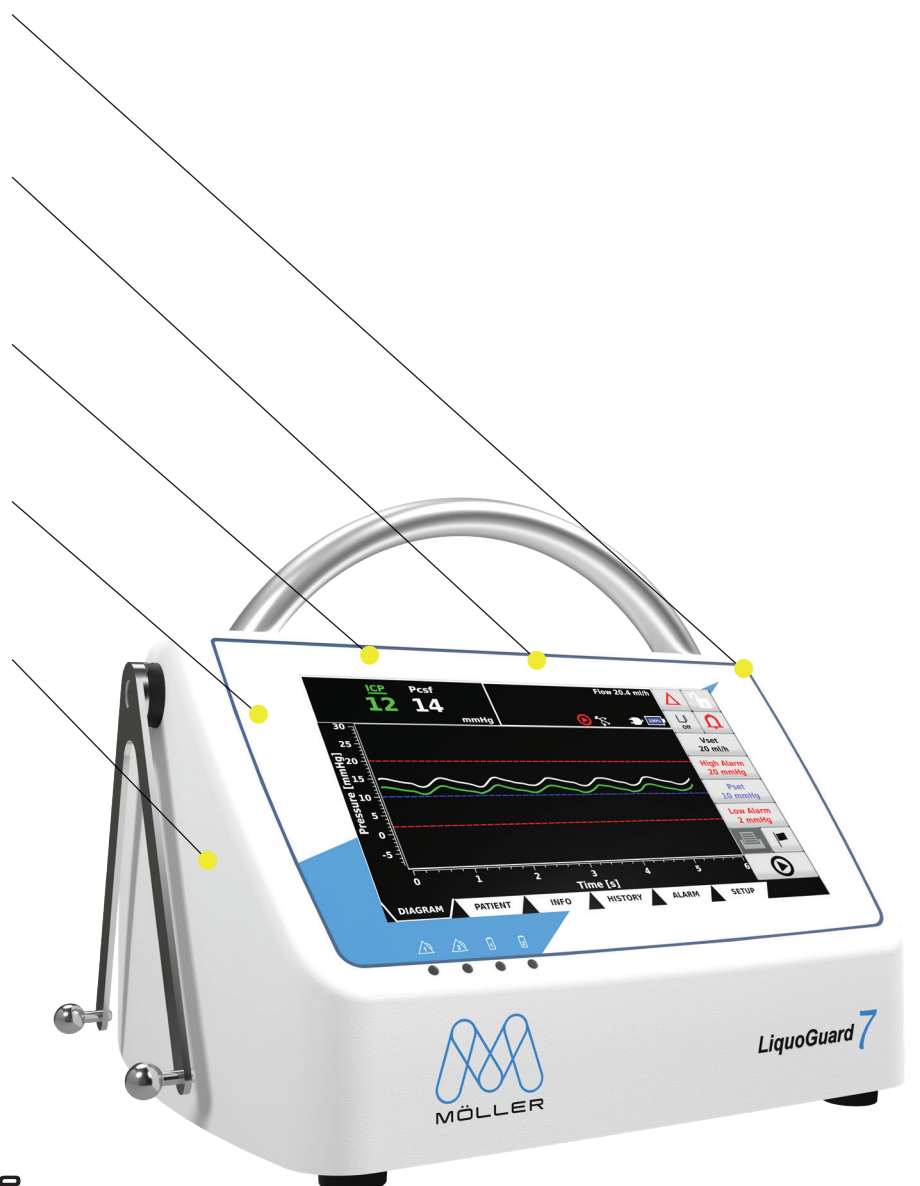
Early ambulation often leads to faster recovery times and improved patient satisfaction.

Reduce Hospital Costs

Reduce by ~90% the time nurses spend managing CSF drains. Provides an option to treat patients outside the ICU.

Documented Care

Continuously record the course of treatment on-screen and via the bedside monitor.



Amazing what's possible.

Optimize Resource Utilization Decrease Cost...



...by caring for patients in the step-down unit or on the floor.

Managing patients with gravity-based drains is challenging and requires specialized knowledge. An automated CSF drain, LiquoGuard®7, facilitates the cost-effective transfer of patients from the ICU to a step-down unit or to the floor.

- Automation eliminates nurse-to-nurse variability.
- Measure pressure and drain CSF simultaneously.
- Precise control of CSF outflow prevents under/over-drainage.
- Patient positioning may be changed safely without clamping the drain.
- Select intermittent pressure-controlled drainage, continuous volume controlled drainage, or a combination of both.



Unlock the potential to save more than **\$ 10,000 per patient per day.**

ICU	vs.	Floor
\$ 19,824.68		\$ 8,620.88

Daily charges for patients with EVD¹



Characteristics of manual drains vs. LiquoGuard®7 proportional to the number of patients.²

	Manual	LiquoGuard
Overdrainage	●●●●●	
Underdrainage	●	
Symptoms of Overdrainage	●●●●●	●
Increased Length of Stay	●●●●●	●

...by reducing complications.

CSF over-drainage often extends hospital length of stay. LiquoGuard®7 greatly lowers the risk of over-drainage thus decreasing the time patients spend in the hospital. Hospitals can save up to \$ 19,000 for each day the patient is discharged earlier. Patient safety is a top priority. LiquoGuard®7's integrated alarm system continuously monitors the patient and quickly identifies critical situations.²

...via ambulation and mobilization.

With gravity drains, patients typically remain in bed throughout the course of treatment, which limits their mobility, requires dietary restrictions, leads to complications, and extends ICU stays. LiquoGuard®7 allows for early ambulation, which can result in a 24% decrease in adverse events and a 34% reduction in hospital stay.³



Patients may be discharged 1-3 days earlier³, which represents a cost savings of up to **\$ 57,000 per patient for the hospital.**

With LiquoGuard®7, CSF drain patients can be managed safely in the step-down unit or on the floor, which frees up beds in the ICU for patients requiring a higher level of care and reduces overall hospital costs.



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1. Chu, J. K., Feroze, A. H., Collins, K., McGrath, L. B., Young, C. C., Williams, J. R., & Browd, S. R. (2019). Variation in hospital charges in patients with external ventricular drains: comparison between the intensive care and surgical floor settings. *Journal of neurosurgery. Pediatrics*, 24(1), 29–34. <https://doi.org/10.3171/2019.2.PEDS18545>
 2. Khawari, S., Kneizeh, M., Elborady, M. et al. The benefits of automated CSF drainage in normal pressure hydrocephalus. *Acta Neurochir* (2023). <https://doi.org/10.1007/s00701-023-05503-y>
 3. Adogwa O, Elasmadicy AA, Flakoff J, et al. Early ambulation decreases length of hospital stay, perioperative complications and improves functional outcomes in elderly patients undergoing surgery for correction of adult degenerative scoliosis. *Spine* 2017; 42: 1420-1425. <https://rb.gy/hnhlh>



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