

## I. Client's Objective

- Ambitious mid-sized pharmaceutical company seeking to expand their pipeline required rapid diligence in validation of acute hospital care therapeutics as acquisition assets

## II. Lumleian's Perspective

- Lumleian's decision scientists can rapidly perform secondary research to identify and define clinical and commercial value in the therapeutic area
- Targeted KOL and physician interviews can extensively probe unmet needs within current treatment paradigm and evaluate opportunity of potential acquisition assets

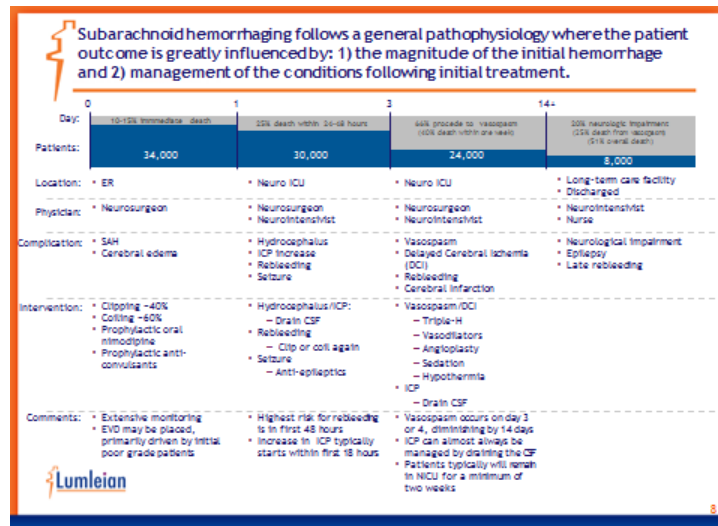
## III. Client Result

- **Quick diligence:** Within 2 weeks, we provided client with 1) high-level target diligence on current therapeutic treatment options for subarachnoid hemorrhage (SAH) and traumatic brain injury (TBI), and 2) extensive evaluation of two acquisition targets
- **Actionable deliverable:** Client was armed with complete asset validation and valuation data to inform strategic investment decisions
- **Expanded therapeutic strategy:** The provided landscape for therapeutic interventions included conditions beyond the initial potential applications for evaluated assets, expanding client's strategic vision for growth in acute hospital care

## IV. Engagement Summary

### Map Patient Flow

- Analysis of entire therapeutic landscape identified high-value acute hospital care markets
  - Prioritized SAH and TBI, and respective downstream complications
- Quantified market size to inform opportunity forecasting
- Characterized management practices and current therapeutic care paradigm through process of patient treatment



## IV. Engagement Summary

### Physician Interviews

- Patient flow analysis identified neurosurgeons and neurointensivists as responsible for all SAH/TBI interventions, and key targets for commercialization strategy
- Insights from the interviews clarified the relevant patient populations that could benefit from additional therapies

The physician interviews indicated clear needs for improved therapies to manage vasospasm, intracranial pressure and coagulopathy.

Unmet Need	Rationale	Physician comments
Vasospasm in SAH patients	<ul style="list-style-type: none"> <li>• Most physicians rate this as the highest unmet need and consider this as a significant driver for delayed death</li> <li>• About 30% of patients require intubation once signs of vasospasm emerge, there are no preventative options</li> <li>• Triple-H therapy is effective in roughly 50% of patients and cannot be used as a preventative measure</li> <li>• Angioplasty is very common in refractory patients though physicians would prefer better options</li> </ul>	<ul style="list-style-type: none"> <li>• "Difficult animal to manage"</li> <li>• "Would like something that works faster than Triple-H"</li> <li>• "Really need a protective agent or technique that reduces incidence and severity"</li> </ul>
Intracranial pressure in TBI patients	<ul style="list-style-type: none"> <li>• Managing ICP still seen as one of the more difficult challenges for TBI patients, diluting of CSF is often not enough</li> <li>• Osmotic therapy not appropriate for many patients and requires close monitoring, physicians would like other options beyond mannitol and hypertonic saline</li> <li>• Decompressive surgery works but is only a last, undesirable option</li> </ul>	<ul style="list-style-type: none"> <li>• "Ability to manage ICP in a reliable and safe manner would be a paradigm shift"</li> <li>• "Something other than mannitol"</li> </ul>
Coagulopathy in TBI patients	<ul style="list-style-type: none"> <li>• Is a significant issue that is difficult to reverse with patients on antiplatelet agents</li> <li>• Even in patients not on warfarin, etc., current options take a long time to produce an effect and work roughly 50-60% of the time</li> <li>• This is not a large patient population but is always an issue with these patients</li> </ul>	<ul style="list-style-type: none"> <li>• "Major, major problem that frequently can't be corrected"</li> <li>• "When these patients present it introduces significant challenges"</li> </ul>

**Decreasing priority**

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### Valuation and Pricing Strategy

- Potential pricing strategies were evaluated in the context of the therapeutic market to quantify true commercial potential

The opportunity exists for premium pricing though not surprisingly this will be dictated by ability to demonstrate a compelling economic advantage along with a clinical benefit.

**Cost Driving Factors**

- Inpatient costs are a primary cost component, comprising 75% - 92% of the total cost
- Current therapeutic costs are relatively low save for two notable exceptions raised by physicians:
  - 21-day treatment of nimodipine leads to overall high costs for hospital and patients, if patients leave the hospital before 21 days the cost is born by them
  - Factor VIII, used for rescue therapy in coagulopathy, costs ~\$6,500 a treatment and physicians stated this typically requires authorization prior to use

**Premium Pricing Challenge and Opportunity**

- Health economic arguments evaluating the treatment continuum historically has been difficult to demonstrate
- However, a few issues provide optimism in this setting:
  - TBI and SAH costs are predominantly incurred within the hospital setting reimbursed via DRG codes
  - Health care reform combined with better hospital management is forcing hospitals to evaluate the total cost of care
- A clinical development strategy demonstrating a clear economic benefit combine with a clear clinical benefit will be key factors driving pricing

**Vasospasm Management Costs\***

PATIENT LOS COST MODEL		
	Oral Nimodipine	Product N
ICU Days <sup>1</sup>	12.4	10.4
Length of Stay (days) <sup>2</sup> - at an average of \$4,000/day	21.3	16.6
Total Inpatient Cost/Patient	\$134,190	\$104,560

ACUTE MEDICAL CARE COST MODEL		
	Oral Nimodipine	Product N
DCI Cost of Care <sup>3</sup>	\$25000	\$17500
Rescue Therapy	\$1000	\$6600
Medication Treatment <sup>4</sup>	\$2163	\$11,000
Added nursing time of 30 min/day @ 31.50/hr x 21 days for medication administration	\$536	0
Total Cost of Care/Patient	\$37,209	\$35,500

Sources: \*company presentation, Physician Interviews

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### Asset Validation

- Two acquisition assets were evaluated in physician interviews to qualitatively corroborate secondary research
- High level cost-benefit analysis of assets armed client with knowledge needed for confident go/no-go decisions

Reactions to Asset V

**Asset V**

- Improved patient outcome through therapeutic management of intracranial pressure
- 10% Increase in the Glasgow Outcome Scale
- Administered in either a 2 day continuous infusion or 3 infusions of 12 hours

**Overall Reaction**

- Physicians felt the more specific inhibitor of nitric oxide synthase would be a welcomed alternative to mannitol and hypertonic saline
- However, there was significant concern surrounding the potential for systemic effects on blood pressure and in the lungs
- Many could see this as something that could replace osmotic therapy though it could be hard to change treatment patterns as it would be going against "fifty years of data and experience"

Pros	Cons
<ul style="list-style-type: none"> <li>• Makes sound mechanistic sense especially if it truly does not produce systemic complications</li> <li>• Either infusion schedule would be acceptable</li> <li>• Assumed durable response with less monitoring</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstrating an improvement in outcome, which the FDA would most likely require, could be a significant challenge</li> <li>• A number of physicians were concerned about inducing ischemic events</li> <li>• It could be a challenge to become first-line in front of osmotic agents, hypertonic saline has produced better data than mannitol but is still not always preferred</li> </ul>

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Sources: Physician Interviews