Linear Accelerators

Medical linear accelerators (linacs) are used in external-beam radiation therapy to non-invasively treat tumors in all areas of the body. Linacs emit well-defined beams of uniformly intense x-ray photon radiation of different energies, depending on the device. Low-energy linacs (4 to 6 MV photons) are used primarily to treat bone cancer and tumors of the head, neck, and breast. High-energy linacs (15 to 25 MV photons) are used to treat deep-seated neoplasms and tumors of the pelvis and thorax.

Models are broadly categorized as being standard linacs or linac-based radiosurgery systems. Linac-based radiosurgery allows for a very large dose of radiation to be delivered to a highly defined target area. Radiosurgery is typically delivered in a total of 1 to 5 doses versus conventional radiotherapy that is delivered in daily fractions over the course of several weeks. For successful treatment, radiation delivery must be very carefully calibrated and well defined to target tumors while avoiding irradiating healthy tissue.

How do your peers rate linac manufacturers and models?

ECRI Institute’s SELECTplus™ User Experience Network (UEN) helps supply chain leaders make more informed purchasing decisions by providing important feedback from their peers. The SELECTplus UEN recently polled hundreds of linac users on a variety of criteria including Ease of Use, Functionality, Reliability, Service, and Vendor Support. The survey results show user satisfaction ratings by manufacturer and model, along with feature comparisons, member interest (market share), and average quoted pricing based on actual proposals submitted by hospitals.
Here is a brief excerpt of the full UEN report (available exclusively to SELECTplus, Health Devices System, and Health Devices Gold members).

**Key survey findings**

- The linac models with the highest overall ratings scored the highest for ease of use, functionality, imaging capabilities, and device interoperability.
- Nearly half of all surveyed members typically utilize their linac for both standard radiotherapy and stereotactic radiosurgery.
- 59% of those surveyed use a treatment planning system and linear accelerator from the same manufacturer, and 47% use an oncology information system that is also sold by the linac manufacturer.

**Analytics and research to support the survey results**

ECRI Institute analysts and technology experts aggregated cost, configuration, service contract, and performance data based on the survey results and our research, deriving the following analytics and key takeaways.

**Key players: Accuray, Brainlab, Elekta, and Varian**

Based on SELECTplus member interest, these four vendors dominate the market. Here are key price metrics for the most popular linac-based radiosurgery systems they offer.

**Average Capital and Service Costs**

<table>
<thead>
<tr>
<th>Linac-based Radiosurgery Systems</th>
<th>Accuray CyberKnife M6</th>
<th>Brainlab Vero</th>
<th>Elekta Versa HD</th>
<th>Varian TrueBeam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg List Price</td>
<td>$7,257,000</td>
<td>$8,110,600</td>
<td>$9,216,700</td>
<td>No Data</td>
</tr>
<tr>
<td>Avg Quoted Price</td>
<td>$3,800,000</td>
<td>$4,800,000</td>
<td>$3,202,600</td>
<td>$3,604,100</td>
</tr>
<tr>
<td>Avg Annual Service</td>
<td>$431,000</td>
<td>$395,000</td>
<td>$212,400</td>
<td>$254,800</td>
</tr>
</tbody>
</table>

*(Quoted prices may include complementary products bundled with the linac.)*

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Reliability
Survey results show user ratings (1 to 5) for Linear Accelerator Reliability by vendor.
(Additional survey results, including ease of use, functionality, treatment speed, imaging capabilities, service response time, and user training for 8 of the latest models currently in production in the US are available to ECRI Institute members by logging on to the SELECTplus member website at www.ecri.org.)

Feature matching
Linac-based radiosurgery systems offer the most advanced and precise radiation treatment options. They are typically configured with integrated imaging systems that track the tumor during treatment and verify patient positioning. Some systems can use infrared markers or electromagnetic beacons for real-time motion monitoring which may be especially useful for stereotactic body radiation therapy (SBRT). Specific intracranial and extracranial (e.g., lung, prostate) radiosurgery packages are offered by several manufacturers.

Radiotherapy systems bundling
There has been a great deal of consolidation in the radiation therapy market over the past few years. Several of the leading suppliers are now able to provide a one-stop solution including the linac with integrated imaging, treatment planning system, oncology information system, and immobilization/positioning systems. Our data suggests that SELECTplus member hospitals have shown increased interest in bundled purchases of these systems. Potential benefits include: higher equipment discounts, reduced training expenses, coinciding service contracts, and enhanced interoperability between systems.

SELECTplus™ market data charts are based solely on price points submitted to ECRI Institute in a 12-month period by members of the SELECTplus™ advisory service, as of November 2014. This data is not validated market share data, and does not reflect information about manufacturers of linear accelerators from which we have not received any data. The data provided is time sensitive and may not be accurate at a future date.

SELECTplus, the nation’s leading healthcare technology procurement advisory service, assists hospitals and health systems worldwide with the safe, cost-effective acquisition of capital medical equipment and health information technologies.

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