Uniform delivery of light fluence is an important goal for photodynamic therapy. We present summary results for an infrared (IR) navigation system to deliver light dose uniformly during intracavitary PDT by tracking the movement of the light source and providing real-time feedback on the light fluence rate on the entire cavity surface area. In the current intrapleural PDT protocol, 8 detectors placed in selected locations in the pleural cavity monitor the light doses. To improve the delivery of light dose uniformity, an IR camera system is used to track the motion of the light source as well as the surface contour of the pleural cavity. A MATLAB-based GUI program is developed to display the light dose in real-time during PDT to guide the PDT treatment delivery to improve the uniformity of the light dose. We have developed an improved model for direct light calculation that accounts for the anisotropy of the light from the light sources. A comprehensive analysis of the distribution of light fluence during PDT is presented in both phantom conditions and in clinical cases.