Awareness, Perceived Importance, and Preparedness for Contingency Planning In Radiation Oncology Against Cyberattacks: A Survey of AAPM and EFOMP Members

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BACKGROUND

Cyberattacks can disable the networked systems required for radiation therapy even when treatment machines remain functional. Prevention is essential, but clinics also need practical contingency plans (CPs) that support safe treatment continuity.

TG-393 is developing guidance to help clinics maintain or restore safe treatment after a cyberattack.

OBJECTIVE

Assess CP awareness, necessity, and preparedness by institution size, region, and time.

AFFILIATIONS

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WHY THIS MATTERS

Radiation oncology has invested heavily in cyberattack prevention, but recovery planning or contingency plan (CP) has received less attention. A clinic may remain unable to treat when oncology information systems, imaging, scheduling, or network services are compromised.

This survey asked:

- How aware and prepared for the CP is the community?
- Does readiness differ between institutions with <5 and ≥5 treatment machines?
- Are there regional differences between the USA and Europe?
- Has readiness changed in the USA from 2022 to 2026?
- Do intended responses match actions actually taken after an attack?

METHODS

A four-question electronic survey assessed
(1) Awareness of CP,
(2) perceived necessity of CP,
(3) Preparedness of CP,
(4) Intended responses, and actions taken after prior attacks.

Awareness: well vs not well informed

Perception: CP essential vs not essential

Preparedness: preparing/implemented vs not preparing

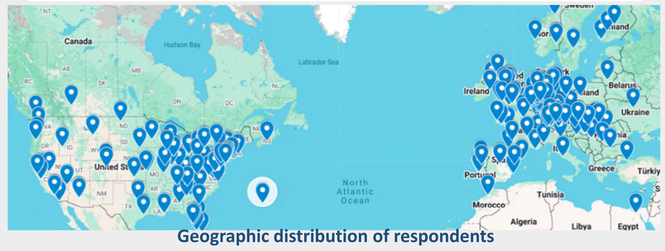
Institutions were grouped by number of treatment machines (<5 vs ≥5). USA–Europe, institution-size, and USA 2022–2026 comparisons

Pearson chi-square tests; $p < 0.05$ was considered significant.

Intended and actual actions were summarized descriptively because their denominators differed.

RESULTS

343 respondents: Europe 179, USA 142, Other 22



Geographic distribution of respondents

A total of 343 responses were analyzed: Europe 179, USA 142, and Other 22.

Table 1. Current status by number of treatment machines (2026)

Outcome	Over - all	Small <5	Large ≥5	Significance
Awareness: well informed	43.8%	35.2%	53.6%	$p < 0.05$
Perception: CP essential	67.0%	59.5%	75.2%	$p < 0.05$
Preparedness: preparing/implemented	47.2%	42.3%	52.4%	NS

Awareness was limited: 43.8% were well informed. Awareness was higher in institutions with ≥5 than <5 treatment machines (53.6% vs 35.2%; $p < 0.05$).

Overall, 67.0% considered a contingency plan essential. Perceived necessity was also higher in institutions with ≥5 machines (75.2% vs 59.5%; $p < 0.05$).

Preparedness remained incomplete: 47.2% were preparing or had implemented a plan. The difference by machine group was not significant (52.4% vs 42.3%).

Table 2. Regional comparison: USA vs Europe (2026)

Treatment machines	Awareness USA vs Europe	Perception USA vs Europe	Preparedness USA vs Europe
All institutions	49.5% vs 38.6% NS	71.4% vs 61.2% NS	48.9% vs 46.5% NS
<5	44.4% vs 26.6% $p < 0.05$	63.5% vs 54.4% NS	48.0% vs 38.9% NS
≥5	55.3% vs 54.0% NS	80.4% vs 69.6% NS	50.0% vs 55.3% NS

Table 3. USA temporal comparison: 2022 vs 2026

Outcome	2022	2026	Significance
Awareness: well informed	41.9%	49.5%	NS
Perception: CP essential	62.8%	71.4%	NS
Preparedness: preparing/implemented	48.8%	48.9%	NS

Insignificant regional and temporal differences are observed.

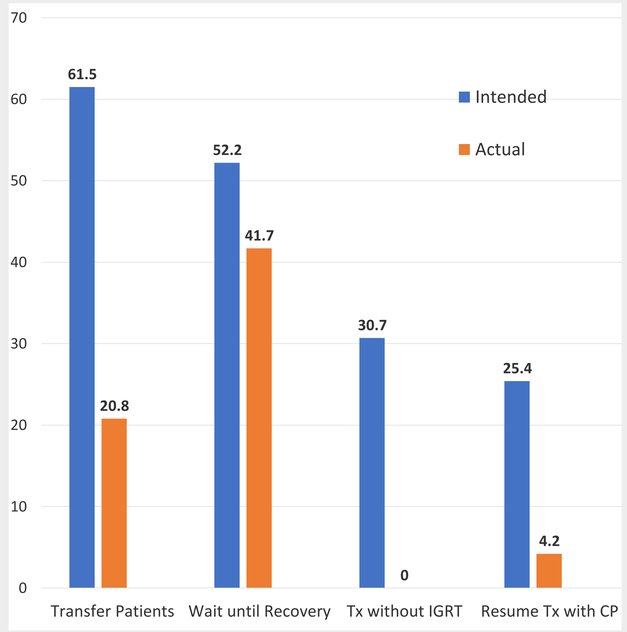


Figure 1. Intended responses versus actual practice after a cyberattack, multiple choices (%)

INTERPRETATION

Institution size was the clearest differentiator. Institutions with ≥5 treatment machines reported significantly greater awareness and perceived necessity; preparedness was not significantly different.

USA–Europe differences were not significant except for awareness among institutions with <5 machines, which was higher in the USA (44.4% vs 26.6%; $p < 0.05$).

USA awareness, perceived necessity, and preparedness increased from 2022 to 2026, but none of the temporal differences were statistically significant.

Intended responses differed markedly from actual practice, especially transfer to a nearby institution (61.5% intended vs 20.8% actual).

SUMMARY

Despite the importance and legal requirement of CP;

- Awareness (43.8%) and preparedness (47.2%) remained below 50%, although 67.0% considered CPs essential.
- Larger institutions reported greater awareness and perceived necessity.
- Regional and temporal differences were mostly not significant.
- Practical workflows, drills, minimum datasets, and cross-institutional coordination are needed.

REFERENCE

1. 1. Yi B, Sawant A, Chen S, Lee SW, Zhang B. Readiness for Radiation Treatment Continuity: Survey on Contingency Plans Against Cyberattacks. Adv Radiat Oncol. 2022;7(5):100990.