1730P Dealing with digital paralysis: Surviving a cyberattack in a cancer centre

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Background: A constellation of a large attack surface of interconnected devices and cyberimmaturity renders healthcare ripe to cybercrime. These vulnerabilities and their consequences will be magnified by the exponential growth in artificial intelligence. We assess the impact and implications of a cyberattack on a national cancer centre.

Methods: On 14 May 2021 (day 0), the first national healthcare ransomware attack occurred within which all hospitals including Cork University Hospital (CUH) Cancer Centre was implicated. Contingency plans were only present in laboratory services who had previously experience information technology (IT) failures. Departmental handwritten logs of activity and responses for 700 days after the attack were reviewed.

Results: Following the attack, all IT systems were shut down. No hospital cyberattack emergency plan was in place. Within CUH, on day 0, all radiotherapy (RT) treatment stopped, outpatient activity fell by 50%, and elective surgery stopped. Haematology, biochemistry and radiology capacity fell by 90% (daily sample deficit (DSD) 2700 samples), 75% (DSD 2,250 samples), and 90% (100% mammography/PETscan) respectively. Histopathology reporting times doubled (7 to 15 days). or paused IT links. Outsourcing of radiology and radiotherapy (RT) commenced, alternative communication networks (e.g., proton mail; Siilo) were utilised and national conference calls for RT and clinical trials were established. 136 patients had interrupted RT: median gap day 6 days category 1, 10 days for remaining patients. By day 28, e-mail communication was restored. By day 210, reporting and data storage backlogs were cleared and over 2000 computers were checked/replaced by the Irish Army. Notification of patients and staff whose data was compromised is ongoing (day 720).

Conclusions: Cyberattacks have rapid, profound and protracted impacts. While laboratory and diagnostic deficits were readily quantified, the impact of disrupted/delayed care on patient outcomes is less readily quantifiable but likely to be much greater. As criminals and nation states weaponize the internet, cyberawareness and cyberattack plans need to be embedded in healthcare.

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1731P Providing access to anticancer drugs within an armed conflict: The experience of Mission Kharkiv (MK) and Medecins Sans Frontieres (MSF) in Ukraine

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Background: Since the outbreak of the Russian Federation invasion, the border city of Kharkiv has come under bombardments leading to disruptions of the medical supply chain. Mission Kharkiv (MK) is a non-governmental organization (NGO) created in 2022 by Ukrainian volunteers to organize a consistent supply of chronic medications, especially anticancer drugs, in the area of Kharkiv.

Methods: A partnership was created between MK and MSF in June 2022. MSF decided a donation of 12 anticancer drugs, all registered on the World Health Organization list of essential medicines. The supplies were dispensed to MK by MSF teams in Ukraine. MK was in charge of the storage and the distribution of the drugs to patients meeting eligibility criteria determined with Ukrainian oncologists. Digital database was created to allow traceability of every medication from its donation to its dispensation.

Results: From October 2022 to April 2023, platinum compounds, taxanes, fluorouracil, trastuzumab, doxorubicin and hormone therapies were given to MK. Drugs were stocked in a warehouse unit equipped with cold chain facilities. 749 patients met eligibility criteria and were registered on the database to receive a whole course of treatment prescribed by Ukrainian oncologists. >99% of patients were ECOG 0-2. The largest types of cancers were digestive cancers (200 patients with gastrointestinal cancer, 21 with pancreatic cancer and 2 with biliary tract cancer representing 29.7% of all patients), breast cancers (206 women — 27.5%), gynaecologic cancers (151 women — 20.2%) followed by lung cancers (49 patients — 6.5%), hematologic malignancies (44 patients — 5.7%) and head and neck cancers (44 patients — 5.4%). Disease stage was reported in 723 patients. 32% were diagnosed with stage I-II, 33% with stage III and 35% with stage IV. Included patients received an average of 4.5 cycles of chemotherapy.

Conclusions: This model of humanitarian cancer medication release, coupled with cooperation between NGOs and a high level of digital traceability, has proven to be efficient. This approach could be scaled up in the future, enabling more cancer patients suffering from the consequences of war to benefit from this humanitarian program.

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1732P War and the fragility of anticancer drug supply networks in Ukraine

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Background: Systemic therapy availability in Ukraine is fluid due to the war. This information is key to optimizing cancer care.

Methods: Online surveys assessing cancer treatment capacity were distributed to physicians in Ukraine through cancer-focused social media in April 2023. Results were analyzed with descriptive statistics and Fisher's exact test.

Results: 15 oncologists from 14 oncology centers and 12 hematologists from 9 hematology centers completed surveys, including 3 (25%) and 4 (27%), respectively, from the more war-affected Northern, Southern, and Eastern Ukraine. Of the 36 drugs used for solid tumors, limited availability (half of the time, rarely available, or unavailable) was reported for 11 (31%) drugs by 2-4 (14-29%) respondents: cisplatin, cyclophosphamide, doxorubicin, etoposide, fluorouracil, ifosfamide, methotrexate, vincristine, filgrastim, dexamethasone, tamoxifen. 7 (19%) had limited availability per 5-6 (36-42%): capecitabine, irinotecan, mesna, anastrozole, leuprolide, zoledronic acid, erlotinib. 12 (33%) drugs were limited per 7-8 (50-57%): abiraterone, bleomycin, carboplatin, docetaxel, gemcitabine, oxaliplatin, paclitaxel, vinblastine, vinorelbine, folinic acid, bicalutamide, trastuzumab. 7 (19%) were limited per 8-13 (57%-93%): nivolumab, diethylstilbestrol, bevacizumab, palbociclib, trastuzumab emtansine, sorafenib. Of 31 drugs used for hematologic malignancies, 4 (21%) were limited in availability per 2-4 respondents: vincristine, bortezomib, imatinib, azacitidine. 5 (16%) were limited per 5-6: bendamustine, filgrastim, doxorubicin, lenalidomide, hydroxycarbamide. 10 (32%) were reported to be limited by 7-8: rituximab, thalidomide, vinblastine, chlorambucil, bleomycin, methotrexate, daunorubicin, nilotinib. 10 (32%) were limited per 9-12: ibrutinib, mercaptopurine, eltrombopag, erythropoietin, thrombopoietin, ruxolitinib, venetoclax, brentuximab, gemtuzumab, obinutuzumab. Drug availability did not differ by country region ($p > 0.05$).

Conclusions: Shortages of essential anticancer drugs are a continued challenge in Ukraine during the war. Results are limited by small sample size and limited sampling from regions affected by active hostilities.

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