**Appendices:**

**Appendix 1: The preliminary systematic review search strategy**

For PubMed, the search strategy employed the string "(Hospital AND Health OR Healthcare OR Medical) AND (Preparedness OR Readiness) AND (Hazardous OR HazMat OR CBRN OR Chemical OR Biological OR Radiological OR Nuclear)." For EBSCO, the search terms "(Healthcare OR Health OR Hospital OR Medical) AND Preparedness AND (Hazard OR Hazardous Material OR HazMat OR CBRN OR Chemical OR Biological OR Radiological OR Nuclear) were used." For English articles in ScienceDirect, three distinct queries were used as follows: "(Health OR Hospital OR Medical) AND Preparedness AND (CBRN OR Chemical OR Biological OR Radiological OR Nuclear)," "(Health OR Hospital OR Medical) AND Preparedness AND (Hazardous AND HazMat)," and "(Health OR Hospital OR Medical) AND readiness AND (Hazardous OR HazMat)." In the French segment of ScienceDirect, the search terms used was "(Santé OU Sanitaire OU Hôpital OR Médical) ET (dangereuse OU Chimique OU Biologique OU Radiologique OU Nucléaire)." Finally, for French articles in "Lissa" and "Santecom," the search terms "(capacité OU Gestion OU Catastrophe OU urgence) ET (Santé OU Sanitaire OU Hôpital OU Médical) ET (Chimique OU Biologique OU Radiologique OU Nucléaire OU CBRN)," and "Chimique OU biologique OU Radiologique OU chimique." were used.

**Appendix 2: Detailed validation results**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Flowcharts and Tabletop Simulation Exercises | | | | | | | |
| Items | ICVI | CI\_Lower | CI\_Upper | Kappa | SCVI\_Avg | SCVI\_Prop | ICC |
| Q1 | 0.857 | 0.421 | 0.963 | -0.333 | 0.810 | 0.630 | -0.106 |
| Q2 | 1.000 | 0.590 | 0.996 | -0.333 | 0.810 | 0.630 | -0.106 |
| Q3 | 0.857 | 0.421 | 0.963 | -0.333 | 0.810 | 0.630 | -0.106 |
| Q4 | 0.571 | 0.184 | 0.816 | 0.000 | 0.810 | 0.630 | -0.106 |
| Q5 | 0.714 | 0.290 | 0.901 | -0.333 | 0.810 | 0.630 | -0.106 |
| Q6 | 0.571 | 0.184 | 0.816 | 0.000 | 0.810 | 0.630 | -0.106 |
| Q7 | 0.571 | 0.184 | 0.816 | 0.000 | 0.810 | 0.630 | -0.106 |
| Q8 | 0.429 | 0.099 | 0.710 | -0.333 | 0.810 | 0.630 | -0.106 |
| Q9 | 0.857 | 0.421 | 0.963 | -0.333 | 0.810 | 0.630 | -0.106 |
| Q10 | 1.000 | 0.590 | 0.996 | -0.333 | 0.810 | 0.630 | -0.106 |
| Q11 | 0.857 | 0.421 | 0.963 | -0.333 | 0.810 | 0.630 | -0.106 |
| Q12 | 1.000 | 0.590 | 0.996 | -0.333 | 0.810 | 0.630 | -0.106 |
| Q13 | 0.857 | 0.421 | 0.963 | -0.333 | 0.810 | 0.630 | -0.106 |
| Q14 | 0.857 | 0.421 | 0.963 | -0.333 | 0.810 | 0.630 | -0.106 |
| Q15 | 0.714 | 0.290 | 0.901 | -0.333 | 0.810 | 0.630 | -0.106 |
| Q16 | 0.714 | 0.290 | 0.901 | -0.333 | 0.810 | 0.630 | -0.106 |
| Q17 | 0.714 | 0.290 | 0.901 | -0.333 | 0.810 | 0.630 | -0.106 |
| Q18 | 1.000 | 0.590 | 0.996 | -0.333 | 0.810 | 0.630 | -0.106 |
| Q19 | 1.000 | 0.590 | 0.996 | -0.333 | 0.810 | 0.630 | -0.106 |
| Q20 | 0.857 | 0.421 | 0.963 | -0.333 | 0.810 | 0.630 | -0.106 |
| Q21 | 0.857 | 0.421 | 0.963 | -0.333 | 0.810 | 0.630 | -0.106 |
| Q22 | 0.714 | 0.290 | 0.901 | -0.333 | 0.810 | 0.630 | -0.106 |
| Q23 | 0.857 | 0.421 | 0.963 | -0.333 | 0.810 | 0.630 | -0.106 |
| Q24 | 0.857 | 0.421 | 0.963 | -0.333 | 0.810 | 0.630 | -0.106 |
| Q25 | 1.000 | 0.590 | 0.996 | -0.333 | 0.810 | 0.630 | -0.106 |
| Q26 | 0.857 | 0.421 | 0.963 | -0.333 | 0.810 | 0.630 | -0.106 |
| Q27 | 0.714 | 0.290 | 0.901 | -0.333 | 0.810 | 0.630 | -0.106 |
| Prepardness Assessement tool | | | | | | | |
| Items | ICVI | CI\_Lower | CI\_Upper | Kappa | SCVI\_Avg | SCVI\_Prop | ICC |
| Q 1 | 0.714 | 0.219 | 0.912 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 2 | 1.000 | 0.478 | 0.995 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 3 | 1.000 | 0.478 | 0.995 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 4 | 0.857 | 0.332 | 0.966 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 5 | 0.714 | 0.219 | 0.912 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 6 | 0.714 | 0.219 | 0.912 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 7 | 0.857 | 0.332 | 0.966 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 8 | 0.714 | 0.219 | 0.912 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 9 | 0.429 | 0.064 | 0.739 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 10 | 0.714 | 0.219 | 0.912 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 11 | 0.571 | 0.131 | 0.837 | 0.000 | 0.850 | 0.655 | -0.072 |
| Q 12 | 0.714 | 0.219 | 0.912 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 13 | 0.714 | 0.219 | 0.912 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 14 | 0.571 | 0.131 | 0.837 | 0.000 | 0.850 | 0.655 | -0.072 |
| Q 15 | 0.571 | 0.131 | 0.837 | 0.000 | 0.850 | 0.655 | -0.072 |
| Q 16 | 0.429 | 0.064 | 0.739 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 17 | 0.714 | 0.219 | 0.912 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 18 | 0.714 | 0.219 | 0.912 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 19 | 0.714 | 0.219 | 0.912 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 20 | 0.857 | 0.332 | 0.966 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 21 | 0.714 | 0.219 | 0.912 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 22 | 0.714 | 0.219 | 0.912 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 23 | 0.429 | 0.064 | 0.739 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 24 | 0.714 | 0.219 | 0.912 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 25 | 0.714 | 0.219 | 0.912 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 26 | 1.000 | 0.478 | 0.995 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 27 | 0.857 | 0.332 | 0.966 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 28 | 1.000 | 0.478 | 0.995 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 29 | 1.000 | 0.478 | 0.995 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 30 | 1.000 | 0.478 | 0.995 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 31 | 1.000 | 0.478 | 0.995 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 32 | 0.857 | 0.332 | 0.966 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 33 | 0.857 | 0.332 | 0.966 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 34 | 1.000 | 0.478 | 0.995 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 35 | 1.000 | 0.478 | 0.995 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 36 | 1.000 | 0.478 | 0.995 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 37 | 0.857 | 0.332 | 0.966 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 38 | 1.000 | 0.478 | 0.995 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 39 | 1.000 | 0.478 | 0.995 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 40 | 1.000 | 0.478 | 0.995 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 41 | 1.000 | 0.478 | 0.995 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 42 | 1.000 | 0.478 | 0.995 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 43 | 1.000 | 0.478 | 0.995 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 44 | 1.000 | 0.478 | 0.995 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 45 | 1.000 | 0.478 | 0.995 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 46 | 0.857 | 0.332 | 0.966 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 47 | 0.857 | 0.332 | 0.966 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 48 | 0.857 | 0.332 | 0.966 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 49 | 1.000 | 0.478 | 0.995 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 50 | 1.000 | 0.478 | 0.995 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 51 | 1.000 | 0.478 | 0.995 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 52 | 0.857 | 0.332 | 0.966 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 53 | 1.000 | 0.478 | 0.995 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 54 | 1.000 | 0.478 | 0.995 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 55 | 0.857 | 0.332 | 0.966 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 56 | 1.000 | 0.478 | 0.995 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 57 | 1.000 | 0.478 | 0.995 | -0.333 | 0.850 | 0.655 | -0.072 |
| Q 58 | 1.000 | 0.478 | 0.995 | -0.333 | 0.850 | 0.655 | -0.072 |

**Appendix 3: Delphi Survey Consensus Analysis Results**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Question | Mean | Median | IQR | Agreement % | Standard Deviation | Coefficient of Variation % | Kendall's W | Kendall's W Classification |
| Q1 | 4.72 | 5 | 0 | 95 | 0.55 | 11.73 | 0.63 | Strong |
| Q2 | 4.53 | 5 | 1 | 90 | 0.75 | 16.59 | 0.92 | Almost Perfect |
| Q3 | 4.75 | 5 | 0 | 95 | 0.54 | 11.43 | 0.68 | Strong |
| Q4 | 4.6 | 5 | 1 | 92.5 | 0.63 | 13.75 | 0.72 | Strong |
| Q5 | 4.58 | 5 | 1 | 90 | 0.75 | 16.33 | 0.75 | Strong |
| Q6 | 4.4 | 5 | 1 | 87.5 | 0.93 | 21.1 | 0.94 | Almost Perfect |
| Q7 | 4.97 | 5 | 0 | 100 | 0.16 | 3.18 | 0.62 | Strong |
| Q8 | 4.82 | 5 | 0 | 97.5 | 0.55 | 11.39 | 0.80 | Strong |
| Q9 | 4.9 | 5 | 0 | 100 | 0.3 | 6.2 | 0.66 | Strong |
| Q10 | 4.8 | 5 | 0 | 97.5 | 0.69 | 14.31 | 0.62 | Strong |
| Q11 | 4.97 | 5 | 0 | 100 | 0.16 | 3.18 | 0.66 | Strong |
| Q12 | 4.9 | 5 | 0 | 100 | 0.3 | 6.2 | 0.76 | Strong |
| Q13 | 4.55 | 5 | 1 | 90 | 0.68 | 14.89 | 0.67 | Strong |
| Q14 | 4.32 | 5 | 1 | 77.5 | 1.05 | 24.21 | 0.75 | Strong |
| Q15 | 4.5 | 5 | 1 | 90 | 0.75 | 16.69 | 0.81 | Almost Perfect |
| Q16 | 4.55 | 5 | 1 | 90 | 0.85 | 18.59 | 0.76 | Strong |
| Q17 | 4.28 | 5 | 1 | 77.5 | 1.04 | 24.27 | 0.75 | Strong |
| Q18 | 4.85 | 5 | 0 | 97.5 | 0.43 | 8.8 | 0.78 | Strong |
| Q19 | 4.8 | 5 | 0 | 97.5 | 0.46 | 9.67 | 0.83 | Almost Perfect |
| Q20 | 4.85 | 5 | 0 | 100 | 0.36 | 7.46 | 0.80 | Strong |
| Q21 | 4.68 | 5 | 0.25 | 92.5 | 0.62 | 13.17 | 0.92 | Almost Perfect |
| Q22 | 4.92 | 5 | 0 | 100 | 0.27 | 5.42 | 0.74 | Strong |
| Q23 | 4.78 | 5 | 0 | 95 | 0.53 | 11.11 | 0.85 | Almost Perfect |
| Q24 | 4.45 | 5 | 1 | 92.5 | 0.93 | 20.95 | 0.78 | Strong |
| Q25 | 3.72 | 4 | 2 | 55 | 1.34 | 35.96 | 0.67 | Strong |
| Q26 | 4.6 | 5 | 1 | 92.5 | 0.81 | 17.61 | 0.77 | Strong |
| Q27 | 4.68 | 5 | 0 | 90 | 0.8 | 17.05 | 0.76 | Strong |
| Q28 | 4.72 | 5 | 0 | 95 | 0.55 | 11.73 | 0.90 | Almost Perfect |
| Q29 | 4.62 | 5 | 1 | 95 | 0.59 | 12.66 | 0.82 | Almost Perfect |
| Q30 | 4 | 5 | 2 | 65 | 1.22 | 30.49 | 0.63 | Strong |
| Q31 | 4.3 | 5 | 1 | 80 | 0.97 | 22.47 | 0.75 | Strong |
| Q32 | 4.78 | 5 | 0 | 92.5 | 0.58 | 12.08 | 0.75 | Strong |
| Q33 | 4.88 | 5 | 0 | 100 | 0.33 | 6.87 | 0.87 | Almost Perfect |
| Q34 | 4.68 | 5 | 0.25 | 95 | 0.66 | 14.03 | 0.78 | Strong |
| Q35 | 4.75 | 5 | 0 | 92.5 | 0.59 | 12.39 | 0.71 | Strong |
| Q36 | 4.8 | 5 | 0 | 97.5 | 0.46 | 9.67 | 0.96 | Almost Perfect |
| Q37 | 4.53 | 5 | 1 | 87.5 | 0.78 | 17.33 | 0.79 | Strong |
| Q38 | 4.75 | 5 | 0 | 95 | 0.63 | 13.27 | 0.73 | Strong |
| Q39 | 4.42 | 5 | 1 | 85 | 0.93 | 21.03 | 0.78 | Strong |
| Q40 | 4.78 | 5 | 0 | 95 | 0.62 | 12.98 | 0.72 | Strong |
| Q41 | 4.72 | 5 | 0 | 92.5 | 0.68 | 14.37 | 0.81 | Almost Perfect |
| Q42 | 4.72 | 5 | 0 | 95 | 0.64 | 13.55 | 0.74 | Strong |
| Q43 | 3.78 | 4.5 | 3 | 57.5 | 1.37 | 36.24 | 0.76 | Strong |
| Q44 | 3.35 | 4 | 4 | 57.5 | 1.7 | 50.83 | 0.86 | Almost Perfect |
| Q45 | 3.38 | 4 | 3 | 55 | 1.58 | 46.82 | 0.70 | Strong |
| Q46 | 3.3 | 3.5 | 3 | 50 | 1.57 | 47.64 | 0.68 | Strong |
| Q47 | 3.85 | 4 | 2 | 72.5 | 1.41 | 36.52 | 0.75 | Strong |
| Q48 | 4.45 | 5 | 1 | 85 | 1.08 | 24.38 | 0.75 | Strong |
| Q49 | 4.7 | 5 | 1 | 97.5 | 0.52 | 10.99 | 0.73 | Strong |
| Q50 | 4.72 | 5 | 0 | 95 | 0.55 | 11.73 | 0.78 | Strong |
| Q51 | 4.72 | 5 | 0.25 | 97.5 | 0.51 | 10.7 | 0.89 | Almost Perfect |
| Q52 | 4.7 | 5 | 0 | 95 | 0.72 | 15.39 | 0.77 | Strong |
| Q53 | 4.82 | 5 | 0 | 97.5 | 0.55 | 11.39 | 0.60 | Moderate |
| Q54 | 4.92 | 5 | 0 | 100 | 0.27 | 5.42 | 0.96 | Almost Perfect |
| Q55 | 4 | 4 | 2 | 72.5 | 1.11 | 27.74 | 0.60 | Strong |
| Q56 | 4.85 | 5 | 0 | 95 | 0.48 | 9.96 | 0.73 | Strong |
| Q57 | 4.35 | 5 | 1 | 77.5 | 1.19 | 27.32 | 0.87 | Almost Perfect |
| Q58 | 3.9 | 4.5 | 2 | 65 | 1.32 | 33.76 | 0.87 | Almost Perfect |
| Q59 | 4.12 | 5 | 2 | 70 | 1.24 | 30.16 | 0.63 | Strong |
| Q60 | 4.88 | 5 | 0 | 100 | 0.33 | 6.87 | 0.98 | Almost Perfect |
| Q61 | 4.85 | 5 | 0 | 100 | 0.36 | 7.46 | 0.69 | Strong |
| Q62 | 4.9 | 5 | 0 | 100 | 0.3 | 6.2 | 0.79 | Strong |
| Q63 | 4.88 | 5 | 0 | 100 | 0.33 | 6.87 | 0.62 | Strong |
| Q64 | 4.58 | 5 | 1 | 92.5 | 0.64 | 13.9 | 0.63 | Strong |
| Q65 | 4.9 | 5 | 0 | 100 | 0.3 | 6.2 | 0.72 | Strong |
| Q66 | 4.72 | 5 | 0 | 95 | 0.55 | 11.73 | 0.61 | Strong |
| Q67 | 4.47 | 5 | 1 | 87.5 | 0.96 | 21.46 | 0.62 | Strong |
| Q68 | 3.17 | 3 | 3 | 37.5 | 1.52 | 47.79 | 0.76 | Strong |
| Q69 | 4.62 | 5 | 1 | 92.5 | 0.7 | 15.24 | 0.70 | Strong |
| Q70 | 4.72 | 5 | 0 | 92.5 | 0.68 | 14.37 | 0.96 | Almost Perfect |
| Q71 | 4.75 | 5 | 0.25 | 100 | 0.44 | 9.23 | 0.71 | Strong |
| Q72 | 4.7 | 5 | 0 | 97.5 | 0.72 | 15.39 | 0.77 | Strong |
| Q73 | 3.88 | 4 | 2 | 62.5 | 1.16 | 29.91 | 0.96 | Almost Perfect |
| Q74 | 2.95 | 3 | 4 | 37.5 | 1.65 | 55.86 | 0.65 | Strong |
| Q75 | 4.88 | 5 | 0 | 100 | 0.33 | 6.87 | 0.76 | Strong |
| Q76 | 4.82 | 5 | 0 | 100 | 0.38 | 7.98 | 0.61 | Strong |
| Q77 | 4.72 | 5 | 0.25 | 97.5 | 0.51 | 10.7 | 0.63 | Strong |
| Q78 | 4.78 | 5 | 0 | 100 | 0.42 | 8.86 | 0.71 | Strong |
| Q79 | 4.47 | 5 | 1 | 90 | 0.85 | 18.93 | 0.65 | Strong |
| Q80 | 4.28 | 5 | 1 | 82.5 | 1.01 | 23.68 | 0.62 | Strong |
| Q81 | 4.28 | 4.5 | 1 | 82.5 | 0.88 | 20.51 | 0.75 | Strong |
| Q82 | 3.83 | 4 | 2.25 | 65 | 1.3 | 33.95 | 0.91 | Almost Perfect |
| Q83 | 3.55 | 3.5 | 3 | 50 | 1.43 | 40.32 | 0.77 | Strong |
| Q84 | 4.72 | 5 | 0.25 | 97.5 | 0.51 | 10.7 | 0.75 | Strong |
| Q85 | 4.53 | 5 | 1 | 90 | 0.75 | 16.59 | 0.63 | Strong |
| Q86 | 4.58 | 5 | 1 | 95 | 0.68 | 14.76 | 0.76 | Strong |
| Q87 | 4.8 | 5 | 0 | 97.5 | 0.46 | 9.67 | 0.68 | Strong |
| Q88 | 4.65 | 5 | 0.25 | 92.5 | 0.7 | 15.05 | 0.78 | Strong |
| Q89 | 4.53 | 5 | 1 | 92.5 | 0.78 | 17.33 | 0.76 | Strong |
| Q90 | 4.62 | 5 | 1 | 95 | 0.67 | 14.43 | 0.82 | Almost Perfect |
| Q91 | 4.55 | 5 | 1 | 90 | 0.75 | 16.47 | 0.67 | Strong |
| Q92 | 4.75 | 5 | 0 | 97.5 | 0.59 | 12.39 | 0.68 | Strong |
| Q93 | 4.7 | 5 | 1 | 97.5 | 0.52 | 10.99 | 0.64 | Strong |
| Q94 | 4.7 | 5 | 0.25 | 97.5 | 0.61 | 12.93 | 0.95 | Almost Perfect |
| Q95 | 4.65 | 5 | 0.25 | 92.5 | 0.7 | 15.05 | 0.75 | Strong |
| Q96 | 4.58 | 5 | 0.25 | 87.5 | 0.84 | 18.45 | 0.78 | Strong |
| Q97 | 4.58 | 5 | 1 | 90 | 0.81 | 17.77 | 0.62 | Strong |
| Q98 | 4.68 | 5 | 1 | 97.5 | 0.62 | 13.17 | 0.66 | Strong |
| Q99 | 4.65 | 5 | 1 | 95 | 0.66 | 14.24 | 0.71 | Strong |
| Q100 | 4.65 | 5 | 1 | 95 | 0.66 | 14.24 | 0.92 | Almost Perfect |
| Q101 | 4.65 | 5 | 1 | 97.5 | 0.53 | 11.47 | 0.63 | Strong |
| Q102 | 4.55 | 5 | 1 | 90 | 0.75 | 16.47 | 0.90 | Almost Perfect |
| Q103 | 4.68 | 5 | 1 | 95 | 0.57 | 12.24 | 0.76 | Strong |
| Q104 | 4.53 | 5 | 1 | 92.5 | 0.72 | 15.82 | 0.76 | Strong |
| Q105 | 4.78 | 5 | 0 | 100 | 0.42 | 8.86 | 0.75 | Strong |
| Q106 | 4.58 | 5 | 1 | 92.5 | 0.71 | 15.56 | 0.63 | Strong |
| Q107 | 4.72 | 5 | 0 | 97.5 | 0.6 | 12.67 | 0.63 | Strong |
| Q108 | 4.62 | 5 | 1 | 95 | 0.67 | 14.43 | 0.75 | Strong |
| Q109 | 4.6 | 5 | 1 | 95 | 0.67 | 14.6 | 0.62 | Strong |
| Q110 | 4.78 | 5 | 0 | 100 | 0.42 | 8.86 | 0.77 | Strong |
| Q111 | 4.65 | 5 | 0.25 | 92.5 | 0.7 | 15.05 | 0.60 | Moderate |
| Q112 | 4.6 | 5 | 1 | 95 | 0.67 | 14.6 | 0.77 | Strong |
| Q113 | 4.72 | 5 | 0 | 95 | 0.55 | 11.73 | 0.83 | Almost Perfect |
| Q114 | 4.65 | 5 | 1 | 92.5 | 0.62 | 13.38 | 0.64 | Strong |
| Q115 | 4.78 | 5 | 0 | 100 | 0.42 | 8.86 | 0.79 | Strong |
| Q116 | 3.5 | 5 | 4 | 60 | 1.83 | 52.16 | 0.71 | Strong |
| Q117 | 3.52 | 5 | 4 | 62.5 | 1.8 | 50.99 | 0.76 | Strong |
| Q118 | 4.72 | 5 | 1 | 100 | 0.45 | 9.57 | 0.67 | Strong |
| Q119 | 4.78 | 5 | 0 | 100 | 0.42 | 8.86 | 0.79 | Strong |
| Q120 | 4.75 | 5 | 0.25 | 100 | 0.44 | 9.23 | 0.75 | Strong |
| Q121 | 4.8 | 5 | 0 | 100 | 0.41 | 8.44 | 0.85 | Almost Perfect |
| Q122 | 4.75 | 5 | 0 | 90 | 0.63 | 13.27 | 0.85 | Almost Perfect |
| Q123 | 4.85 | 5 | 0 | 100 | 0.36 | 7.46 | 0.68 | Strong |
| Q124 | 4.75 | 5 | 0.25 | 100 | 0.44 | 9.23 | 0.77 | Strong |
| Q125 | 4.75 | 5 | 0 | 95 | 0.54 | 11.43 | 0.80 | Strong |
| Q126 | 4.8 | 5 | 0 | 97.5 | 0.46 | 9.67 | 0.76 | Strong |
| Q127 | 4.7 | 5 | 1 | 97.5 | 0.52 | 10.99 | 0.64 | Strong |
| Q128 | 4.88 | 5 | 0 | 95 | 0.46 | 9.51 | 0.66 | Strong |
| Q129 | 4.78 | 5 | 0 | 97.5 | 0.48 | 10.05 | 0.74 | Strong |
| Q130 | 4.65 | 5 | 0 | 85 | 0.74 | 15.82 | 0.76 | Strong |
| Q131 | 4.75 | 5 | 0 | 97.5 | 0.49 | 10.39 | 0.71 | Strong |
| Q132 | 4.68 | 5 | 0.25 | 92.5 | 0.62 | 13.17 | 0.63 | Strong |
| Q133 | 4.6 | 5 | 1 | 95 | 0.59 | 12.84 | 0.77 | Strong |
| Q134 | 4.6 | 5 | 1 | 92.5 | 0.63 | 13.75 | 0.76 | Strong |
| Q135 | 4.5 | 5 | 1 | 87.5 | 0.72 | 15.91 | 0.64 | Strong |
| Q136 | 4.62 | 5 | 1 | 95 | 0.59 | 12.66 | 0.67 | Strong |
| Q137 | 4.58 | 5 | 1 | 90 | 0.68 | 14.76 | 0.68 | Strong |
| Q138 | 4.42 | 5 | 1 | 82.5 | 0.84 | 19.07 | 0.66 | Strong |
| Q139 | 4.6 | 5 | 1 | 90 | 0.67 | 14.6 | 0.79 | Strong |
| Q140 | 4.25 | 5 | 1.25 | 75 | 0.95 | 22.45 | 0.79 | Strong |
| Q141 | 4.53 | 5 | 1 | 90 | 0.68 | 15 | 0.79 | Strong |
| Q142 | 4.2 | 5 | 1.25 | 75 | 1.02 | 24.23 | 0.81 | Almost Perfect |
| Q143 | 4.55 | 5 | 1 | 87.5 | 0.71 | 15.7 | 0.72 | Strong |
| Q144 | 4.45 | 5 | 1 | 87.5 | 0.71 | 16.05 | 0.78 | Strong |
| Q145 | 4.2 | 5 | 2 | 72.5 | 1.02 | 24.23 | 0.66 | Strong |
| Q146 | 4.42 | 5 | 1 | 87.5 | 0.71 | 16.09 | 0.67 | Strong |
| Q147 | 4.4 | 5 | 1 | 85 | 0.74 | 16.91 | 0.76 | Strong |
| Q148 | 4.4 | 5 | 1 | 82.5 | 0.78 | 17.68 | 0.63 | Strong |
| Q149 | 4.45 | 5 | 1 | 87.5 | 0.71 | 16.05 | 0.74 | Strong |
| Q150 | 4.3 | 5 | 2 | 72.5 | 0.94 | 21.84 | 0.65 | Strong |
| Q151 | 4.6 | 5 | 1 | 90 | 0.67 | 14.6 | 0.75 | Strong |
| Q152 | 4.2 | 5 | 2 | 70 | 0.99 | 23.63 | 0.62 | Strong |
| Q153 | 4.6 | 5 | 1 | 90 | 0.67 | 14.6 | 0.75 | Strong |
| Q154 | 4.53 | 5 | 1 | 85 | 0.75 | 16.59 | 0.76 | Strong |
| Q155 | 4.53 | 5 | 1 | 87.5 | 0.72 | 15.82 | 0.76 | Strong |
| Q156 | 4.42 | 5 | 1 | 82.5 | 0.78 | 17.64 | 0.63 | Strong |
| Q157 | 4.55 | 5 | 1 | 90 | 0.68 | 14.89 | 0.65 | Strong |
| Q158 | 4.53 | 5 | 1 | 92.5 | 0.64 | 14.14 | 0.83 | Almost Perfect |
| Q159 | 4.53 | 5 | 1 | 90 | 0.68 | 15 | 0.72 | Strong |
| Q160 | 4.53 | 5 | 1 | 90 | 0.68 | 15 | 0.66 | Strong |

**Appendix 4: Unsupervised Machine-Learning Delphi Response Analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Summary of the clusters’ Age and experiences | | | | |
| Cluster | Experts’ Count | Mean\_Age (Years) | Mean\_Experience (Years) | |
| 1 | 7 | 38.9 | 4 | |
| 2 | 4 | 31.5 | 3.25 | |
| 3 | 14 | 56.7 | 23.7 | |
| 4 | 15 | 43.6 | 11.5 | |
| Cluster Analysis detailed results | | | | |
| Cluster’s label | | | | Clusters Number |
| 1-Egyptian Ambulance Organisation-Egypt | | | | 1 |
| 7-KSAU-HS-Saudi Arabia | | | | 1 |
| 9-Presidency state of security-Saudi Arabia | | | | 1 |
| 12-Charles Nicolle Hospital-Tunisia | | | | 1 |
| 19-I prefer not to disclose-Palestine | | | | 1 |
| 20-Independent CBRN trainer certified by EU-Lebanon | | | | 1 |
| 28-Emergency department and prehospital emergency service-Tunisia | | | | 1 |
| 29-Iran University of Medical Science-Iran | | | | 1 |
| 34-SAMU01-Tunisia | | | | 1 |
| 40-Soonchunhyang University Bucheon Hospital-South Korea | | | | 1 |
| 4-Lebanese American University-Lebanon | | | | 2 |
| 8-Queens and University of Technology University-Australia | | | | 2 |
| 11-I prefer not to disclose-I prefer not to disclose | | | | 2 |
| 21-Mohammed VI Hospital Center of Marrakech-Morocco | | | | 2 |
| 23-I prefer not to disclose-Saudi Arabia | | | | 2 |
| 25-Hamad Medical Corporation-Qatar | | | | 2 |
| 26-Crisis department, Ministry of Transport/Security-Defense University Laboratory, Conservatoire National des Arts et Métiers-France | | | | 2 |
| 27-Ministry of interior-Saudi Arabia | | | | 2 |
| 36-National Ambulance-UAE | | | | 2 |
| 39-College of Health Sciences-Kuwait | | | | 2 |
| 2-Hamad Medical Corporation-Qatar | | | | 3 |
| 14-University of Rome, Tor Vergata,Italy.-Lebanon | | | | 3 |
| 16-Sharm Elsheikh International hospital-Egypt | | | | 3 |
| 18-I prefer not to disclose-I prefer not to disclose | | | | 3 |
| 31-Shahid Beheshti University of Medical Sciences-Iran | | | | 3 |
| 32-SAMU05-Tunisia | | | | 3 |
| 33-Independent Consultant-Belgium | | | | 3 |
| 37-Alberta Health Services-Emergency Disaster Management-Canada | | | | 3 |
| 3-Centro Hospitalar do Médio Tejo EPE-Portugal | | | | 4 |
| 5-Assistance publique des Hôpitaux de Paris-France | | | | 4 |
| 6-International CBRN Institute and Université Libre de Bruxelles-Belgium | | | | 4 |
| 10-CHMT-Portugal | | | | 4 |
| 13-International CBRN Institute-Belgium | | | | 4 |
| 15-Hamad Medical Corporation-Qatar | | | | 4 |
| 17-SAMU 08-Tunisia | | | | 4 |
| 22-Dwam Medical Co.-Saudi Arabia | | | | 4 |
| 24-I prefer not to disclose-France | | | | 4 |
| 30-Tekirdag Namik Kemal University-Turkey | | | | 4 |
| 35-Hôpitaux de Paris-France | | | | 4 |
| 38-University of Medicine of Tunis-Tunisia | | | | 4 |

**Appendix 5: Decision Trees Flowcharts for Managing CBRN Emergencies**

1. **Preamble**

Chemical, Biological, Radiological, and Nuclear (CBRN) incidents pose diversified challenges and potential threats to the contemporary world. This guideline’s inception is motivated by the need for a structured approach to managing and responding to such incidents.

CBRN incidents are not limited to terrorist activities or unintended leakages; they also include the manipulations by criminal groups intending to trade, attack, or use CBR materials against opposing entities, reflecting the multi-layered nature of the threat background.

Countries worldwide, notably those in the Middle East and North Africa (MENA) region, host chemical plants. These industrial establishments might be juxtaposed with variations in safety measures, illuminating the potential for “accidents,” which can profoundly impact surrounding residential areas and hospitals, particularly those with limited protection levels. Therefore, healthcare personnel in the nearby hospitals must be trained and ready to receive a sudden influx of contaminated patients and be capable of ensuring self-protection with available resources, especially in low-income MENA countries.

It is essential to recognize that the imperative for readiness is universal, transcending the geographical, economic, and infrastructural differences and limitations of most hospitals in the Middle East and North Africa Region except the Gulf Cooperation Council (GCC).

This document provides comprehensive guidance to pre-hospital healthcare providers, emergency departments (EDs), and receiving facilities that are fundamental in managing mass casualty incidents emanating from CBRN events.

**To whom this guideline is created?**

The guidelines are pertinent to healthcare frontline responders and equally significant for EDs and other healthcare facilities. In the aftermath of a CBRN incident, victims (potentially contaminated patients) may not always await pre-hospital emergency medical assistance; many might move toward the nearest EDs, precipitating an urgent requirement for adjacent facilities to prepare for a surge of patients. In such scenarios, a nuanced understanding of diverse patient pathways, including those for pediatrics and individuals with language barriers, is indispensable. It is essential to consider the specific vulnerabilities associated with different demographic and ethnic groups, such as children, the elderly, and pregnant individuals, to ensure equitable and effective response strategies.

**Notes regarding the PPE**

This guideline’s emphasis on Personal Protective Equipment (PPE) mirrors its crucial role in protecting healthcare workers from injuries or exposure to hazardous conditions.

PPE, ranging from respirators and chemical protective suits to gloves and boots, must comply with prevailing standards and provide requisite protection levels for varying hospital decontamination receiver roles.

This guideline underlines the importance of imparting training on the effective use, limitations, and maintenance of PPE and providing refresher training at regular intervals to all pertinent departments. The selection of PPE should optimally balance protection levels and practical considerations, such as movement restrictions and maintenance requirements.

Level C and D equipment are integral components in responding to CBRN incidents.

* Level C equipment includes:
  + Full-face masks with visors.
  + Air Purifying Respirators (APR).
  + Chemical Protective Clothing, amongst others.
* Level D equipment involves:
  + Surgical masks with visors.
  + Surgical gowns and caps

Highlighting the difference in protection levels between the two. A detailed understanding of these equipment levels’ specifications, usage, and limitations is vital in ensuring the safety and efficacy of the response to CBRN incidents.

Level C maximum is typically sufficient for pre- or in-hospital healthcare personnel to assess and treat CBRN patients. Levels A and B are reserved for responders operating at the source of the CBRN and the surrounding high-risk areas. Fully removing the patient’s clothes is imperative to mitigate the risk of CBRN exposure, all while maintaining the utmost respect for human rights and individual ethnic practices, such as wearing hijabs by Muslim women, wearing hoods by Christian nuns, or adhering to Jewish clothing requirements.

It is crucial to remember that many MENA countries, such as Tunisia, Morocco, Iraq, etc., predominantly have residents from these three ethnic groups, necessitating the assurance of their privacy as far as possible in the given circumstances. Establishing and preserving a trusting relationship between clinicians and patients is essential, and offering alternatives when possible is crucial in maintaining this bond.

**Special considerations before decontamination**

I would also like to remind you that the steps of the guidelines, especially decontamination/antidote administration, are important for the following:

* It is essential to ensure rinsing and covering any visible wound before decontaminating.
* Children are particularly susceptible to the repercussions of Chemical Warfare Agents (CWAs) and Toxic Industrial Chemicals (TICs), due to their greater density than air, causing these agents to linger closer to the ground.
* Elderly individuals, juxtaposed with their lower immune system capabilities and prevalent comorbidities, may encounter augmented mobility impairments during CBRN events, necessitating tailored response strategies.
* Pregnant individuals warrant special consideration due to the unique vulnerabilities and needs associated with pregnancy.

**Future plans**

Subsequent “Sub-guidelines” will be developed to elaborate further on steps, for instance, according to the type of CBR hazards (Gas, liquid, solid...).

**Remarque about the VIPs**

In the guidelines for managing intentional CBRN incidents, the triage protocol includes a provision for segregating individuals classified as Very Important Persons (VIPs). It is imperative to clarify that VIP status is confined **strictly to individuals occupying positions of significant political prominence** rather than denoting a distinction based on economic stature.

This stratification is established on the pragmatic assessment that such political figures are likely to constitute the primary targets in the event of a deliberate CBRN incident. Consequently, the co-location of VIPs with the general population victims during the triage process could inadvertently elevate the risk of secondary attacks against the latter group. Furthermore, the unique security protocols accompanying political personages necessitate tailored considerations, which, if integrated within the broader triage operations, could potentially encroach upon the expedition and efficacy of the response to the broader victim cohort.

The guidelines advocate for a distinct triage trajectory for VIPs during CBRN events within this context—a measure not born out of preferential treatment based on status but out of a strategic imperative to minimise additional risks and ensure an unimpeded and effective medical and security response for all affected individuals.

Abbreviation

1. **Chemical Incident Emergencies (ST-SRAT Decision Tree)**

A diagram of a safety hazard

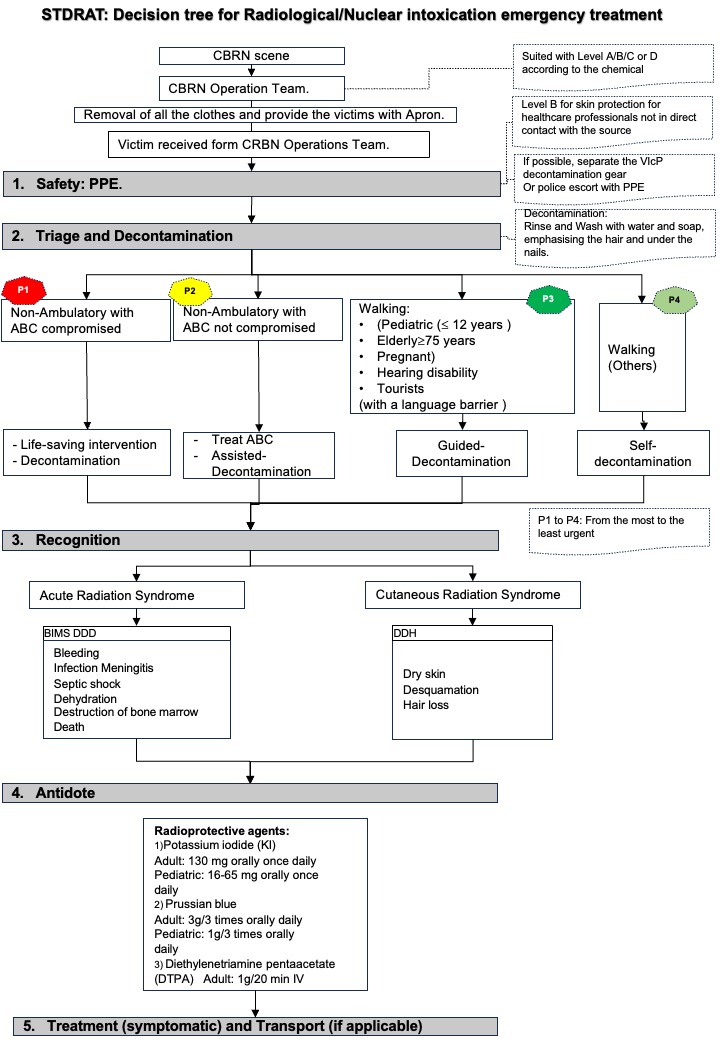
Description automatically generated with medium confidence

1. **Biological Incidents/Pandemic Emergencies (RSI-DATT/RSI-DTT Decision Tree)**

A diagram of a safety system

Description automatically generated with medium confidence

1. **Radiological/Nuclear Incidents Emergencies (ST-SRAT)**



1. **References**
2. Department of Health. Victoria, Australia. (2013, November 22). *Decontamination guidance for hospitals*. <https://www.health.vic.gov.au/publications/decontamination-guidance-for-hospitals>.
3. (Moore, Geller, and Clark 2015).
4. Moore, Brooks L., Robert J. Geller, and Charlotte Clark. 2015. ‘Hospital Preparedness for Chemical and Radiological Disasters’. *Emergency Medicine Clinics of North America* 33(1): 37–49.

**Appendix 6: CBRN Emergencies Tabletop Simulation Training Scenarios**

# Preamble

The pertinence of robust preparedness against Chemical, Biological, Radiological, and Nuclear (CBRN) contingencies cannot be overstated. The scenarios herein presented constitute a pedagogic toolkit designed to underpin tabletop exercises that can be conducted virtually and in face-to-face settings.

These scenarios are used for strategic and tactical training to enhance the readiness of organizations and personnel to respond to CBRN incidents. From the specter of bioterrorism to the exigencies of chemical incident management, each scenario is scaffolded to provide a realistic approach to the challenges caused by such emergencies:

# “Bioterrorism: Responding to Exposure to Biological Agents”: Responding to Exposure to Biological Agents.

* “Chemical Incident Leakage Near Football Stadium” immerses responders in a large-scale chemical leak, demanding immediate and effective intervention.
* “Communicable Disease or Intoxication Scenario” unfolds the complexity of dealing with widespread health emergencies, a timely reminder of our vulnerabilities in the post-pandemic world.
* “Terrorist Attack at HazChem Convention Center Metro Station” propels trainees into the heart of an urban terrorist attack scenario, encompassing the nuances of hazardous chemical involvement.
* “Appendices” provide supplementary information, a repository of ancillary data to augment the training experience.

In these scenarios, participants will encounter a spectrum of potential realities, improving their skills and fortifying their capacity against these existential menaces.

We reflect on the online workshop at the Qatar Health International Congress 2022. Where these scenarios were piloted in an online workshop. [An article](https://www.qscience.com/content/journals/10.5339/jemtac.2022.38?crawler=true#:~:text=Conclusion%3A%20This%20study%20demonstrated%20that,conducted%20again%20for%20other%20participants.) was published explaining the level of satisfaction with this workshop, making the scenarios more than just hypothetical constructs

# Information

1. The following scenarios were created to be utilized in preparedness training for various types of CBRN incidents.
2. The following application has to be installed on the attendees’ devices to help them in some of the scenarios:

Graphical user interface, application

Description automatically generatedGraphical user interface, application

Description automatically generated

1. The objective of these scenarios is to help any training attended to:
   * 1. Understand the layout of the HazMat CBRN scene during response.
     2. Explain the importance of installing medical and non-medical decontamination stations.
     3. Practice the triage and the pre-hospital deployment in case of a HazMat CBRN incident.

# Bioterrorism: Responding to Exposure to Biological Agents

February 7, 2022, was a beautiful evening with a full moon in Hazchem Ville. Everyone was looking forward to attending the concert of the world-famous singer Chemistra Nuclori, which should start at 7 p.m. Local newspapers have been talking about it for weeks. They are expecting at least 20,000 fans to be present in HazChem theatre for this concert. Crowding started at the theatre’s gates two hours before the concert. With the worldwide terrorist threat, police and checkpoints were everywhere at the entry points of Hazchem Ville.

Ahmed and Victor are two doctors working in the academic hospital of HazChem Ville. Ahmed is an emergency doctor with 20 years of experience. In contrast, Victor is a newly recruited family physician with two years of experience in emergency medicine and is actively involved in any improvement projects of patient safety and care. His latest project aimed to Optimise the inventory, procurement, and distribution of antibiotic medical countermeasures (MCMs) for post-exposure and prophylaxis from two of the most known bioterrorist diseases at HazChem Hospital. The intervention consisted of implementing an emergency stock for Anthrax infection, sufficient for 50 patients for three days in case of a sudden terrorist attack. This is a project that few of his colleagues appreciated since HazChem Ville is one of the safest cities in the world.

The hospital received two patients on February 14th, 2021, at 06.45 pm. They are both neighbors. They both fainted at their houses thirty minutes ago. They had a sudden onset of fever and severe headache. They have no past medical history. After examination, Dr. Ahmed prescribed a flu treatment and was getting ready to discharge them. In between, the nurse Leshika informed him that she noticed the existence of a painless, raised, itchy, hard erythema with a black center resembling an insect bite on both patients’ necks.

A close up of a hairy arm

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Source (<https://mayocl.in/3yGqydP>)

1. If you receive two patients with the same sudden onset of the symptoms above, would you do the same as Dr. Ahmed? Explain.

After examination, Dr. Ahmed decided to keep them for surveillance as they both were too weak to walk. 45 minutes later, 05 patients from the same neighborhood came to the ED with the same fever symptoms and the same painless, itchy erythema with a black center. They were all in the same concert, and Dr. Ahmed decided that, according to his long experience, this must have been a dermal reaction due to an insect bite. Dr. Victor believes this might be a suspicious situation and that exposure to a biological agent should be expected, and precautionary measures should be taken.

1. Which one of them do you think is right? Explain.
2. What are the precautionary measures that Dr. Victor would be advising?

After further investigation with the patients, Dr. Victor figured out that one of those patients, Mark, was working with a veterinarian, and he helped in carrying a package of dead animals labeled with United Nations (UN) number 2814 without even wearing basic PPE.

1. Using the ERG as indicated in the picture below, what new measures would you establish in this ED?

# Chemical Incident Leakage Near Football Stadium

HAZCHEM is a chemical industrial facility located in the southern region of HAZCHEM Ville. Its total land area exceeds 20,000 m2.

It is 06:30 p.m. on Friday, July 21st, 2022, the National Command Center (NCC) of HAZCHEM Ville receives a call.

* (1) Call taker: Ambulance service, what’s the emergency address?
* (2) Caller: there is a yellowish smoke cloud coming out from one of the factory stores
* (3) Call taker: what’s the address of the emergency, sir, so we can send the ambulance?
* (4) Caller: Hazchem factory in Hazchem Ville, near gate 5
* (5) Call taker: OK, sir, your address is clear, and an ambulance is on the way. What’s the phone number you are calling from?
* (6) Caller: Sir, I don’t know if it is one of the factory landlines. Let me check my register and get back to you.
* (7) Call taker: it’s OK, sir, give me a valid mobile number in case we need to contact you later.
* (8) Caller: 30507396, 30507396 this is my mobile number
* (9) Call taker: OK, tell me exactly what happened.
* (10) Caller: a very dense yellowish cloud of smoke was coming from one of the facility’s stores, and there were people there doing the inventory. The alarm has been triggered.
* (11) Call taker: Are you with the patients now?
* (12) Caller: no, I am outside the gate, but I think 10 people are working inside the store and 06 of my colleagues, each one is in an entrance gate
* (13) Call taker: OK, sir as I told you, an ambulance is already on the way. Kindly stay online I need to get more information from you.
* (14) Call taker: is everyone safe and out of danger?
* (15) Caller: I am not sure …as I told you 10 workers are still inside the store with fumes, 60 in the building located downwind beside the store, now two security guards of the other facility gates are approaching my porta cabin and they seem unharmed, we are safe for now, but the cloud can move due to the wind…exactly in the direction of HazChem football stadium.
* (16) Call taker: What kinds of fumes or hazardous materials are involved?
* (17) Caller: Sir, I am just a security agent I don’t know…
* (18) Call taker: do you know the warning placard numbers?
* (19) Caller: the store has a black and white lozenge with a skull picture inside the lozenge…
* (22) Call taker: are any of your colleagues contaminated with chemicals?
* (23) Caller: I am unsure about the workers inside the store, but two of my colleagues were exposed to the fumes.
* (24) Call taker: are they completely alert?
* (25) Caller: my colleagues are OK, but I am not sure about the others inside
* (26) Call taker: are they having any difficulty breathing?
* (27) Caller: I am not sure, sir, they are both coughing non-stop, their eyes are tearing and reddening, and they are telling me that they have chest burning sensation, but as I previously told you, I have no idea about the others.
* (28) Call taker: do they have difficulty speaking between breaths?
* (29) Caller: no sir…
* (30) Call taker: I already sent the ambulance to help you stay on the line I will tell you exactly what to do next. Do not open any doors or windows in an attempt to gain access to the patients.
* (31) Caller: OK sir… the ambulance is here.

NCC supervisor noticed that they were receiving numerous calls of the HazChem compound situated 3 km downwind from Hazchem industrial facility with complaints of eye, nose, and throat irritation.

1. According to the information provided in the call taking, what could be the case? Explain.

Chemical Spill

Fire

Both

1. Using the description provided in statement 19, use the ERG mobile app to determine the initial isolation distance to become aware of your own safety and correct use of PPE.
2. What advice could you provide to Hazchem compound residents?

An ambulance with two paramedics, Ahmed and Victor, reached the scene at 06:45 pm. Using a binocular, they noticed also the existence of another placard with UN number on it 1017.

1. What would Ahmed and Victor report to the NATIONAL COMMAND CENTER (NCC)?
2. Using the ERG mobile app as indicated below, determine what is the name of this hazardous material, then identify the immediate isolation distance.
3. Using what we have seen in the presentation, draw on the whiteboard the scene response layout.

HazChem stadium was located 3 Km downwind, and the fumes cloud was moving along the wind direction. Hazchem stadium, with its closing roof, was hosting the semi-final between Chemstar team and Biostar team with full spectator attendance (around 40000). The football match was in its 93 minutes with 2-0 score for Biostar team. Only 2 more minutes were approximatively remaining of the match.

1. What would be the next action that you recommend?

# Communicable Disease or Intoxication Scenario

On December 20, 2022, the xxx Medical Conference was held in the Hazchem Grand Hotel in HAZCHEM Ville. Presenters and participants were invited from all over the world. On December 19, 30 overseas speakers attended the dinner reception at 8 p.m. The Guests enjoyed the food except Dr. Chaka, who was not feeling well and stayed in his room to rest. Dr. Chaka, an epidemiologist working with the World Health Organization in Geneva, came straight from a week’s mission in his home country, the Democratic Republic of Congo.

Three hours after the welcoming dinner, the event coordinator called 999 to request an ambulance for Dr. Chaka, who was very sick.

* (1) Call taker: Ambulance service, what’s the emergency address?
* (2) Caller: Hazchem Grand Hotel, floor 56, room 562.
* (3) Call taker: OK, your address is clear, and an ambulance is on the way. What’s the phone number you are calling from?
* (4) Caller: I am calling from the hotel landline, but I can give you my mobile phone number if it’s ok.
* (5) Call taker: yes, please.
* (6) Caller: it’s 30507396
* (7) Call taker: 30507396. OK, tell me exactly what happened.
* (8) Caller: Dr. Chaka, a 45-year-old male, a guest in our conference, is very sick; he told me that he vomited around 04 times and has diarrhoea. He is shivering, I am facing him now that he is fully conscious.
* (9) Call taker: Is he completely alert?
* (10) Caller: yes
* (11) Call taker: Is he breathing normally?
* (12) Caller: he is breathing fast
* (13) Call taker: is he bleeding or vomiting blood?
* (14) Caller: he says that his vomit is reddish blood-like, and his stool is watery and dark-colored.
* (15) Call taker: Is the bleeding serious?
* (16) Caller: no
* (17) Call taker: Does he have a bleeding disorder, or is he on blood thinners?
* (18) Caller: he said no… is it something bad?!!! This question scared me; I hope the paramedics will be here soon…

An ambulance with two paramedics, Ahmed and Victor, was nearby and responded to the scene within 5 minutes. At that time, Dr. Chaka was in the toilet, so they started collecting information from the event coordinator when they found out that the patient arrived the day before from the Democratic Republic of Congo. He remained in his room since then, complaining of fever, acute bloody diarrhea, and epistaxis. Victor and Ahmed had a small discussion since the patient had a recent history of travel…

1. What do you think was the discussion about?

Meanwhile, the Hazchem Grand Hotel chief personnel came to the paramedics and reported that around 30 guests were calling from the 49th and 50th floors complaining of severe abdominal pain. Some of them were vomiting. They were all guests in the welcoming dining ceremony.

1. What seems to be the problem? Explain.
2. What would Ahmed and Victor report to the NATIONAL COMMAND CENTER (NCC)?
3. Should Ahmed and Victor establish an IV line immediately and start administering normal saline to Dr. Chaka until they check the other patients? Explain.
4. What should Ahmed and Victor do to manage the situation after the arrival of more ambulances?
5. Using what we have seen in the presentation, draw the scene response layout on the whiteboard.
6. Type the word “infectious substance” in the ERG phone app as indicated in the picture below and briefly explain what kind of information it provides.

# Terrorist Attack at HazChem Convention Center Metro Station

Overview:

This scenario concerns an incident at HazChem Convention Center’s Metro station. It is composed of two parts:

1. The first part of the scenario is the phone call made by the security agent in the HazChem convention centre’s Metro station to the HazChem-Ambulance Service call taker in the National Command Center (NCC) to report a suspicious incident during the crowded morning rush hour.
2. The second part was when the first ambulance arrived with two paramedics on board.
3. For this activity, kindly download the application ERG 2020, available on Android and IOS.

* (1) (Call Taker): Ambulance Service. What’s the emergency address?
* (2) (Caller): Hello, sir, I am the security officer at HazChem Convention Centre’s Metro station, the one near Dubai Mall basement B2. Please send an ambulance fast, everybody is sick!!!
* (3) (Call Taker) The address is clear; the Ambulance is on the way, sir. What’s the phone number you are calling from?
* (4) (Caller) 30507396, 30507396, the mess is everywhere, sir!!!
* (5) (Call Taker) Be reassured, sir, an ambulance is on the way, I will help you until the crew reaches you. Okay, tell me exactly what happened.
* (6) (Caller) Everyone became suddenly sick, sir, we are around 30 people here, and almost all are having the same problem; everyone is vomiting and coughing…sir my eyes are watery and burning…I don’t know what’s going on. I just came from the ground floor.
* (7) (Call Taker) If it is too dangerous to stay where you are and think you can leave safely, get away and call us from somewhere safe. Don’t worry, sir, an ambulance is on the way, I need to ask you some answers so we can help the patients.
* (8) (Caller) It’s chaotic! Everyone is using the stairs to leave the underground level.
* (9) (Call Taker) Is everybody safe and out of danger?
* (10) (Caller) I am not sure, I feel tightness in my chest now, and I can barely see… Am I going to die!!!! Please send us civil defense; someone says his friends are still down.
* (11) (Call Taker) Help is on the way. Ambulances also civil defence will handle the situation, stay out of danger and don’t allow anyone to go inside.
* (12) (Caller) I will hang up the phone!

The line was disconnected.

A nearby ambulance with two paramedics on board, Ahmed and Victor, was dispatched by the National Command Center (NCC) to the scene. They arrived in 07 minutes. On their arrival, the situation was chaotic; people ran out of the station. Some were coughing, with watery eyes and runny nose, sweating. One patient was lying on the floor with obvious tachypnea; two others had tonic-clonic movements. Security approached the two paramedics “Sir! Sir! I am the one who called you!” [Coughing in between] “There are still many people inside lying on the floor. Please check them.” Ahmed and Victor returned to their ambulance to wear an N95 mask.

1. According to the information provided, what seems probable to be the problem:
2. CO intoxication
3. Blister agent’s intoxication
4. Nerves agents
5. Chocking agent
6. Ahmed and Victor returned to the ambulance to put on N95 masks. What do you think? Please explain
7. I agree
8. I disagree

Explain.

1. What would be your report to NATIONAL COMMAND CENTER (NCC)?
2. What would you do if you were the one responding to this situation? Please Explain.
3. Besides Benzodiazepine®, what else do you recommend administering to the patient with convulsion?

Meanwhile, more people were still coming out from the stairs exit. The scene was still messy. They were all coughing, holding their chest. Some were vomiting, and all with red, watery eyes. More ambulances, police, and civil defense units arrived.

1. Draw the scene response layout on the whiteboard using what we have seen in the presentation.
2. Assuming that this is a situation of a terrorist attack by “Sarin”, type the word “sarin” in the ERG phone app as indicated in the picture below and explain briefly what kind of information is provided about this agent.

# Others

Diagram

Description automatically generated

Diagram

Description automatically generated