

Analysis of standard serum biomarker levels in patients with non-specific symptoms seen at Guy's Rapid Diagnostic Clinic



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Background

- Rapid diagnostic clinics (RDCs) were set up by NHS England to provide an alternative pathway for patients with non-specific symptoms (e.g., weight loss and fatigue) concerning of malignancy, who are not suitable for a site-specific route.
- The aim of the current study was to perform a preliminary analysis of the serum biomarker levels of patients attending an RDC and subsequently diagnosed with cancer, as compared to those patients diagnosed with a mild benign disease or with no clear organic cause for their symptoms.
- The overall aim of our project is to introduce a blood panel to provide an 'alert' or triage to fast-track RDC referrals and expedite diagnostics.

Methods

- We analyzed the current panel of standard serum biomarkers taken at referral for patients seen at Guy's RDC between December 2016 and April 2022.
- We compared the distribution of biomarkers based on the clinical cut-off levels between those diagnosed with cancer (n=283) and those with a mild benign diagnosis or with unknown cause for their symptoms (n=1,787).

Further Analyses



Figure 1. Analytical pathway followed to create a blood panel triage system for patients referred to Guy's RDC

Results

- The biggest differences were observed for inflammatory markers (i.e., erythrocyte sedimentation rate (ESR), ferritin, lactate dehydrogenase (LDH), C reactive protein (CRP)), albumin, alkaline phosphatase (ALP), and serum free light chain (SFLC) ratio.
- Compared with the non-cancer population, more cancer patients had high levels of ESR (≥ 14 mm/hr) (36% (n=103) vs 17% (n=301)), ferritin (≥ 276 ug/L) (21% (n=59) vs 6% (n=108)), LDH (≥ 225 U/L) (34% (n=95) vs 17% (n=302)), CRP (4 mg/L) (56% (n=157) vs 20% (n=356)), ALP (≥ 130 mL/min) (27% (n=77) vs 5% (n=86)), platelets ($\geq 400 \times 10^9$) (11% (n=31) vs 3% (n=45)), and SFLC ratio (≥ 1.65) (12% (n=33) vs 4% (n=68)).
- Conversely, 25% (n=70) of cancer patients had low albumin levels (< 40 g/L) compared with 4% (n=68) of the non-cancer population.

Conclusions

- Preliminary descriptive analysis of data showed that cancer patients with non-specific symptoms commonly present with abnormal inflammatory markers, albumin, ALP, platelets, and SFLC ratio, compared with patients diagnosed with a mild benign disease or with no clear organic cause for their symptoms.
- This is the first step in the development of a risk-stratification tool which will aid in the early diagnosis of cancer in patients who present with non-specific symptoms in the RDC.

Results

	Non cancer (n= 1787) n, %	Cancer (n=283) n, %
ESR		
Normal (0-13 mm/hr)	546 (30.6)	65 (23)
High (≥ 14 mm/hr)	301 (16.8)	103 (36.4)
Missing	940 (52.6)	115 (40.6)
Ferritin		
Low (≤ 21 mcg/L)	65 (3.6)	9 (3.2)
Normal (22-275)	717 (40.1)	95 (33.6)
High (≥ 276)	108 (6)	59 (20.9)
Missing	897 (50.2)	120 (42.4)
LDH		
Low (≤ 134)	33 (1.9)	12 (4.2)
Normal (135-214)	811 (45.4)	92 (32.5)
High (≥ 215)	302 (16.9)	95 (33.6)
Missing	641 (35.9)	84 (29.7)
CRP		
Normal (≤ 3)	1148 (64.2)	100 (35.3)
High (≥ 4)	356 (19.9)	157 (55.5)
Missing	283 (15.8)	26 (9.2)
ALP		
Low (≤ 34)	15 (0.8)	1 (0.4)
Normal (35-129)	1520 (85.1)	192 (67.8)
High (≥ 130)	86 (4.8)	77 (27.2)
Missing	166 (9.3)	13 (4.8)
Albumin		
Low (≤ 39)	85 (4.8)	70 (24.7)
Normal (40-52)	1532 (85.7)	198 (70)
High (≥ 52)	15 (0.8)	2 (0.7)
Missing	155 (8.7)	13 (4.6)
Platelets		
Low (≤ 149)	76 (4.3)	20 (7.1)
Normal (150-450)	1550 (86.7)	224 (79.2)
High (≥ 451)	45 (2.5)	31 (11)
Missing	116 (6.5)	8 (2.8)
SFLC ratio		
Low (≤ 0.25)	4 (0.2)	4 (1.4)
Normal (0.26-1.65)	629 (35.2)	97 (34.3)
High (≥ 1.66)	68 (3.8)	33 (11.7)
Missing	1086 (60.8)	149 (52.7)

Table 1. Clinical cut-off levels of standard serum biomarkers taken at referral to the Guy's RDC, by cancer status.