Desk-top computer in the clinical laboratory linked to automatic multichannel biochemistry analysers

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Introduction

New analytical instruments are continuously being introduced into the clinical laboratory. Although these instruments are becoming more and more sophisticated they have many drawbacks: inflexible result print-outs, meagre analytical-method control reports and no statistics for billing purposes and cost evaluation.

Due to the continued advancements in computer technology, relatively inexpensive microcomputers have become available for use in the laboratory [1, 2].

A small, inexpensive desk-top computer system has been in regular use in the authors' laboratory since May 1981. The system's prime purpose is to collect results from multichannel analysers, such as the G-300 (Greiner) and SMA-IIC (Technicon), and to store them on a discette. The collected data are later sorted, statistically processed and listed.

Equipment and method

The system hardware consists of three Metric 85 microcomputers. Each has a Zilog Z 80 CPU, 64 kilobytes RAM, two

Figure 1. Schematic outline of the desk-top computer system linkage to the G-300 and SMA-IIC multichannel analysers.

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KONTO	CA	KREA	UREA	BIL	ALP	ASAT	ALAT	LD	GGT	ALB	KOL	TRI	AMY
37210	0	7	26	20	16	142	142	115	1	25	0	0	14
37313	0	27	0	27	25	120	119	94	0	1	0	0	72
37510	0	0	0	26	24	24	24	23	0	0	0	0	8
50106	0	4	1	171	163	166	169	165	1	13	0	0	118
50110	0	3	1	7	7	9	9	9	0	0	0	0	0
50111	0	0	0	3	22	40	40	21	0	0	0	0	0
50120	0	0	0	3	5	9	9	0	1	0	0	0	0
50112	0	0	0	1	1	1	1	1	0	0	0	0	0
50128	0	5	0	2	1	11	11	10	0	0	0	0	1
50210	0	0	0	47	63	62	72	36	3	0	1	1	4
50220	0	1	9	61	61	69	71	62	16	0	7	7	1
50310	0	9	8	238	236	329	329	306	19	12	0	0	30
50320	0	0	0	24	24	203	203	184	3	0	0	0	1
50410	0	1	1	2	19	40	40	30	0	0	1	1	1
50420	0	0	0	0	0	0	0	0	0	0	0	0	0
50510	0	0	1	26	27	28	28	27	4	1	7	7	0
50520	0	0	1	16	184	186	186	184	7	0	1	1	0
50710	0	0	0	1	43	41	41	41	6	5	0	0	0
50720	0	0	6	2	2	3	3	0	0	1	0	0	0
51810	0	0	13	0	1	4	4	3	0	1	0	0	0
51820	0	0	0	1	0	4	4	4	0	0	0	0	0
51820	0	1	0	2	2	2	2	2	0	0	0	0	0
52110	0	0	0	32	32	32	32	32	0	0	0	0	0
52120	0	0	0	0	0	0	0	0	0	0	0	0	0
52128	0	0	0	10	11	11	11	11	0	0	0	0	0
52205	0	3	0	9	9	12	12	10	0	0	0	0	0
52210	0	0	0	0	0	0	0	0	0	0	0	0	0
52220	0	0	0	0	0	0	0	0	0	0	0	0	0
52220	0	0	0	1	2	2	2	2	0	0	1	1	0
52225	0	0	0	0	0	1	1	1	0	0	0	0	0
52410	0	0	0	1	0	7	7	5	0	0	0	0	0
52420	0	0	0	27	27	27	27	27	1	0	0	0	1
52710	0	5	3	42	43	50	50	45	14	0	0	0	2
52720	0	0	0	2	3	3	3	3	0	0	0	0	0
52810	0	0	0	13	33	19	19	14	0	0	0	0	2
52820	0	0	0	0	0	0	0	0	0	0	0	0	0
55104	0	0	0	0	0	0	0	0	0	0	0	0	0
55110	0	0	0	6	2	9	9	1	10	0	0	0	2
55120	0	0	0	4	0	4	4	0	4	0	0	0	3

Figure 3. Administrative statistics over a monthly period.

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LÖPNR. 001		111111111 HEMOLYS	
ANALYS	REF	ENHET	SVAR
S-CALCIUM	2.15-2.60	MMOL/L	2.50
S-KREATININ	56 -126	UMOL/L	- -
S-UREA	3.6 -8.9	MMOL/L	- -
S-BILIRUBIN	3 -20	UMOL/L	- -
S-ALP	1.2 -5.2	UKAT/L	6.5 *
S-ASAT	0.15-0.70	UKAT/L	0.85 *
S-ALAT	0.15-0.70	UKAT/L	1.15 *
S-LD	0 -8.0	UKAT/L	- -
S-GAMMA-GT	-	UKAT/L	- -
S-ALBUMIN	40.0-52.0	G/L	45.0
S-KOLEST.	3.6 -8.8	MMOL/L	- -
S-TRIGLY.	0.6 -2.6	MMOL/L	- -
S-AMYLAS	1.2 -5.0	UKAT/L	- -
	-		- -

patient's personal identification number which includes the birth date. After entering the identification number the requested analyses are entered via the keyboard. This data- or request-routine does not need any special personnel for the data input step. At the end of each day the data are transferred to the monthly and the weekly discette.

In the process of converting the data the program checks for error messages from the G-300 and the SMA-IIC (channel difficulties, out of instrument range etc.), and it looks for abnormal patient values and at some sample aspects (haemolytic, icteric, lipaemic). The system's capacity on one computer is up to 750 different patients/day at a maximum of 14 analyses/patient. The system can administrate 72 different ward numbers on a special monthly discette and 5500 patients with 14 analyses/patient on a special weekly discette. Figure 3 is an example of the results that would be available monthly.

All laboratory requests are entered on either the G-300 or the SMA-IIC's keyboard. Each patient has an identification number of 12 digits: the first three digits are a ward number for administrative statistics and the other nine digits are the

- 168