manifold household duties, etc., after their day at the factory must also be taken into consideration.

We are not in a position to refer to the employment of pregnant women except in the special factories in which we have worked. We feel that co-ordination between employers of labour, trade unions, and Ministries should now be forthcoming, so that a general scheme for rationalizing the position of pregnant women in industry may be worked out for the whole country.

Analysis of Cases

TABLE I

No. of patients, 90 (68 primiparae, 22 multiparae):

Group 1 (under 20 years)	..	10	
,, 2 (21–25 years)	..	36 (31 primiparae;	5 multiparae)
,, 3 (26–30 years)	..	27 (20 ,,	7 ,,)
,, 4 (31–40 years)	..	15 (6 ,,	9 ,,)
,, 5 (over 40 years)	..	2 (– ,,	2 ,,)

TABLE II.—*Periods of Pregnancy at which the Women ceased Factory Work*

Weeks of Pregnancy	Group 1		Group 2		Group 3		Group 4		Group 5		Totals
	M.	P.	M.	P.	M.	P.	M.	P.	M.	P.	
18		1		3		1					5
20			1	3		2		1	1		8
22						1					1
24				2		4	1				7
26				7	1		2	4	1		15
28		3	1	8	3	6	3				24
30			1	2	1	2	1				7
32		1		3		3					7
34		2	1	2	1	1	1	1			9
36		3	1	1	1		1				7
Totals	10		36		27		15		2		90

Of the series of 90 cases, 77 confinements were normal, 80 had normal pregnancies, and 87 had an uneventful puerperium. There were 7 cases of toxaemia (including 2 cases of primary hypertension), 2 cases of puerperal pyrexia, 1 case of severe anaemia (below 50%), 9 cases with haemoglobin between 50 and 60%, 38 with haemoglobin between 60 and 75%, and 42 with haemoglobin above 75%. Abnormal labours comprised 1 Caesarean section and 4 forceps; premature labour—2 premature (1 stillbirth of 3 lb.) and 2 breeches. Breast-feeding was established in 77 cases out of a total of 90.

Conclusions

Ante-natal clinics in factories where pregnant women are employed are very advisable under present conditions.

Where insufficient numbers in any one factory render this impossible, clinics to cover groups of factories in an area might be established.

Under medical supervision many women can do suitable work to an advanced stage of pregnancy.

Nursing mothers should not recommence work (particularly if the baby is breast-fed) for at least three months after delivery.

Day nurseries must be established if a return to work becomes necessary.

A national scheme should be set up to supervise employment of pregnant women and investigate the possibility of increased financial benefits.

We wish to express our gratitude to Sister W. M. Brown, who did much of the original work in establishing the clinic and making the arrangements with local authorities and the hospitals concerned. We must also express our thanks to the City of London Maternity, St. Mary's Islington (L.C.C.), the Royal Free, the Royal Northern, and other hospitals, and also to the municipal midwives who have co-operated so whole-heartedly in the scheme.

M. H. Shulman (*New Engl. J. Med.*, 1942, **226**, 260), impressed with the results in epilepsy of sodium diphenyl hydantoinate, and because of recent work on the psychogenic aspect of bronchial asthma, has tried the drug on six or seven patients suffering from severe asthmatic attacks. The proprietary preparation, dilantin sodium, gave pronounced relief in his small patients aged between 5 and 14 years. He observes that the drug must be given continuously to prevent attacks. In some of these patients the personality was improved.

FIVE CASES OF JAUNDICE FOLLOWING TRANSFUSION OF WHOLE BLOOD OR HUMAN PLASMA

BY

R. E. STEINER, M.B.

(From an E.M.S. Hospital)

In the last few months 5 cases of jaundice have been observed in this hospital. It was found that these patients had all received transfusions and some time later developed the disease. A similar occurrence has been recorded previously by other writers: Morgan and Williamson (1943) reported 9 cases of jaundice following the administration of human blood products, and Beeson (1943) recorded 7 cases of delayed jaundice in subjects who had received blood or plasma transfusions. It seemed, therefore, to be of importance to report the present cases.

Our patients were battle casualties from North Africa, and had been admitted to this hospital from two to three months after having been wounded; they then developed jaundice. All of them had had transfusions of whole blood, human plasma, or both, in varying quantities. The treatment in every case was primarily some form of surgical intervention plus chemotherapeutic measures such as antitetanic and anti-gas-gangrene serum and massive doses of the sulphonamide group of drugs.

Case I

Male aged 23; sustained multiple shrapnel wounds of both legs on April 7, 1943. A transfusion of 500 c.cm. of whole blood, followed by 2.500 c.cm. of plasma, was given on the same day. Jaundice was noticed for the first time three months after injury, the patient having had very slight prodromal symptoms of nausea and headache for some days. Thereafter he felt perfectly well. The jaundice deepened considerably during the first three days, was then stationary for one week, and disappeared in the next two weeks.

Physical examination showed slight tenderness on deep pressure over the right subcostal region for a week after the onset of jaundice; the liver and spleen were never palpable, and the temperature and pulse remained normal throughout the illness.

Laboratory Findings.—Blood count: Normal during the course of the illness, except for a mononucleosis of 8%. Urine: There was never bile in the urine, but excessive urobilin was present. Faeces: Stercobilin diminished. Van den Bergh: Direct positive reaction; quantitative indirect, 2 mg. per 100 c.cm.

Case II

Male aged 28; wounded by a machine-gun bullet in the left thigh on April 11, 1943. A plasma transfusion of 3,000 c.cm. was given on the same day. Three months afterwards he developed loss of appetite and headache, which were followed by jaundice two weeks later. The jaundice deepened steadily over the first week, then became stationary for two weeks; after four weeks only a very faint trace was noticeable. The appetite returned about one week after the onset.

Physical examination after the appearance of jaundice revealed a just palpable liver, which was not tender. The spleen was never palpable. The temperature was slightly raised for the first week of the illness; the pulse remained normal.

Laboratory Findings.—Blood count: Normal during the illness. Urine: Slight trace of bile, large amount of urobilin for four weeks. Faeces: Very much diminished stercobilin for 17 days. Van den Bergh: Prompt positive direct after the first week; quantitative indirect, 4.2 mg. per 100 c.cm.

Case III

Male aged 21; sustained multiple shrapnel wounds on May 9, 1943. A transfusion of 1,000 c.cm. of whole blood was given on the same day. Jaundice was first noticed three months after the wounding. The patient had no symptoms or

signs up to the second day after the onset, when he developed nausea, anorexia, slight abdominal pain, and vomiting. The jaundice deepened during the first week; it remained stationary for some days, and then began to fade until only a faint trace was observed eight days later.

Physical examination revealed a palpable liver one week after the onset of jaundice, and there was slight tenderness on deep pressure in the right subcostal region. The patient was slightly febrile for the first 10 days of the illness, the pulse rate was slow, and the blood pressure slightly below normal.

Laboratory Findings.—Blood count: During the first week normal apart from a mononucleosis of 10% and slight irregularity of red cells. Urine: From the first day of the disease there was excessive urobilin; this gradually diminished, until there was only a trace three weeks after the onset. Faeces: No bile pigments; full of fatty acids for the first week.

Case IV

Male aged 36; wounded by shrapnel and machine-gun bullets in the right arm and both legs on March 18, 1943. He received five transfusions between March 21 and April 14—in all, 3,500 c.cm. of whole blood and 250 c.cm. of plasma. Jaundice was first noticed four months after the injury. Two days previously he had had a slight chill and a moderate elevation of temperature, accompanied by generalized aching pains. Then followed a severe illness of two weeks' duration characterized by general malaise, headache, slight abdominal discomfort, anorexia, frequent vomiting, and drowsiness. The jaundice deepened considerably during the first week, then remained unchanged for two weeks, and after another 10 days only a faint trace was recognizable.

Physical examination during the first week of the illness revealed a slightly enlarged liver with moderate tenderness in the right subcostal region. The spleen was never palpable. After the second week the liver was no longer palpable. The pulse was very rapid—120–130 before the onset of the jaundice; it then settled down to 80–100.

Laboratory Findings.—Blood count: Normal during the first two weeks of the illness apart from a mononucleosis varying from 3 to 16%; moderate anisocytosis and poikilocytosis. Urine: No bile; excess of urobilin. Faeces: Diminution of stercobilin. Van den Bergh: Prompt direct positive; quantitative indirect, 8 mg. per 100 c.cm.

Case V

Male aged 24; received multiple shrapnel wounds in the left leg and chest on March 17, 1943. Transfusion of 500 c.cm. of whole blood was given on March 22. Jaundice was noticed for the first time two months after the wounding. There had been slight abdominal pain and anorexia for two weeks before the onset. He suddenly became very ill on the appearance of the jaundice, which deepened on the second day, and he complained of severe abdominal pain mainly in the subcostal region, incessant vomiting, and headache. At first he was very restless; then gradually he became drowsy and comatose, and died two days after the onset of jaundice.

Physical examination during the last two days of the patient's illness revealed that the liver and spleen were not palpable. The temperature was slightly elevated, the pulse rapid, and the blood pressure normal at first, gradually becoming very low.

Laboratory Findings.—Blood count: The blood picture was normal; there was a slight leucocytosis, with toxic granulations of polymorphs. Urine: Faint trace of bile and bilirubin. Faeces: Slightly diminished stercobilin. Van den Bergh: Slightly delayed positive direct; quantitative indirect, 1.8 mg. per 100 c.cm.

Post-mortem Findings.—There was generalized jaundice, with haemorrhages into the serous membranes. Other findings of significance were:—*Liver:* 32 oz. It had a soft yellow mottled surface, and on section showed irregular yellow patches on a dark red background. Microscopical examination revealed complete destruction of liver cells. The only normal-staining elements were the bile ducts, which were loaded with pigment. Some of the liver cells were greatly swollen and pigmented; the others were reduced to a small necrotic mass and were separated from one another. The capsule was wrinkled. *Spleen:* 7½ oz.; moderately enlarged; diffluent and dark red. Histological examination showed the sinuses to be congested. There was widespread blood pigment, both free and in macrophages. *Kidneys:* Together 12 oz.; flabby; cortex dull, opaque, and swollen, stained dull faint yellow. Microscopically a great degree of swelling of convoluted tubules was seen.

Table showing Details of Cases

Case	Age	Date of Transf.	Amount of Transf. (c.cm.)		Onset of Symptoms	Interval in Days	Date of Recovery
			Blood	Plasma			
I	23	7/4/43	500	2,500	3/7/43	87	26/7/43
II	28	11/4/43		3,000	18/7/43	98	16/8/43
III	21	9/5/43	1,000		31/8/43	114	23/9/43 Still faint trace of jaundice
IV	36	21/3/43	500		10/7/43	111	3/8/43
		23/3/43	500				
		24/3/43	500	250			
		29/3/43	1,200				
		14/4/43	850				
V	24	22/3/43	500		27/5/43	66	(Died 29/5/43)

Discussion

The clinical picture in the five cases described resembled in many ways catarrhal jaundice or infective hepatitis. Generally speaking, it was a slightly febrile illness, with symptoms of nausea, anorexia, slight abdominal discomfort, vomiting, and signs of jaundice, liver enlargement, and tenderness in the right subcostal region. There were, however, some factors which are not usually seen in catarrhal jaundice. In three of the cases there was a definite lack of free bile in the urine, with an excessive amount of urobilin present. In some of the cases—e.g., I, III, IV—there was a marked mononucleosis.

The aetiology of the illness described in these five cases is unknown, and it is impossible, in view of the lack of information about the incidence of jaundice among the untransfused troops in North Africa, to assess the statistical certainty of a connexion between the transfusion and the illness. Nevertheless, the fact that of 245 cases from North Africa, of which approximately 45% had transfusions, 5 developed jaundice while not one of the untransfused cases developed it suggests a connexion between the two. Outbreaks of an illness resembling catarrhal jaundice following inoculation of groups of people with human plasma, serum, or lymph have previously been recorded.

Some aetiological significance must be attributed to (1) the temporal coincidence of the transfusions—within three weeks in four cases—as shown in the accompanying table; and (2) the fact that jaundice has been observed only in our casualties from North Africa and not in those from other theatres of war. It would therefore appear that, while the transfusion may be the cause of the jaundice, certain special circumstances must be attendant on the transfusion before jaundice is produced.

Summary

Five cases of jaundice developing two to three months after transfusion have been reported. It is suggested that the transfusion is the cause of the illness. The limited incidence of this complication has been pointed out.

I would like to thank Mr. C. H. Cullen, who is in charge of these cases, and also Drs. J. Doupe and Mary Sharpe, for their help and criticisms.

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J. B. Hartzell and W. E. Stone (*Surg. Gynec. Obstet.*, 1942, **75**, 1), in an experimental investigation into wound healing, found that this was retarded in guinea-pigs kept on a subscurvy diet. In animals operated upon while in a subscurvy state, and given high doses of vitamin C, the wounds reached the same degree of tensile strength as in normal animals by the eighth post-operative day. Histological studies showed that the low tensile strength of wounds in vitamin-C-deficient animals was due to a failure of production of collagen.