UNITED NATIONS RELIEF AND WORKS AGENCY FOR

PALESTINE REFUGEES

DEPARTMENT OF HEALTH HQ

REPORT ON A COMPARATIVE STUDY OF THE ECONOMICS OF DISPOSABLE SYRINGES AND NEEDLES AND THE CONVENTIONAL STERILIZATION BY BOILING

by

Dr. M.K. Muzayyin, MD MPH
Chief, Curative Medicine Division

1.0 INTRODUCTION

1.1 UNRWA provides health services, which include out-patient medical care, at its 98 health centres which are distributed in the five Fields of its operation, i.e. Lebanon, SAR, Jordan, West Bank of Jordan and Gaza. At these centres injections are given for therapy at the injection room (I.R.) of the General Clinic and for the MCH immunization programme (MCH/IP) at the MCH clinic , by glass syringes and needles (S&N) which are sterilized by boiling. Lately, pressure sterilization has been put on trial on limited scale.

1.2 During his recent visit to the Agency's area of operation, Dr. Robert Cook, Regional Adviser on MCH and Nutrition, WHO/EMRO discussed the use of disposable syringes and needles (DS&N) in the MCH/IP. Professionally, this is considered a highly desirable objective of any medical care service, because that would avoid the many risks of the use of conventional sterilization (some times partially) by boiling. However, for most public medical care programmes, the cost has been the main prohibitive factor in achieving this objective. It was suggested and the Director of Health and WHO Representative, UNRWA, agreed to carry out a comparative study of the "economics" of using DS&N and the conventional sterilization at UNRWA's terms of cost.

2.0 DESCRIPTIVE INFORMATION AND PROCEDURE FOLLOWED

2.1 The study is oriented to define the economical consequences of replacing the present practice of using S&N, sterilized by boiling, by DS&N:-

a. in the MCH/IP and

b. in the I.R., mainly for therapeutic injections.

The UNRWA Departments of Health in the five Fields were requested to collect the basic pertinent information, on site where the injections are administered. In each Field three representative health centres (big, medium and small) were selected and included in the review. These provide coverage to 27.5% of the total population served by UNRWA OPD services. The following information and data were collected:-

a. The number of S&N used and their sizes, and how frequently their sterilization was repeated in each clinic session.

b. Data needed to assess the cost of "Manpower" utilized in the cleaning and boiling of S&N, the cleaning of the sterilizers (once a day) etc.

c. The cost of material consumed, such as syringes, needles , fuel, cleaning material etc. and cost of repair and depreciation of equipment, all grouped under the heading "Others".

d. The actual number of injections given by the S&N sterilized.

2.2 The above data were collected from the MCH/IP and the I.R. and recorded separately at each clinic session for a period of about two weeks in July-August 1977. The Curative Medicine Division (CMD) computed the cost of manpower for the time utilized in the cleaning and the sterilization of S&N as reported by the individual units in each health centre.

3.0 ANALYTICAL REVIEW

3.1 Statistical data which were reported from the MCH/IP and I.R. of the fifteen health centres included in this study have been compiled and analysed Field-wise and by the size of the centres. In Annex I is a tabulation of a summary of the number of syringes used and their percentage distribution by size, the number of injections given and the ratio between the numbers of syringes and injections. It is noted that during the period of the review 2,155 syringes were in use, and 18,353 injections were given. More of the 1 ml and 2 ml size syringes were used in the MCH/IP and more of the 5 ml and 10 ml were used in the I.R. Field-wise the ratio between syringes and injections varied from 1:2 in SAR to 1:21 in Gaza; from 1:8 in the MCH/IP to 1:9 in the I.R.; and from 1:5 in a small health centre to 1:14 in a medium one. These ratios indicate to the necessity for repeated sterilization (average 3 times) in each clinic session and the tendency to use multi-dose syringe method in most health centres, in all Fields.

3.2 In Annex II the cost of "manpower" and "others", utilized in the sterilization of S&N are summarised and tabulated. It is noted that the total cost of sterilization for the giving of 18,353 injections was $1,090.23, consisting of $1,004.99 (92.2%) of "manpower" and $85.24 (7.8%) of "others". The "manpower" cost component, was relatively highest in Lebanon (96.5%) and lowest in Gaza (88.3%), highest in "big" health centres (93.1%) and lowest in "small" ones (88.9%); and higher for the I.R. (93.0%) than for the MCH/IP (90.2%). By the size of the health centre the benefit (output) is corrolated with the cost (input) in "meium" (29% : 29%) but was lower in "small" (11% : 14%) and higher (more efficient) in "big" (60% : 57%) centres.

3.3 In Annex III is tabulated the average cost per injection given. Agency-wide the cost of sterilization for each injection was $0.059 with a Field-wise variation from highest in SAR ($0.154) to lowest in Gaza (0.029). By the size of the centre, the cost was higher in small ($0.077) and lower in big ($0.056) ones; and was higher for MCH/IP ($0.072) than for I.R. ($0.056). For more details on individual variations between the Fields for both services and size of centres please consult the table.

3.4 A market research of the cost of DS&N was carried out by the Supply Officer (Medical) of the CMD and the results, including a 10% overhead charges for packing and/or freight, are tabulated hereunder:-

a. Ex-UNICEF - Copenhagen

	$
DS 2ml + N 21 G x 1"	0.033
DS 2ml + N 19 G x 1½"	0.044
DS 5ml + N 21 G x 1"	0.055
DS 5ml + N 19 G x 1½"	0.066

b. Market - F.O.B. Copenhagen

	$
DS 2ml with needle	0.05621
DS 5ml " "	0.06446
DS 10ml " "	0.08734

To calculate the average prices per DS&N for use at MCH/IP, it is assumed that all syringes needed would be of 2 ml size and needles of 21 (or 23) G x 1". Thus the price would be $0.033 if supplied through UNICEF or $0.05621 from the market. For use at the I.R., it is assumed that the need would be for equal quantities of 2 ml and 5 ml syringes, and of 21 G and 19 G needles. The computed average price for the I.R. would be $0.04950 at UNICEF or $0.06033 at market prices. The UNICEF prices are 41% cheaper for MCH/IP and 18% for I.R. than those of the market.

3.5 In Annex IV is a tabulation of the number of injections given Agency-wide in 1976; together with their computed cost of "manpower" and "others", based on the findings of this study; the costs of an equivalent number of DS&N based on prices quoted in para. 3.4 above; and these costs minus the cost of "others", the balances being the additional costs required to replace the saving on manpower if DS&N were to be used. The difference between the latter costs and those of the manpower are the net gain or (loss) expected from replacing the conventional sterilization by DS&N. It is noticed that the total additional cost of DS&N to replace the manpower saved would have been in the MCH/IP $5,072 or $10,190 at the UNICEF or market prices and in the I.R. $49,457 or $61,423 respectively. The net gain would then be: in the MCH/IP $13,472 or $8,354, in the I.R. $18,439 or $6,473 and for both $31,911 or $14,827 depending whether UNICEF or market prices were quoted.

3.6 In Annex V is a tabulation of the computed cost of manpower utilized in conventional sterilization and expected as a saving if replaced by DS&N, the cost of the DS&N required less the cost of "others" and the economical gain or (loss) thereby, all expressed in the number of posts of practical nurses at UNRWA grade 4, which can be considered the lower grade of staff involved in the sterilization and the administration of injections. This table shows that in the MCH/IP for a manpower saving of 7 posts and in the I.R. of 25 posts (total 32) the balance cost of DS&N required is equivalent to the "staff cost" of 2 and 19 (21) posts respectively at the UNICEF prices or 4 and 23 (28) at the market prices. The net gain would be equivalent to that of at least 11 to 4 posts respectively[M].

4.0 CONCLUSION AND RECOMMENDATIONS:

4.1 The above findings prove that at UNRWA's terms of cost at the time of the study, the use of DS&N would be more economical than the computed cost of manpower and supplies utilized in the conventional sterilization. Agency-wide,

---

[M] If DS&N of the same sizes as those assumed for MCH/IP would be used in the immunization programme of the school health the saving in manpower would be of 2.75 posts ($7,831) and the cost of DS&N would be equivalent to staff cost of 1 or 1.75 post ($2,419 - $4,583) with net gain of 1.75 or 1 post.

the cost of DS&N required can be met from the expected saving in the cost of manpower and others. An additional manpower gain, of 73-45% would be expected in the MCH/IP, of 27-10%in the I.R., and of 34-14% in both depending whether UNICEF or market prices are quoted respectively. This gain could be utilized to support improvements in other services provided by the same staff. Thus the use of DS&N at the MCH/IP is more economical than that at the I.R. and more in both if supplied at UNICEF prices.

4.2 The use of DS&N would also avoid the risk of complications arising from incomplete sterilization or improper cleaning of used syringes and needles. Most important are infective hapatitis-type B, allergic or anaphylactic reaction (e.g. to traces of penicillin) in sensitive persons which might prove fatal, abscess formation, tissue damage (because of repeated use of needles) etc. The economical saving on the treatment (or even of life) of such complications is an additional gain above the one(s) reported in para. 4.1 above.

4.3 The WHO/EMRO regional office could examine the possibility of providing technical support and assistance to an intra-regional scheme to establish a plant for the production of DS&N. This might prove more economical to the member states than the importation of their needs from areas where manpower is more expensive than it is in certain states of the region. The cost of freight, totally or partially, could be also saved. A cost benefit analysis of such a scheme is worth a trial.

Curative Medicine Division
Department of Health
UNRWA HQ

21 September 1977.

ANNEX I

DATA ON SYRINGES USED AND INJECTIONS GIVEN

	Syringes Sterilised	Percentage Distribution of Syringes				No. of Injections	Ratio of Syringes to Injections
		1 ml	2 ml	5 ml	10 ml		
A. Field wise	No.	%	%	%	%	No.	
1. Lebanon	159	9	40	26	25	1,271	1:8
2. SAR	634	5	37	52	6	951	1:2
3. Jordan	650	4	49	39	8	5,530	1:9
4. W/B Jordan	340	3	43	30	24	2,604	1:8
5. Gaza	372	2	27	38	33	7,997	1:21
Agency wide	2,155	4	40	40	16	18,353	1:9
B. By Size of H. Centre							
1. Big							
a. Inj. R.	1,064	1	31	52	16	8,537	1:8
b. MCH/IP	353	9	68	23	0	2,524	1:7
c. S/T	1,417	3	40	45	12	11,061	1:8
2. Medium							
a. Inj. R.	274	0	39	35	26	4,050	1:15
b. MCH/IP	115	23	39	33	5	1,341	1:12
c. S/T	389	7	39	34	20	5,391	1:14
3. Small							
a. Inj. R.	258	0	38	31	31	1,567	1:6
b. MCH/IP	91	12	67	21	0	334	1:4
c. S/T	349	3	44	29	24	1,901	1:5
Agency wide							
a. Inj. R.	1,596	1	33	46	20	14,154	1:9
b. MCH/IP	559	13	61	25	1	4,199	1:8
c. Total	2,155	4	40	40	16	18,353	1:9

ANNEX II

COST ANALYSIS

Field Wise	A. IN - PUT						B. OUT - PUT
	1. Manpower		2. Others		3. Total		Distribution of Injections
	$	%	$	%	$	%	%
1. Lebanon	136.34	96.5	5.17	3.5	141.51	13	7
2. S.A.R.	130.19	88.7	16.59	11.3	146.78	13	5
3. Jordan	362.69	93.5	25.13	6.5	387.82	36	30
4. W/B Jordan	173.44	93.8	11.53	6.2	184.97	17	14
5. Gaza	202.33	88.3	26.82	11.7	229.15	21	44
Agency Wide	1,004.99	92.2	85.24	7.8	1,090.23	100	100
By Size of H. Centre							
1. Big							
a. Inj. R.	417.68	93.9	27.30	6.1	444.98	41	46
b. MCH/IP	161.79	91.1	15.80	8.9	177.59	16	14
c. S/T	579.47	93.1	43.10	6.9	622.57	57	60
2. Medium							
a. Inj. R.	209.99	92.5	17.02	7.5	227.01	21	22
b. MCH/IP	84.99	90.6	8.85	9.4	93.84	8	7
c. S/T	294.98	91.9	25.87	8.1	320.85	29	29
3. Small							
a. Inj. R.	104.26	90.4	11.12	9.6	115.38	11	9
b. MCH/IP	26.28	83.6	5.15	16.4	31.43	3	2
c. S/T	130.54	88.9	16.27	11.1	146.81	14	11
Agency Wide							
a. Inj. R.	731.93	93.0	55.44	7.0	787.37	72	77
b. MCH/IP	273.06	90.2	29.80	9.8	302.86	28	23
c. Total	1,004.99	92.2	85.24	7.8	1,090.23	100	100

ANNEX III

AVERAGE COST PER INJECTION GIVEN
FIELD WISE, BY SIZE OF HEALTH CENTRE AND TYPE OF SERVICE

FIELD	BIG			MEDIUM			SMALL			TOTAL		
	Inj.R. $	MCH/IP $	Total $	Inj.R. $	MCH/IP $	Total $	Inj.R. $	MCH/IP $	Total $	Inj.R. $	MCH/IP $	Total $
Lebanon	0.065	0.149	0.078	0.138	0.155	0.145	0.339	0.253	0.322	0.102	0.161	0.111
S.A.R.	0.118	0.435	0.162	0.117	0.196	0.113	0.274	0.210	0.258	0.126	0.288	0.154
Jordan	0.065	0.068	0.066	0.074	0.236	0.078	-	-	-	0.067	0.080	0.070
West Bank/J	0.058	0.044	0.054	0.072	0.088	0.077	0.151	0.085	0.130	0.074	0.064	0.071
Gaza	0.024	0.039	0.027	0.027	0.025	0.026	0.035	0.072	0.039	0.027	0.036	0.029
Agency Wide	0.052	0.070	0.056	0.056	0.070	0.060	0.074	0.094	0.077	0.056	0.072	0.059

ANNEX IV

COST ANALYSIS OF DS&N v.s. CONVENTIONAL STERILIZATION
BASED ON 1976 NO. OF INJECTIONS

FIELD	A. Data on 1976			B. Cost of DS & N		C. Cost of DS & N Less Cost of Others		D. Economic Gain (loss)	
		Computed Cost at Study Rates							
	a. Injections given	b. Manpower	c. Others	d. UNICEF Price	e. Market Price	f. UNICEF d-c	g. Market e-c	h. UNICEF b-f	i. Market b-g
	No.	$	$	$	$	$	$	$	$
MCH/IP									
Lebanon	8,900	1,330	101	294	500	193	399	1,137	931
S.A.R	33,900	8,623	1,125	1,119	1,906	(6)	781	8,629	7,842
Jordan	47,300	3,462	338	1,561	2,659	1,223	2,321	2,239	1,141
W/B Jordan	39,700	2,354	197	1,310	2,232	1,113	2,035	1,241	319
Gaza	90,700	2,775	444	2,993	5,098	2,549	4,654	226	(1,879)
Agency Wide	220,500	18,544	2,205	7,277	12,395	5,072	10,190	13,472	8,354
I.R.									
Lebanon	95,200	9,445	254	4,712	5,743	4,458	5,489	4,987	3,956
S.A.R.	135,700	15,181	1,913	6,717	8,187	4,804	6,274	10,377	8,907
Jordan	343,200	21,630	1,259	16,988	20,705	15,729	19,446	5,901	2,184
W/B Jordan	193,800	13,564	810	9,593	11,692	8,783	10,882	4,781	2,682
Gaza	337,000	8,076	999	16,682	20,331	15,683	19,332	(7,607)	(11,256)
Agency Wide	1,104.900	67,896	5,235	54,692	66,658	49,457	61,423	18,439	6,473
TOTAL	1,325,400	86,440	7,440	61,969	79,053	54,529	71,613	31,911	14,827

ANNEX V

ECONOMICS OF REPLACING CONVENTIONAL STERILIZATION OF S&N BY THE USE OF DS&N EXPRESSED IN THE NUMBER OF POSTS, GRADE 04

Field	Cost of Expected Manpower Savings			Cost of Disposable Syringes & Needles Less Cost of "Others"						Economic Gain (Loss)	
				UNICEF Prices			Market Prices			Total	
	MCH/IP	I.R.	Total	MCH/IP	I.R.	Total	MCH/IP	I.R.	Total	UNICEF	Market
	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
Lebanon	0.35	2.50	2.85	0.05	1.18	1.23	0.11	1.45	1.56	1.62	1.29
S.A.R.	3.51	6.18	9.69	0.00	1.96	1.96	0.32	2.56	2.88	7.73	6.81
Jordan	1.06	6.59	7.65	0.37	4.79	5.16	0.70	5.92	6.62	2.49	1.03
W/B Jordan	0.98	5.66	6.64	0.46	3.66	4.12	0.84	4.53	5.37	2.52	1.27
Gaza	1.28	3.73	5.01	1.18	7.24	8.42	2.15	8.92	11.07	(3.41)	(6.06)
Agency-wide	7.18	24.66	31.84	2.06	18.83	20.89	4.12	23.38	27.50	10.95	4.34