

UKRAINE

Ministry of Health

World Health Organization



**Injection safety
Healthcare waste management**

**Pilot project
Needle removing and plastic recycling**

**March 2003 - February 2005
E. Laurent, CDS/VPI, WHO Euro**



TABLE OF CONTENT

Executive summary	3
Pilot project report	5
1. Introduction	5
2. Background	5
2.1. Geography and demography	5
2.2. Administrative structure	5
2.3. Economy	5
3. National Immunization Programme	5
3.1. Organisation	5
3.2. Programme implementation	6
3.3. Performances	6
4. Pilot project description	6
4.1. Rationale	6
4.2. Objectives	7
4.3. Sampling methodology	7
4.4. Monitoring and data collection	8
4.5. Synoptic of the systems	8
5. Pilot project results	10
5.1. Needle cutting	10
5.2. Containment of used syringe/needle	11
5.3. Neutralisation by autoclaving	11
5.4. Waste transport	12
5.5. AD syringe plastic recycling	13
5.6. Needle disposal	13
5.7. Costs of the systems	14
6. Kiev Conference, 8 th February 2005	16
7. Conclusions and perspectives	17
8. Acknowledgement	18
Annexes	
Annex 1: Synoptic of the systems	
Annex 2: Questionnaire for health facilities	
Annex 3: Complete results of the pilot project	
Annex 4: Implementation and monitoring phases of the pilot project	
Annex 5: List of health facilities monitored and location on map	
Annex 6: Independent report on the costs to recycle the plastic of AD syringes	
Annex 7: Kiev conference: scope of purpose, agenda and list of participants	
Annex 8: Composition of the National Working Group on Injection Safety	

Executive Summary

Objectives

As a follow up of the 2002 injection safety assessment and the 2003 introduction of AD syringes in Ukraine, a pilot project was initiated with the objective to design a safe and viable process for disposing AD syringes through a non-burning option. The project was to test a system using a) needle removing with needle cutter, b) neutralisation by autoclaving, c) containment with safety container and autoclaving bag, d) different methods of transport, e) disposal through shredding and recycling. The costs analysis was also an objective of the pilot project.

Pilot project results

a) Needle cutting

- Overall sense of increased safety while disposing injections (feedback from the health staff)
- Real saving in the time health staff spend in taking care of the used injection material
- Stopping the use of liquid disinfectant positively received (avoiding possible allergy)
- Rust noticed on the cutting edge of several needle cutters, whatever the model
- Issue of decontamination of needle cutter needs to be clarified

b) Neutralisation/decontamination by autoclaving

- Using autoclaving for neutralisation judged feasible and well accepted by health staff
- Quality control of neutralisation possible for autoclaving (use of test indicators)
- Centralized autoclaving versus decentralized depending on size and location of health facility
- Specific room for autoclaving syringes and needles to be allocated
- Specific waste management officer to be assigned or extra time given to the main nurse
- Need for investment in new autoclaves (current ones not able to cop with the workload)

c) Containment of used syringe/needle

- Safety improved by using safety container for needles and autoclaving bag for used syringes
- New system felt to be very easy to use (simple manipulations of containers and bags)
- No autoclaving bag found punctured or damaged during usage and autoclaving
- All needle cutters need to have a transparent safety container

d) Transport of waste

- Transport burden remains the same with the new system, and certainly a costly component
- Transport ensured by the recycling company for city (Kiev) or by health facilities vehicle
- Small and remote facility not be included in the collection/recycling option if not sustainable
- Legislation of waste transport to be revised, especially in case of transport of waste not neutralised/decontaminated (centralised autoclaving option)
- Further cost analysis required for the transport component, considering the full volume of injection material used (immunization and therapeutic)

e) Disposal by shredding and recycling

- Plastic of regular disposable syringes already widely recycled for several years in Ukraine
- Recycling of AD syringes technically feasible and achieved by separation of metal insert
- Still some technical problems (remaining pieces of needles, mix of the two kinds of plastic) making the financial interest for recycling AD lower than for regular disposable
- Reluctance of one of the two companies to deal wit AD syringes (“not much worth doing it”)
- Recycling not an absolute requirement, if not sustainable, shredding still being a disposal option

f) Costs of the systems

- The overall cost for the new system remains the same than the previous system
 - o Operational costs between the two systems are balanced
 - o Staff costs decrease significantly for new system
 - o Transport costs remain the same
 - o Capital costs are higher for new system
 - o AD syringes recycling will generate fewer incomes than regular disposable syringes
- Injuries reported with the previous system had a cost, difficult to evaluate but certain
- If the new system had to be implemented, further costs estimation will be needed
- Evaluating and budgeting the cost of waste management is an important task at all levels

Kiev conference

The Ukraine National Working Group on Injection Safety convened a conference in Kiev on the 8th February 2005, with the objectives to debrief on the final outcomes of the pilot project, to discuss questions and issues related to injection safety and healthcare waste management, and to provide the opportunity to debate on the feasibility to implementing the options tested. Supported by WHO EURO, participants from Ukraine and representatives of the Russian Federation and the Republic of Belarus attended the conference.

All participants emphasized on the need to improve the safety by changing the current practices and promoting safe manipulations for decontamination and disposal. Discussions stressed the need for new policies and to look more at financial implications. They all agreed that there was a necessity now to move forward, after the first step initiated with the pilot project. After the conference, the Ukraine National Working Group on Injection Safety briefly met and agreed to request all oblasts (region) to feedback on the outcomes of the conference and the way they foresee the implementation.

Separate consultations were held with the Russian and the Belarus Delegations. They expressed their strong interest in improving the safety of the current practices and in introducing needle cutter. The Russian Federation is currently conducting a survey on the disposal/recycling practices in all their 89 territories. The Republic of Belarus may introduce AD syringes during their 2005 Rubella campaign. WHO Euro proposed to these two countries to utilize the protocol for using needle cutter in routine immunization and the protocol for using needle cutter during campaign to pilot the introduction of needle cutter.

Conclusions and perspectives

As an overall conclusion, the new system provided strong argument regarding the improvement of safety and the viability of the system. Action may now be undertaken to look at the next phase.

Vision and suggestions for the sub-region: Ukraine, Republic of Belarus, Russian Federation

1. Put injection safety and healthcare waste management high on the National Agenda
2. Activate a functional inter-sectorial Committee on IS/HCWM at National and Regional level
3. Advocate for recruiting a coordinator
4. Technical options to be selected (if even several options)
5. National Plan of Action to be drafted/revised
6. Provide more analysis on the cost of implementation of the programme
7. Gather Partners to support the implementation and equipments purchase
8. Maintain the regional dynamic within neighbouring countries
9. Whenever feasible, integrate into the programme all wastes issued from injection

Pilot Project Report

1. Introduction

As a follow up of the injection safety assessment conducted in Ukraine in 2002 and the introduction of auto-disable (AD) syringes for immunization in 2003, a pilot project was initiated in order to look after options to improve the safety of injection for immunization and to ensure safe disposal of syringes and needles.

2. Background

2.1. Geography and Demography (2003 basic statistics from the Health for All database)

Ukraine is a country in Eastern Europe, sharing borders with Romania, Moldova, Hungary, Slovakia, Poland, Belarus and the Russian Federation. The country surface area is 603,700 square km. Its population was 47.6 millions in 2003. The live births per 1000 population were 8.6, while the crude death rate per 1000 population was 16.1. The population 0-14 years represented 15.55% of the population. The life expectancy was 62 years for male and 74 years for female. The infant mortality rate was 16 per 1,000 live births (2000 WHO-UNICEF estimate).

2.2. Administrative structure

Ukraine regained its independence in 1991, following the break-up of the USSR. The first administrative level in Ukraine is the oblast (region or province). Ukraine has 24 oblasts, 2 cities (Kiev and Sevastopol) and the autonomous republic of Crimea. The second administrative level is the rayon (district); there are 628 rayons.

2.3. Economy

Ukraine is a lower middle income country with a Gross National Income (GNI) per capita in 2003 of US\$ 970 (World Bank). In the Soviet era, Ukraine's economy was deeply integrated with that of the USSR. Inter-republic trade accounted for more than 80% of all exports and imports. The destruction of these economic links after independence was regained had a significant adverse effect on Ukraine's economy. Overall, the Gross Domestic Product (GDP) fell by about 50% in the period 1991-1994. Inflation climbed from 390% in 1991 to 10 255% in 1993. As a result of measures taken by the government (including the introduction of a national currency, the hryvna), inflation fell to 10% in 1997. However, the economic crisis in 1998 caused the annual inflation rate in the country to rise to 20% (WHO Liaison Office in Ukraine, 1999).

3. National Immunization Programme

3.1. Organisation

The National Immunization Programme in Ukraine has a well organized infrastructure. The organizational structure of the public health system has mainly been maintained from Soviet times. Vaccine provision and monitoring of immunization coverage is being done by the Department for Prevention of Infectious Diseases, MOH. Identification of target groups, immunization delivery and AEFI surveillance is done by the primary healthcare services.

3.2. Programme implementation

Vaccine	Age
BCG	3 days; 7, 14 years
DT	7 years (x3)
DTaP	3, 4, 5, 18 months
HepB	1 day; 1, 6 months
DTaPHepB	3, 4, 5 months
IPV	3 months
MMR	12-15 months; 6 years
Mumps	Young men of 15 years
Rubella	Young women of 15 years
OPV	4, 5, 18 months; 3, 4, 14 years
Td	11, 14, 18 years (and every 10 years after)

Immunization services are provided by the paediatric clinics, rural ambulatories/FAPs, schools and kindergartens. There are approximately 21,216 centres for immunization in Ukraine at present. Immunization is provided free of charge for all required child and adolescent vaccinations.

3.3. Performances

The National Immunization Programme has succeeded in achieving and maintaining very high vaccination coverage nationally in spite of the challenges posed by economic change.

Vaccine	Monitoring (2003)
BCG	98
DTP3	97
HepB3	77
MCV	99
Pol3	99

(WHO-UNICEF estimates 2003)

4. Pilot project description

4.1. Rationale

The Ministry of Health with the support of WHO EURO conducted in September 2002 an injection safety assessment for immunization. The study pointed to a relatively low, risk to patients (proper provision of disposables, sterile practices). But the risk to the health care workers was relatively high (extensive manipulations of used syringes and needles, absence of safety container) and the risk to the communities was also non negligible (open container, no harmonized and

regulated practice for disposal). The system at the time for disposal of used syringes and needles utilized chemical decontamination after separation of syringes and needles, and regularly recycled the plastic of syringe (slight income for facility).

In April 2003, the Ministry of Health applied for the GAVI financial support for injection safety for immunization. The application was granted and auto-disable (AD) syringes were to be introduced for all childhood immunizations in 2004 (previously used for Hep.B starting 2003). At the time, the disposal system was not any more adapted as AD syringe and needle could not be easily separated and chemically decontaminated. The MOH expressed also the intention not to promote an incineration solution for burning the used syringes.

Meanwhile the MOH set up a national working group on injection safety including interested parties from Infectious Diseases Prevention and Environmental Health departments, from national and oblast levels (composition of the working group provided in annex). Following technical discussions with WHO EURO (April 2003), it was agreed to revise the decontamination and disposal system and to test new options which will greatly improve safety. It was also agreed not to prohibit the recycling of the plastic of syringes but to evaluate its safety, feasibility and economic interest.

4.2. Objectives

The overall objective of the pilot project was to design a safe and viable process for disposing AD syringes through a non-burning option. It was achieved through testing systems using:

- needle removing: evaluation of needle cutters
- neutralisation/ decontamination: evaluation of centralised and decentralised autoclaving
- containment: evaluation of safety container and autoclaving bag
- transport: evaluation of public and private transport systems
- disposal: evaluation of shredding and recycling disposal systems

Specific objectives included the analysis of the cost-effectiveness of the options and the final recommendations on the safest and most viable process. The pilot project was aimed to base the conclusions on an extensive data collection. It was also important that the recommendations could be extended to non-AD syringes, especially for the therapeutic sector.

4.3. Sampling methodology

The complexity of setting up a new disposal system in parallel of the previous system motivated the limitation of the size of the pilot project. However it was still important to look after a wide enough representation of health facilities (large, medium, small; urban, semi-urban, rural; within a city administrative unit, within an oblast, within rayon).

Two "first level administrative units" were selected under the criterion that they should have in their territory a company already recycling the plastic of syringes. The other criteria were related to city versus oblast and urban versus rural. After agreement with the local Authorities, were selected:

- Kiev city representing a full urban setting
- Khmelnytsky oblast (province) representing some urban and some rural settings

For Kiev city it was decided to take 10 health facilities (5 large and 5 small) in 5 of the 10 rayons of Kiev city. The difference between the two kinds of facilities was mainly with the first ones having already at least one autoclave (large facilities) and the second ones not having autoclave (small facilities). For these small facilities, a centralized autoclaving was done in a specialized institution.

For Khmelnytsky oblast, a sampling of 15 facilities was decided, structured in 3 levels:

- a) the oblast level (region, province) with the selection of the main oblast health facility for immunization (children hospital)
- b) the rayon level (district) with a selection of 7 rayon main health facilities (central rayon hospital), randomly selected
- c) the rural level with the selection of 7 rural health facilities (within one rayon), randomly selected

For Khmelnytsky oblast as for Kiev city, large health facilities (oblast and rayon level) were to have an autoclave, while small and rural facilities were not. The list of all selected health facilities is provided in annex.

4.4. Monitoring and data collection

The pilot project was monitored in the 25 health facilities, in the institutions selected for centralized autoclaving, and in the recycling companies. The duration of the monitoring was 5 months (May-September 2004) for Khmelnytsky oblast and 3 months for Kiev city (July-September 2004), due to some delay in Kiev. The data collection was based on the followings:

- A standard questionnaire for health facilities, filled in by all of the 25 selected facilities
- A standard questionnaire for recycling companies, filled in by the 2 selected companies
- Observational visits by the coordinators, with interviews of the vaccinators, the autoclaving and waste officers and the managers of the recycling companies
- A continuous quality control with specific instruments (time/steam/temperature indicators)

The indicators used for monitoring looked at all components (safety, efficiency, convenience, technical viability, cost). They were sorted out in the questionnaire as follows, including several questions for each indicator:

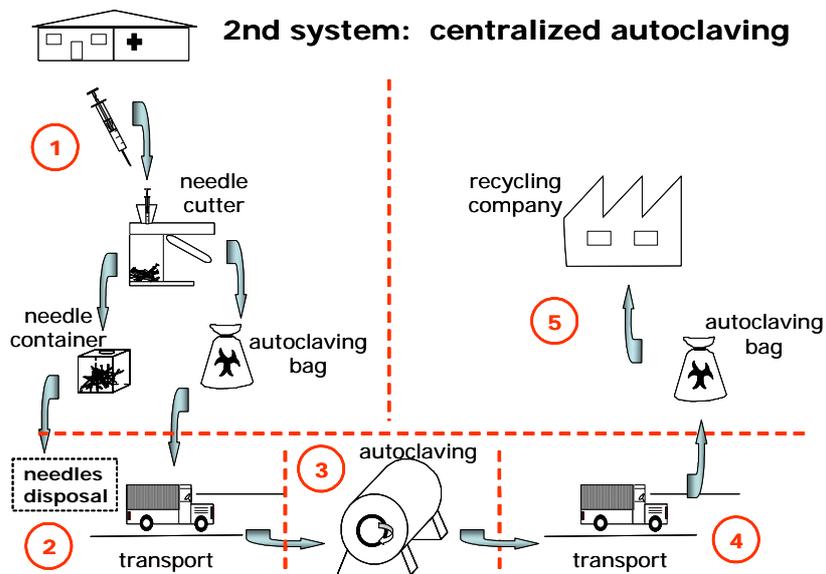
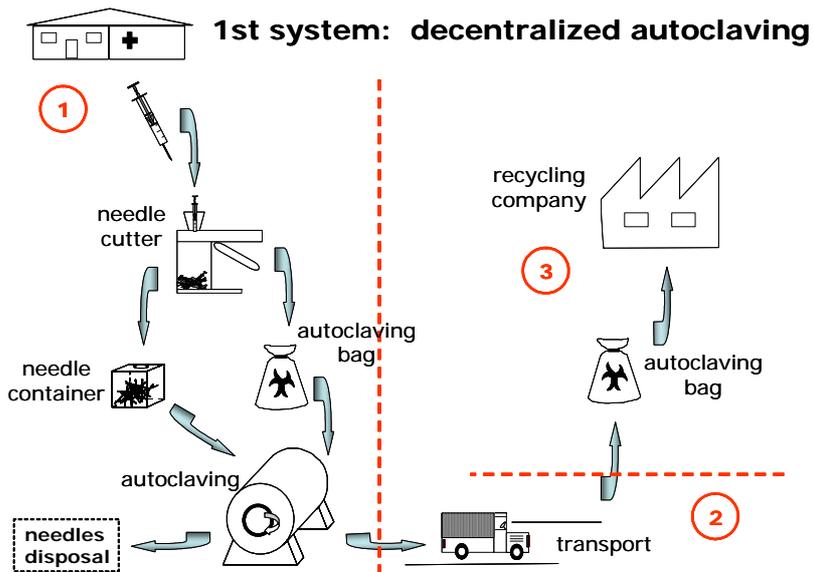
- A. Safety of using the needle cutter
- B. Efficiency and convenience in using the needle cutter
- C. Containment and storage of used syringes and needles
- D. Autoclaving process
- E. Logistics and transport issues
- F. Recycling of the AD syringes
- G. Final disposal of the needles
- H. Cost analysis
- I. Data collection for statistics

All data were processed under Epi-Info latest version.

A specific mission with the support of WHO Geneva was conducted in October 2004 to look at the economic component. A full report has been published (provided in annex), but the summary results are included in this report.

4.5. Synoptic of the systems

As earlier mentioned, different systems were tested, including different models of equipment (needle cutter, autoclave, transport), but also a centralized autoclaving versus decentralized. These two options implied different transportation issues, which were in turn evaluated. As a summary, the systems could be pictured as follows:



Equipments:

With the support of WHO, 3 models of needle cutters were provided (Biomedical 7 litres, Biomedical 0.5 litres, Balcan 0.2 litres). The needle cutters were supplied with stocks of containers (for the used needles) and autoclaving bags (for the used syringes).



Concerning autoclaves, no new equipment was provided, and autoclaves already in place in Kiev central laboratory (left photo) and in large health facilities (right photo), were utilized during the pilot project. In facilities where autoclaves were in use for sterilisation, a strict protocol was developed for using them for sharps waste decontamination.



5. Pilot project results

5.1. Needle cutting

Coming out of the questionnaires and the interviews, there was a very positive feedback from all health staff about the use of the needle cutters. A general agreement emerged on the following points (in comparison to the previous system):

- There was an overall sense of increased safety from the health staff doing the injection.
- They also reported a real saving in the time they spend in taking care of the used injection material.
- Stopping to use liquid disinfectant was also positively received (avoiding possible allergy).

Some problems were identified, which will need to be addressed:

- The major issue was the rust which was noticed on several needle cutters, whatever the model. It is difficult to say the exact cause but decontamination of the needle cutter was done with chlorine solution.
- The issue of decontamination of the needle cutter remained a major concern, and will need to be clarified if needle cutters to be used.
- Other issues were also reported like the size of the hole of the needle cutters used, too wide for BCG syringes, and needle cutters wobbling (unstable) on the injection preparation table.

Data collection for needle cutting:

A. Safety of using the needle cutter ¹	Incidence	Percent
Injuries occurred during needle cutting	0	0%
Any blood stain on the cutter/table	0	0%
Needle cutter wobbling	7/25	28%
Staff opinion about the safety of using a needle cutter ²	-	82% safe

¹ 11,000 needle cutting operations were done per month in all the 25 health facilities monitored

² To assess staff opinion, a 5 levels scoring system was used (for further information, refer to annex 2)

B. Efficiency in using the needle cutter	Incidence	Percent
Easy to operate the needle cutter	-	76% easy
Time needed for needle cutting process	0.4 minutes	-
Time needed for previous process	63 minutes	-
Staff opinion about the efficiency and convenience of needle cutting	-	82% efficient

5.2. Containment of used syringe/needle

The containment of used needles in the puncture-proof safety containers and of used syringes in the autoclaving bags was said to have drastically improved the safety compared to the previous system (where transfer from different pans/boxes was practised).

- The new system was felt very easy to be used (placing, removing and transporting containers and bags).
- No autoclaving bag was punctured (in case of remaining sharps on the syringe hub) or damaged during usage and autoclaving.
- Health staff didn't meet any problem for safely storing containers and bags (available room).
- A problem was reported regarding the transparency of the container for the Biomedical needle cutters (necessary to see the level of filling).

Data collection for containment:

C. Containment of used syringes/needles	Incidence	Percent
Easy to manipulate containers, autoclaving bags	-	81% easy
Autoclaving bags punctured/damaged	0	0%
Problem of storage of containers, bags	1/25	4%
Staff opinion about the efficiency and convenience of containment	-	77% efficient

5.3. Neutralisation by autoclaving

The option of using autoclaving for neutralisation/decontaminating syringes and needles instead of liquid decontaminant was judged feasible and relatively well accepted by the health staff. General comments pointed out:

- The new system makes possible the quality control of neutralisation/decontamination, through the use of time/steam/temperature indicators. In comparison, there was no simple solution to control the neutralisation following the use of liquid decontaminant.
- The autoclaving process was not seen as a too heavy burden by the main nurse of the health facilities where autoclaving was performed.
- The selection of a centralized autoclaving option versus a decentralized option was depending on the size of the health facility, its location and the existence or not of an autoclave.

The problems identified are mainly related to the overall organisation of the sharps waste autoclaving option:

- The « flow of wastes » inside the health facilities will need to be reorganized, and a specific room for the neutralisation/decontamination of syringes and needles allocated. The sterilisation room could not be used as a waste neutralisation room, beyond the pilot project.
- The transfer of work from the immunization nurses (having stopped decontaminating used equipment) to the main nurse (having to ensure autoclaving) was not everywhere well

received. Time should be dedicated for this person or for a waste officer.

- The use of already old and busy autoclaves was seen as an extra burden. There will be a need for investment in new autoclaves in case of selection of the new system.

Data collection for neutralisation through autoclaving:

D. Autoclaving process ³	Incidence	Percent
Leakage from containers and autoclaving bags	0	0%
Autoclaving indicator always activated ⁴	14/18 ⁵	77%
Any other problem during autoclaving	3/18	17%
Staff opinion about the efficiency and convenience of autoclaving	-	76% efficient

³ 31 autoclaving cycles were done per month for neutralization (for all facilities monitored)

⁴ 18 facilities with autoclave were monitored during 3 to 5 months trial

⁵ In 4/18 facilities, the indicator was at least once not activated, showing a problem in the autoclaving cycle

5.4. Waste transport

Syringes were already transported to recycling companies in the previous system. The new setting didn't change the burden of transport, which will remain a costly component. However the positive outcomes were:

- No major difficulty in ensuring the transport to the recycling companies was reported during the pilot project.
- Often, in order to save funds, health facilities vehicle were used for transport of used syringes at the time of new syringes collection, vaccines collection or activities report (« exchange strategy »).
- Then in some situation (as for Kiev) the transport was ensured by the recycling company.

The problems identified are related to the overall organisation of the transport of sharps waste:

- The legislation of healthcare waste transport will need revisions, especially in case of transport of sharps waste not neutralised/decontaminated, as it will be for a centralised autoclaving option.
- There are limits in term of collection distance, and small and remote facilities might not be included in the collection/recycling option.
- As it is a costly component, the transport of sharps waste will need further cost analysis, especially considering the full volume of injection material used (during the pilot project volumes were quite small).

Data collection for sharps waste transport:

E. Logistics and sharps waste transport issues ⁶	Incidence	Percent
Health facility vehicle used	18/25	78%
Occupational hazards occurred	0	0%
Any other problem during transport	0	0%
Staff opinion about the efficiency and convenience of the transport	-	69% efficient

⁶ There was an average of 1 transport per facility per month

5.5. AD syringe plastic recycling

Plastic of disposable syringes have been recycled for several years in Ukraine. As an HIV/AIDS 2002 survey describing the disposal of used syringes in Ukraine have shown 27 companies used “thermoplast” machines for recycling plastic. At this time, 8 of them had a license to recycle the plastic of disposable syringes. Until the pilot project took place, none of these companies had tried to recycle the plastic of AD syringe. In 2004 Roksana in Kiev was the first company to try, followed by Polymet in Kaminiets-Podolsky. After experimenting and monitoring this kind of recycling, the option of reprocessing the plastic of AD syringes appears to be a feasible option:

- Technically, the separation of the metal insert of AD syringe was successfully achieved (automatically through electromagnetism by Roksana, manually by Polymet).
- The 2 recycling companies involved in the project were initially committed to adapt their line of manufacturing for recycling AD syringe.

However soon difficulties arose, pointing out technical problems but also a lack of interest by one company:

- Technically, pieces of remaining needles were rapidly un-sharpening the blades of the shredders.
- Then the mix of the two kinds of plastic constituting AD syringes (polypropylene and polyethylene), not being a problem for the regular disposable syringes (plunger and syringe body were separated), causes difficulties for selling the reprocessed plastic (lower value).
- The reluctance by one of the two companies was mainly motivated by the fact that recycling syringes was a small part in its business, and recycling AD was not worth doing it (increases workload).

Finally, as we will see in the cost analysis, AD recycling sustainability will much depend on the cost of transportation, and obviously on volume issues. It should also be reminded that recycling is not an absolute requirement, where not sustainable, shredding still being an option (although not generating any income).

Data collection for recycling plastic of AD syringe:

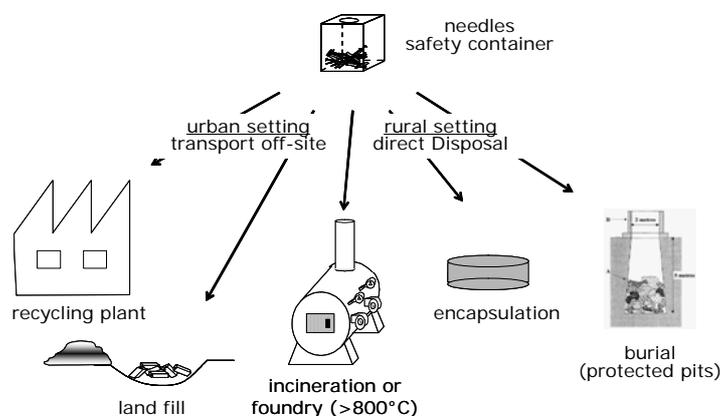
F. Recycling plastic of AD syringe ⁷	Incidence	Percent
Recycling companies involved in the project	2	-
Recycling companies licensed	2/2	100%
Number of years of experience of recycling plastic of syringe	8 years	-
Companies opinion about efficiency & convenience of recycling AD	½	50% efficient

⁷ Due to small volume of AD syringes processed during the pilot project, there was a relatively limited experimentation by recycling companies (only 130 kg processed by Roksana and 25 kg by Polymet)

5.6. Needle disposal

Disposal of used needles remains a real problem in Ukraine, often solved through local available options. Recycling needles present little interest, mainly due to the small amount generated and to the need to wait for a very long time before getting enough volume. Incinerating and land-filling are currently proscribed in Ukraine. Few options then remain and current practices unfortunately do not reflect a consistent approach.

needle disposal: options



Data collection for needle disposal:

G. Final disposal of needles ⁸	Incidence	Percent
Options used to dispose of needles - Burying/Land-filling	5/18	28%
Options used to dispose of needles - Foundry/Incineration	6/18	33%
Options used to dispose of needles - Other option	7/18	39%
Staff opinion about efficiency and convenience of disposing needles	-	83% efficient

⁸ Only 18 health facilities reported on this issue (the remaining 7 delivered the used needle to the recycling companies for final disposal)

5.7. Costs of the systems

The costs analysis was an important component of the pilot project. Demonstrating that the new system increased the safety and was technically sound would not have been sufficient if the economic component was not assessed. In order to cover properly this aspect, an independent mission supported by WHO was carried out in October 2004. The full costs analysis will be provided in annex.

However the followings can summarize:

- The overall cost (including operational costs, staff costs and capital costs) for the new system remains more or less the same than the overall cost for the previous system.
- Operational costs between the two systems are equally balanced (decontaminant solution versus safety containers and autoclaving bags).
- Staff costs decrease significantly for new system.
- Transport costs remain the same.
- Capital costs are higher for new system (were negligible for the previous system).
- AD syringes recycling will generate fewer incomes than regular disposable syringes were generating.

However some limitations should be taken into account concerning the costs analysis, mainly due to the scale effect, the geographical coverage and the size of the sampling. If the new system had to be implemented, further costs estimation will probably be needed. Should also be taken into account a possible national production of containers, autoclaving bags and maybe needle cutters,

which could lower the operational costs. Finally the capital costs are annualized in the analysis, although any implementation project will require initial investments.

Average annual costs (in USD) per health facility for both systems:

RECURRENT COSTS	PREVIOUS SYSTEM			NEW SYSTEM		
	Unit costs	Monthly quantity	Annual costs	Unit costs	Monthly quantity	Annual costs
Disinfectant (kg)	12	0.66	95			
Autoclaving bag				0.4	2	10
Safety box				2.0	1	24
Autoclave electricity				0.12	1.35	19
Maintenance				44		44
Subtotal			95			97
Salaries (hours):						
Nurse	0.23	44	120	0.23	1.5	4
Head medical nurse				0.4	1.5	5.4
Driver	0.23	2	5	0.23	2	5.5
Subtotal			125			15
Fuel (litres)	0.5	15	180	0.5	15	180
Subtotal			180			180
CAPITAL COSTS	Value from new	Useful life years	Annual costs	Value from new	Useful life years	Annual costs
Needle cutter				15	15	1.3
Autoclave				2,000	25	115
Autoclave installation				100	25	5.7
Subtotal			0			122
GRAND TOTAL			400			414

Beyond the comparison between the new and the previous system, the opportunity was given to calculate the full cost of disposing used syringes and needles. The cost of sharps waste management has a price to pay for and evaluating and budgeting is an important task. The bearing of the costs should be shared between the health facility, the local Authorities and the MOH.

Average costs (in USD) of disposal per syringe for both systems:

	PREVIOUS SYSTEM	NEW SYSTEM
GRAND TOTAL	400	414
Revenue generated from sale of syringes ⁹	12	6
NET COSTS	388	408
COST PER SYRINGE	0.035	0.036
COST PER SYRINGE (without transport)	0.018	0.020

⁹ Assumptions: 11,100 injections a year in each facility, 200 syringes in 1 kg and a selling price of US\$0.2 per kg of used syringes for the previous system and of US\$0.1 per kg of (not dissembled) syringes with the new system

The final analysis concerning the costs, and probably the most difficult to evaluate was the cost of the safety. The previous system demonstrated high risk for health workers. Needle stick injuries were happening and have been reported. Injuries have an inherent cost (direct or indirect) difficult to evaluate but certain. The following table, although not estimating the cost of injuries, demonstrates the implicit cost between the two systems.

Annual average number of needle stick injuries per facility for both systems:

	PREVIOUS SYSTEM	NEW SYSTEM
Average number of injuries per facility ¹⁰	46	0
Minimum number reported	0	0
Maximum number reported	160	0
TOTAL NUMBER OF INJURIES (on average)	46	0

¹⁰ 8 health facilities were adequately reporting needle sticks injuries. An extrapolation from the 4 months that lasted the pilot project to an annual estimation of the number of injuries have been done

6. Kiev Conference

Following a decision by the Ukraine National Working Group on Injection Safety, a conference was convened in Kiev on the 8th February 2005, with the objectives:

- To debrief National and Oblast Immunization Officers and Environmental Health Officers on the final outcomes of the pilot project.
- To discuss questions and issues related to injection safety and healthcare waste management in the context of immunization.
- To provide participants with the opportunity to debate on the feasibility to implementing the options tested during the pilot project.

More than 70 participants, coming from all regions of Ukraine, attended the conference. Representatives of the Russian Federation and the Republic of Belarus, invited to the conference as they expressed their interest for the pilot project, also attended the meeting. The Russian Federation and the Republic of Belarus have also previously conducted an injection safety assessment, respectively in September 2003 and November 2003, which brought similar outcomes than the Ukraine assessment. These two countries also aimed to improve the safety of their practices and to identify a non burning option.

All participants emphasized on the importance of the topic covered, and the opportunity for them to be consulted. They also insisted that there is a real necessity to improve the safety by changing the current practices. They would like to reduce present manipulations, be rid of chemical decontamination and adopt a safe system.

Concerning AD syringes already introduced in Ukraine (GAVI support) and the methods currently in use for disposing them, the participants mentioned diverse options, as burning, autoclaving, recycling and delivering to an independent waste company. Two participants mentioned that the recycling companies were not much committed to recycle AD syringes as it brought technical constraints.

During the conference, group's works were held to look at the feasibility, perspectives and requirements for an implementation phase with the new option tested during the pilot project.

Discussions went on the need for new policies and the necessity to look more at financial implications. The oblasts (regions) mentioned that some financing could and should be available at their own level. At last they all agreed that there was a necessity now to move forward, after the first step initiated with the pilot project.

After the end of the conference, the National Working Group on Injection Safety briefly met. It was agreed to request to all oblasts to feedback within two-three weeks on the outcomes of the conference and on the way they see any implementation taking place in their oblast. Then the National Working Group will meet again and will decide on the actions to be taken.

Separate consultations were held with the Russian and the Belarus Delegations. They expressed their strong interest in improving the safety of the current practices and in introducing needle cutter in their countries. They required the support of WHO Euro for this process. The Russian Federation is currently conducting a survey on the disposal/recycling practices in all their 89 territories. The Republic of Belarus may introduce AD syringes during their Rubella campaign, planned for September 2005. WHO HQ developed a protocol for using needle cutter in routine immunization and a protocol for using needle cutter during campaign. WHO Euro proposed to these two countries to use these protocols to pilot the introduction of needle cutter.

7. Conclusions and perspectives

The main objectives of the pilot project were, a) to evaluate the safety of the option tested, b) to evaluate the technical feasibility, c) to evaluate the cost-efficacy.

After several months of trial, the main conclusions are the followings:

- The improvement in term of safety is confirmed by all health staff
- The time saved for the health workers with the new system is really noticeable
- No major technical problem needs to be overcome
- A major issue if the option is adopted will be the organization of sharps waste autoclaving
- The transport of sharps waste (syringes and needles) needs regulation
- The recycling process faces more difficulties for AD syringes than for regular disposables
- The new system doesn't cost more than the previous system

As an overall conclusion, the new system provided strong argument regarding the improvement of safety and the viability of the system. Action may now be undertaken to look at the next phase, considering a national endorsement.

Perspectives – A few questions to be answered before moving to the next phase

- Should the pilot project be followed by a national implementation programme?
- If so, what should be the size of the programme? national? sub-national?
- Which mechanism and funds will be needed to implement this programme?
- Which will be the committee suitable to coordinate the implementation of this programme?

Vision and suggestions for the sub-region: Ukraine, Republic of Belarus, Russian Federation

The followings are suggestions for further steps, building on the results of the pilot project:

- I. Injection safety and healthcare waste management should be put high on the National Agenda: "This is the interest of all sectors, not only of the health sector"
- II. A functional inter-sectorial committee on injection safety and healthcare waste management should be activated/maintained at the national and regional level; Immunization + Therapeutic + Environment + other Stakeholders should participate
- III. Committees would not function without extra human resource; Advocacy should be done for recruiting a coordinator
- IV. Policy and plan could not be revised if technical options are not determined; Technical options should be selected (several options could be selected depending on the situation)
- V. Step by step activities should be identified; National Plan of Action and work-plan should be drafted/revised
- VI. The National Plan would not function without further assessment of financial needs; More analysis should be done regarding the costs of implementation of the programme
- VII. Synergy will be needed to secure funds; Regional, National and International Partners should be gathered to support the programme implementation and equipments purchase
- VIII. The regional dynamic within neighbouring countries should be maintained; The Republic of Belarus, the Russian Federation, Ukraine should exchange information about their National Plan and their implementation
- IX. Whenever feasible the programme should integrate all wastes issued from injection, not only immunization injection

8. Acknowledgement

I would like to acknowledge the valuable contribution and thank for their support:

Dr. Luidmila Mukharskaya, Head of Department for Prevention of Infectious Diseases, MOH

Dr Olga Stelmakh, Senior Specialist, Department for Prevention of Infectious Diseases, MOH

Dr Larysa Kolos, Deputy Chief, Kiev City Sanitary Epidemiological Station, MOH

Dr Larysa Kaliner, Head of Department of Epidemiology, Khmelnytsky SES, MOH

Mr Alexander, General Director of Roksana Thermoplast Company

Mr Anatoliy Gluzman, General Director of Polymet Thermoplast Company

Dr Youri Subbotin, WHO Liaison Officer for Ukraine

Dr. Chinara Aidyralieva, WHO/EURO, Medical Officer

I would like also to honour the memory of Dmitry Tishchenko, our pilot project national implementer, who sadly passed away in September 2004. His important contribution made the project successful.